出國報告〈出國類別：實習〉

# 機場查核員訓練
# Safety Oversight Inspector - Aerodrome

服務機關：交通部民用航空局

姓名職稱：王華駿 科長

派赴國家：新加坡

出國期間：100 年 9 月 11 日～100 年 9 月 17 日

報告日期：100 年 12 月 5 日

# 目次

# 1. 目的

爲了解國際間就「機場安全監督」方面於國家民航法規架構下之相關做法，同時學習如何規劃並執行機場檢查計畫之各項檢查內容，以提升本國機場檢查員（Aerodrome Inspector）之查核內容及效率。

# 2. 過程

本次出國預算由民航事業作業基金支應，課程由新加坡民航學院（Singapore Aviation Academy，簡稱 SAA）辦理，茲將訓練地點、往返行程、課程安排、講師及參訓學員簡述如下：

## 2.1 訓練地點

SAA 位於城市國家新加坡的東北角，鄰近新加坡樟宜國際機場 20R 跑道端，附近雖無捷運（MRT）可供搭乘，不過搭乘公車也是十分方便，公車站牌間十分接近，大約 100 公尺就有公車站，因附近都是住宅區及工業區，所以搭乘公車人潮眾多，該學院專門提供民航業務相關訓練，相關設施十分完善。

## 2.2 往返行程

1. 100年9月11日搭乘中華航空CI0753班機，由台北出發於同日抵達新加坡。
2. 100年9月12日至100年9月16日於新加坡民航學院進行「機場查核員訓練」課程。
3. 100年9月17日搭乘中華航空CI0754班機，由新加坡出發於同日返抵台北。

## 2.3 課程安排

五天課程內容共包含 19 節課堂訓練及分組討論、半天樟宜機場參觀，課程安排如下所示：

第 1 天

| | |
|---|---|
| Session 1 | Course Introduction delegates' Objectives |
| Session 2 | Review of regulatory requirements, obligations and objectives |

Session 3 Aviation system
Session 4 Techniques for safety audits and Inspections – Part 1

第 2 天

Session 5 Techniques for safety audits and Inspections – Part 2
Session 6 Audit and Inspection techniques
Session 7 Tools and Mechanisms to meet Safety Objectives
Session 8 Human Factors or Factors in Human Performance
Session 9 Inspector Skills and Personal Attributes

第 3 天

Session 10 Sharing on Changi Airport's Safety Management Systems
Session 11 Site Visit to Apron / Airside
Session 12 Site Visit Debrief
Session 13 Service Provider Competence

第 4 天

Session 14 Planning and Programming Inspection
Session 15 More on formats for Inspections and Safety Audits
Session 16 Data
Session 17 Document Audit – SSP or SMS

第 5 天

Session 18 Auditing an SMS
Session 19 Inspection and Audit Protocols
Session 20 Inspector Handbook
Certificate Presentation and Closing

2.4 講師及參訓學員介紹

1. 講師介紹：

Peter Ray 機長累積 48 年有關航空運作、法規及機場安全監督、法規文件之研擬及訓練之相關經驗，現於英國民航局、ICAO 及下轄之技術合作局（Technical Cooperation Bureau, TCB）、歐盟 EU 等相關組織擔任航空顧問及大學的資深講師等工作。

2. 學員介紹：

這次是第三次來到新加坡受訓，以前參訓的學員大多來自亞洲及非洲等國家，這次也不例外，本次參訓的學員共有 19 位，依國籍及來分：有二位來自柬埔寨、一位來自香港、二位來自科威特、一位來自盧森堡、一位來自蒙古、一位

來自紐西蘭、一位來自盧安達、四位來自新加坡、一位來自瑞士、三位來自泰國、一位來自烏干達及來自臺灣的我共十九位成員；就學員職業背景，有十三位來自各國民航管理當局、六位來自新加坡及泰國的機場公司，不同以往的是，新加坡學院的課程內容已經可以吸引三位來自歐洲及大洋洲等航空大國前來參訓，致感觸略有不同。

## 3. 課程內容

3.1 審視法規要求、義務及目的

3.1.1 何謂安全監督（Safety Oversight）

於 ICAO 第 9734 號文件第 2.1.1 節做出以下定義：

國家藉由安全監督之功能，以確保與安全相關之標準、建議措施及配套程序可被有效的實施。

3.1.2 國際民航組織標準及建議措施（SARPs）和參考文件（Guidance）之相關規定

1. 國際民航組織於附約 14 中第 1.4 節機場驗證（Aerodrome Certification）的註中敘明本節規範之意旨，在於建立一套管理制度以確保本附件的規範可以被有效地强制遵守。一般認爲，由於各國於機場之所有人、運作及監督的方式各有不同，因此爲了確保符合相應規範之最有效且最透明的方法便是：在適當立法的支持下，建立一個獨立的安全監督機構及一個明確安全監督機制，以便能夠行使機場安全規章之各項功能；另外又在附約 14 的第 10 次修正中加入爲了持續監督規範的符合情形，要求各國必須要把機場認證的情形公布於飛航情報指南之上。本國尚未有機場通過機場認證，針對 AIP 公布情形請教其他國家民航主管機關之辦理情形，如下所示：

   1). 新加坡：通過機場認證之機場已公告於 AIP 之上。

   2). 紐西蘭：採負面表列，於 AIP 上公告尚未通過機場認證之機場。

3). 柬埔寨及香港：通過機場認證之機場已公告於 AIP 之上，不過仍覺得有許多不足之處。

4). 泰國：仍未公告於 AIP 上。

2. 指導文件（呈現在各國法規及參考文件之中）

1). Doc. 9774 Manual on Certification of Aerodrome（機場認證手冊）

2). Doc. 9734 Safety Oversight Manual（安全監督手冊）

3). Doc. 9859 SMS Manual（安全管理系統手冊）

3.1.3 國家管理者的責任

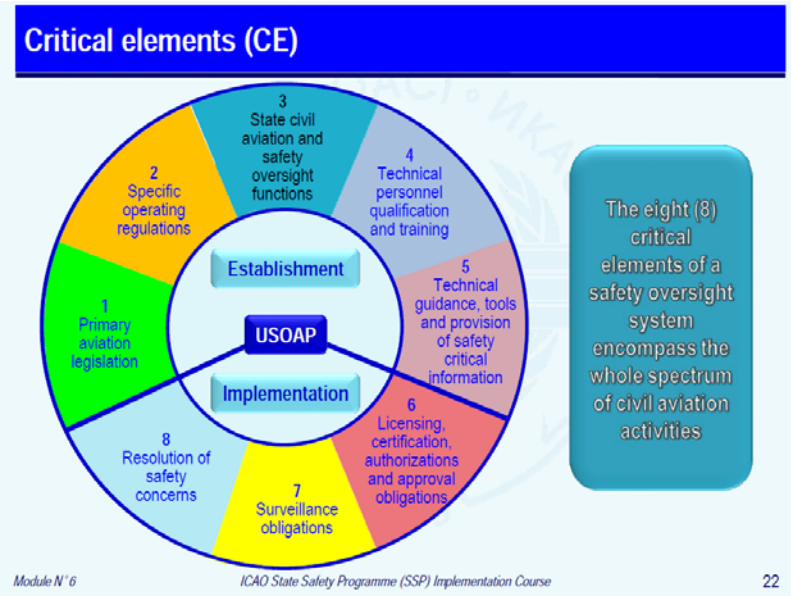
1. 經由國家法律及規章以符合 ICAO 相關標準及建議措施。
2. 發展國家航空安全計畫(SSP)
3. 明確定義管理各服務提供者（含機場提供者）之國家安全管理者的相關職務與責任。
4. 具備足額合格、適任且完訓之職員，提供必要的支持與資源以有效遂行其所賦予之職務與責任。
5. 於安全監督相關內容中另外提到以下兩點：

1). 於國家航空安全計畫第三要項「國家安全保證」及第 9734 號文件安全監督手冊第 3 章介紹 8 個關鍵要素中均提及，應發展、執行及監督／改善一套安全監督系統。

2). 當存有不符國家法規或未能解決安全關注議題的情形時，應採取適當的懲罰措施，此係安全監督的後續舉措之一。

註 1－國家安全監督的定義可參考 ICAO 針對國家航空安全計畫之課程第 6 單元第 21 張投影片，係國家爲確保與安全相關之標準、建議措施及程序均可被有效實施的一項功能。


註 2－安全監督系統是否有效端繫於下列八大關鍵要素，包括：主要航空法規、特定作業規定、國家民航及安全監督功能、技術人員資格及訓練、技術指導及安全重要資訊規定、證照授權及許可之責任、監管(Surveillance)之責任、安全相關事項之解決方法。




註 3－最後，ICAO 經由全球安全監督查核計畫 USOAP 計畫來監督國家是否符合其安全監督之義務，其範圍包括附約 1、6、8、11、14。

6. 可從 ICAO 第 9734 號文件之相關章節中進一步了解有關國家管理者之責任：

1). 頒布優於標準及建議措施（第 2.3.2.2 節）：爲確保國家系統與其航空規模互相搭配，國家管理者應循安全監督系統之 8 項關鍵要素進行自我檢核；檢核過程中，應包含如何以系統化的方式管理影響組織之內外部資源間的關鍵安全議題（safety-critical pressure）、相依及衝突問題之國家政策；因此，上述管理過程中，於某特定環境及環境下，國家可考量採行優於 ICAO SARPs 的國家規定。

2). 非委外辦理事項（第 2.4.6 節）：當建立各種安全監督功能及系統時，國家應仔細思考大眾關心事項，並確保系統維持在適當的制約與平衡之下運作，各項重要檢查功能仍應由國家有效的控管，且不能委外辦理。

3). 安全監督系統應具備以下特性（第 2.5.3 節）：

a. 健全且有效（法規）的推動。

b. 協調的推動。

c. 監督單位與服務提供者間職責妥善地分配。

d. 國家與業界間應培養及維持和諧的關係，包括溝通與諮詢。

4). 人力資源及能力（第 3.4.2.1 節）：爲有效執行其職務，國家民航系統涉及安全監督部分，必須適當規劃及配置具備各技術領域能力的人員。

5). 監督職責及服務提供者之能力（3.8.1）：ICAO 締約國爲維持安全及有序的民用航空系統，其職責及義務在於不停的執行核發執照、評比、認證或相關批准等工作，特別是是面臨明顯改變的期間更應維持穩定的安全運作，因此要求國家應建置一套持續性且組織化查核機制以確保服務提供者之能力。

3.1.4 服務提供者的責任

1. 符合國家法規，通知國家管理者不符合之處、爲何（why）及如何（how）進行矯正、或處於某一例外情形之下其原本不能接受的安全等級可以被改正並回覆至原本法規要求之安全等級。
2. 發展、執行、遵守公司的安全管理系統並監視績效，其中應包括國家安全監督活動及公司內部之安全績效監督活動之立即改善措施。
3. 尋求妥適的安全績效改進方案。

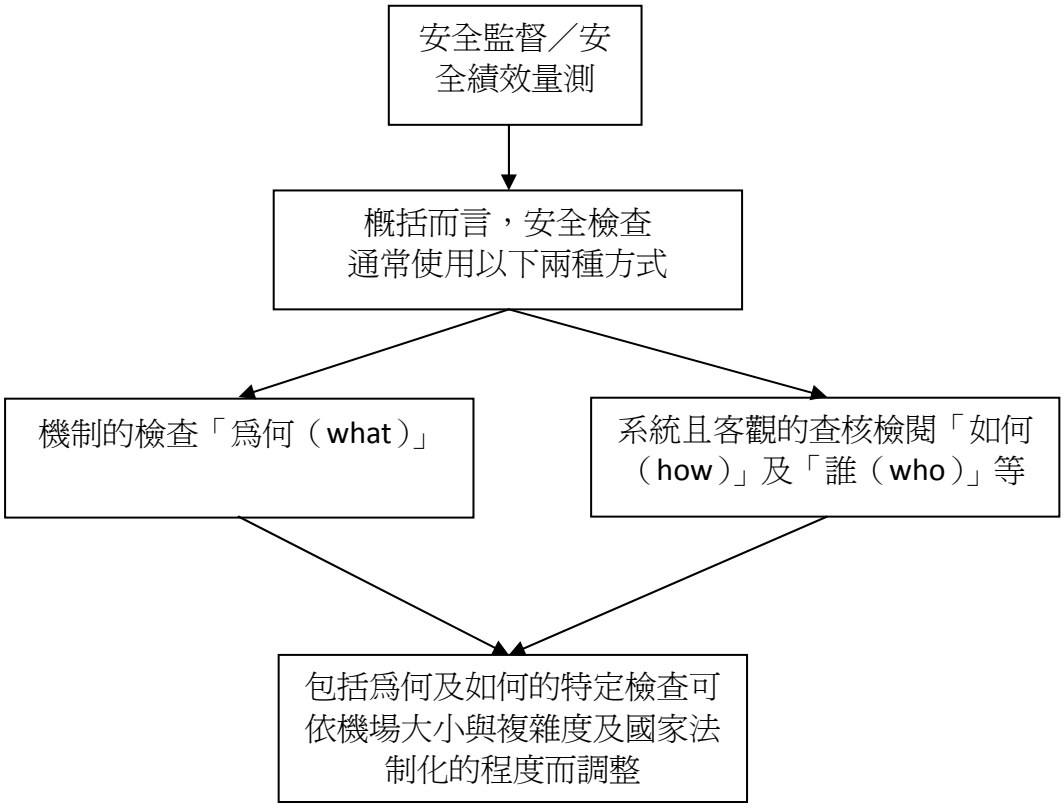
3.1.5 安全目標

1. 安全目標即組織所欲達成之目標，就國家管理者而言，安全目標內容應記載於國家航空安全計畫之中；就服務提供者而言安全目標則記載於該公司的安全管理系統手冊之中。
2. 國家管理者應如何推動及其搭配作爲：執行國家航空安全計畫，計畫中包含安全監督之安全查核計畫，其目的在於：
   1) 確認新認證申請人的初步符合情形
   2) 確保證照持有人符合所有適用的需求。
   3) 監督證照持有人的安全績效及後續改善措施推動情形
3. 服務提供者應如何推動及其搭配作爲：執行安全管理系統，計畫中包含安全績效管控／測量計畫，此係安全管理系統組成要項－安全保證的一部份，其目的在於：
   1) 向公司及國家管理者確認機場設施及作業符合公司及法規需求。
   2 ) 確認以下 2 點：
      a. 符合的持續性，特別是當任何運作環境改變時。
      b. 達到績效目標。

3.2 安全查核（Audit）與檢查（Inspection）之技術

3.2.1 安全監督檢查（Inspection）與查核（Audit）差別

1. 檢查（Inspection）：概括而言，同「檢查員」職稱，而此名詞（職稱）於其他國家，可能會變更爲「查核」及「查核員」，然爲明確區分，本課程仍延用傳統的用法，即一個特定的機制，檢查員經由實地勘查、測量與計算取得場面的幾何資料，如跑道地帶寬度或消救車輛的數量。
2. 安全查核（Safety Audit）屬另一機制，經由程序進行更深入的檢查某項東西如何被使用、文件如何符合需求、以及包含與被查核人們間的互動。
3. 檢查或查核通常視對象而定。




4. 檢查或查核可以下表進行簡易的區別：

| 檢查 | 查核 |
| --- | --- |
| ● 除了觀察過程外，相較於「如何」多著重在「什麼」 | ● 著重在「如何」、「爲何」及「誰」，但同時也會包含到一些「什麼」 |
| ● 或許會探討到安全保證文件，但涉略不多 | ● 探討到安全政策及目標並取得相關佐證資料 |
| ● 檢查範圍多在工作層級 | ● 高層主管間應負責任（accountable）的協調 |
| ● 過程簡單、結果易於取得 | ● 相較於檢查，查核將花費較多時間與資源 |

5. 基本技術包含下列幾點：

1). 檢查機制

a. 實地現勘，通常只是目視，如：

a). 鋪面道面的狀況。

b). 非鋪面道面狀況，如跑道端安全區。

c). 目視助航設施。

b. 測量，使用測距輪測量跑道安全區的尺寸。

c. 計算，如消防車輛配備裝備的清單檢查。

2). 觀察

a. 被動觀察，如查看排定的程序、運作及活動，但其運作過程且不予介入並干涉。

b. 主動觀察，如要求執行一項程序或活動，其目的在於：

a). 決定其符合程度：確認標準作業程序或程序彼此間的介面已被確實的遵守；如果可行，評估是否符合其制定之目的。

b). 評估其執行能力：通常除檢查從業人員持有之證照外，同時也可評估其所屬公司或組織的能力。

c). 測試其功能性，測試裝備的相關功能是否正常。

d). 找出其缺點，此係預測式風險管理中取得安全資料的方

法之一，如標準作業程序與實際運作狀況不一致時，導致偏移的證據；尤其是因爲改變或標準作業程序實務產生偏移所衍生的危害。

3). 撰寫面對面問題及面談，其重點如下：

a. 執行檢查前，應先備妥相關查核問題並送至被查核單位。

b. 特定工作區域，應會同相關人員於執行現場檢查時進行面談；此類相關人員可以是 ICAO 第 9859 號文件所指的權責主管，或直接與安全管理政策或與安全績效相關的現場監督主管，或間接與安全政策或與安全績效相關的人員，如負責訓練經理、人力資源部門或非關技術負責編列預算的財務人員。

c. 於特定簡報或預先安排的面談中可使用以下方式，俾獲致相關檢查結果：

a). 應預先準備問題並應於會談前交予受訪者。

b). 於討論或面談中衍生的其他問題

c). 上述兩類問題的合併使用。

d. 相關調查結果可供作進行”預測性”風險管理的評估參考。

e. 本項檢查之目的在於解決：

a). 預檢過程（pre-inspection process）中部分無法確定之項目，可利用本檢查方式加以確認。

b). 檢查小組於預檢準備過程中，或於答詢過程中衍生且需進一步釐清的問題。

f. 面談可以是整體檢查中表定行程的一部份，如可於整體檢查進行之始，即安排對權責主管進行訪談；也可以於整體檢查進行中，隨機視需要或就檢查發現要求被查核單位進

一步的說明。

g. 面談時應把握以下重點：

a). 回饋提供足夠且適當的改正資訊。

b). 諮詢問題內容應與面談工作人員的層級相稱。

c). 面談目的及結果應予公開，包括證據及發現，如此被查核單位才有機會了解問題並進行相關缺失之改正。

d). 秉持客觀且公正的態度。

h. 面談問題的設計原則

a) 於特定機場類似的運作規模下，相關諮詢問題的通用性。

b). 閉合式問題(closed, Yes-No)和開放式問題(open, Wh-)的交替合併使用。

c). 問題內容應適切搭配被徵詢人員之職務或工作層級。

d). 挑選之問題應與所欲探討的內容相關，如下例。

| 檢查範圍 | 問題 |
|---|---|
| 權責主管 | ● 於國家法規中是否對權責主管的職權及決策權做出相關規定？<br>若有：<br>■ 規定在哪？<br>■ 如方便，請陳現相關規定之文字內容？ |

4). 文件審查／檢視：不僅是檢視文件可讀性及格式，而是要從人爲因素的觀點來進行檢視（如避免誤解及意義不明確）；因此文件的審閱應完整且著重於下列事項：

a. 文件內容是否符合法規要求部分（包括文件控制），應

包括以下內容：

a). 記載法規的要求的符合情形。

b). 文件中記載之作業或設施，其適用範圍，應以系統描述（system description）方式進行說明。

c). 採結構化流程（structured process），以簡易的方式比較文件內容與要求內容並加以記錄，一般稱此過程爲差異分析（Gap Analysis），差異分析中另需決定文件中的系統描述的作業及設施範圍是否與現況相符，此類檢查適用於機場手冊（Aerodrome Manual）或安全管理系統手冊中記載內容之核對及檢查。

b. 檢視文件內容包含：

a). 是否達到其制定的用途（fitness for purpose），包括與其他文件的相容性及整體性。

b). 檢視記載的書面證據，包括記載內容是否與其規劃目的相符，及後續改善措施或行動計畫的推動情形。

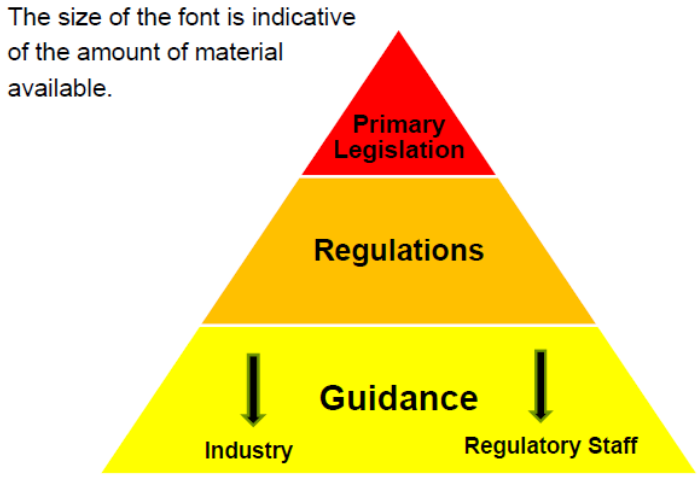
c. 爲何需要系統描述（system description）：

舉例來說，倘機場最近就航空器交通量的作了一項重大的改變，此時便可顯現出安全管理的重大好處，因爲若機場忽略了修正安全管理系統，尤其是危害通報單，亦可能順勢遺漏針對運作說明的相關修正（系統描述）；但如果機場經營人就可能的改變，先行針對該機場的系統描述進行相關必要修正，於修正的同時也會啓動機場進入檢查的標準作業程序，進而修正危害通報單、修訂安全管理系統手冊及設施的提升，或許可以避免機場因重大改變而導致意外的發生，進而改採行更嚴厲的規定以限制機場的相關運作。

3.3 爲符合安全查核目的應備之工具及機制

3.3.1 查核人員

1. 查核人員必須經過相關的訓練以確保其具備執行及管理的稽核技巧，相關訓練包括：
    1). 充分了解各項查核標準的相關訓練。
    2). 進行評估（evaluating）、詳細檢查（examining）、提問（questioning）、報告（reporting）作業的相關技術
    3). 管理稽核過程的技巧，包括規劃、組織、溝通、指揮。
    4). 檢查員的能力可經由筆試、口試或其他可接受的方法來進行驗證，於訓練足夠檢查員後，再經由主任檢查員的挑選以組成合適的稽核團隊，後續再藉由持續的訓練以維持並改善檢查人員的能力。
2. 法律條文、過程、程序與指導文件
    1). 基本法，如民用航空法。
    2). 法規命令，由基本立法授權，如民用航空管理規則(CARs)。
    3). 指導文件：
        a. 由管理規則延伸，供服務提供者遵循，如民用航空出版刊物(CAPs)或諮詢通告(Advisory Notices)。
        b. 安全監督任務之職員方針及程序，原則上相關規定應出現在職員手冊／檢查員手冊中。




3.3.2 設備含支援系統

1. 辦公室及相關裝備，包含電腦及網路連線。
2. 支援系統，如：
    1). 失事及意外資料。
    2). 完整的技術資料庫。
    3). 其他文件，如前一次檢查及改正錯失報告、機場幾何資料；資料最好 E 化以具備方便存取、遠端連線等功能，另相關資料應以紙本備份儲存。
    4). 內部及發展訓練。

3.3.3 常見缺失

1. 檢查員不足。
2. 檢查員訓練不足或未具資格。
3. 檢查員支援不足：泛指裝備、相關文件資料（含紀錄、指導文件、決策數據）及欲採行法規相關措施等項目之缺乏。
4. 航空業界就法規命令、行政規則及指導文件上的差異。
5. 缺乏國家安全目標。
6. 當機場未能達到期望的安全標準時，缺乏管理的措施，而國家管理者處於拒絕推動的狀態，僅能倚賴運氣或者命運。

## 3.4 人爲因素

當工程師設計出一項產品或系統時，必須將使用人與產品或系統同時考慮成爲一套人機系統（Human-Machine System），而評估分析此產品或系統的可靠度、操作難易度、所發揮的績效功能等，由於使用人係人機系統的主要部份，使用人的感知、判斷、反應、行動力、性向、持續力、壓力等生理、心理的反應與能力，直接影響系統的績效，這些心理與生理的反應與能力統稱爲人爲因素。美國人因學會（Human Factors Society）所發表的定義爲：「人爲因素可適用於所有的系統與產品的規範、設計、評估、操作與維護等過程，以提高其安全性、效率與滿意程度的有關人的行爲與生理上的科學與技術。」

查核人員對於人爲因素應有之認知及能力說明如下：

1. 查核人員必須了解對人爲因素有充分的認知，並適時對蓄意產生的誤失的可能性及一般常發生的錯誤行爲及條件提出警告。
2. 查核人員應有能力指出，當被查核單位爲提升各項程序或措施的符合程度，致所採行的一些不妥適之控制方法及建議。
3. 查核人員對於人爲因素的認知，於進一步的調查時，可提供一有效辨識既存或潛在問題的方法。

## 3.5 樟宜國際機場空側參觀

1. 關閉中的停機坪，阻絕設施、停機坪標線（停機坪安全線、停機位導入線、停止線、空橋作業區域標線）之劃設情形與本國各機場並無差異。

2. 施工中關閉滑行道上的阻絕設施。

3. 內外層的保安圍籬，圍籬間的巡場道路、機場出入閘門、巡場道路的道路照明。

4. 安全告示，以漫畫的方式說明機場活動區內飲食將吸引野生動物進入，倘違反規定將處以新加坡幣 170 元的罰鍰。

5. 安全告示，以漫畫的方式說明勤務車輛應優先讓航空器通行，違反規定者將處以新加坡幣 170 元的罰鍰。


6. 停機坪施工，相關施工圍籬、阻絕設施、施工機具標誌、施工人員休息區的設置情形。

7. 空橋下方之空橋作業區域標線，另於突出地面水泥基座側邊以黑黃相間的顏色提醒工作人員避免被絆倒。

8. 航務作業車輛

9. 工作人員使用安全繫繩避免從空橋上跌落受傷


3.6 檢查或查核的形式

1. 在最初檢查到更新（換證）檢查整個完整的週期期間，應包含以下事項並進行更進一步的查核：

   1). 確認是否完全符合國家的安全規定，包括機場特性、位置以及相關應用，如符合易碎性之規定。

   2). 任何不符規範而可被國家管理者接受的部分，應確保其已執行適切的安全風險控制方法。

   3). 於國家管理者核可之前，申請機場必須進行相關風險評估。

   4). 透過實地檢查，即採計數、觀察、稽核等方式，來加以確認其符合程度。

   5). 檢查範圍包含下列範圍：

      a. 機場手冊所載之機場管理系統、手冊及程序。

      b. 跑道及鄰接地區。

      c. 滑行道及銜接介面。

d. 停機坪區域。

e. 除了地面活動導引系統外的目視助航設施，如精確滑降指示燈系統（PAPI）。

f. 地面活動導引系統（SMGCS）。

g. 障礙物限制面。

h. 消防及救援裝備。

i. 其他作業設施，如圍籬、加油設備。

j. 野生動物管理。

k. 維護。

l. 電力系統。

m. 組織能力。

n. 與飛航管制單位間的介面。

2. 上述的每個區域都可以在細分爲幾個檢查重點項目，以跑道及鄰接地區爲例：

1). 依據該機場接受之航空器特性決定機場代碼後，相關跑道、道肩、跑道地帶、跑道端安全區的設置情形。

2). 道面狀況包括跑道摩擦力、地面活動導引系統的相關設施必須符合使用航空器之需求、交通密度、機場特性及能見度條件。

3). 持有／申請證照機場之跑道公布距離（Declared distance）應提供有效的測量資料並證明其資料符合規範精確度之相關規定。

3. 核心及主題區域（core and themed areas）：中至大型且複雜的機場，於每年的檢查期間若將所有區域均納入檢查範圍，於實務運作上恐難以達成；因此，與其於嘗試每次檢查都包含每一面向，可能導致不符合項目及／或安全關切事項的遺漏及其風險被低估，因此可考慮於每次檢查都針對相關核心區域進行檢查，如此每次查核都可以把焦點關注於相關核心區域。

4. 如果一個國家預劃以四年的時間推動機場認證，分別規劃在第一年進行初始（initial）檢查及第四年規劃更新（renewal）檢查，而核心區域則於每一年均進行檢查，擇定之主題區域則於第二年及第三年進行檢查。
5. 此外，國家管理者可以考慮變更其年度檢查之週期爲 12＋／－3 個月，其目的在於：
   1). 針對運作比較有問題的機場，可以執行較多次的安全查核；另針對運作比較沒問題的機場，可以執行較少次的安全查核。
   2). 可以在每年不同的月份進行年度機場檢查。
6. 以下針對機場緊急應變計畫及救援與消防作業特定區域爲例，完成一份檢查計畫綱要：
   1). 目的：爲完成規範要求的檢查，檢查員必須對下列事項進行檢查及確認：
      a. 消防作業：車輛、滅火劑、消防人力、程序、管理及訓練是否符合其設置目的；特殊作業環境及機場交通量之考量，如每班是否包含因應全部任務且數量足夠之合格完訓人員，並於所有正常或非正常的情況下，每班配置人員於所有任務下的表現是否都能符合預期。
      b. 緊急應變計畫：倘防禦措施失敗出現漏洞時，應考量其可能潛在的缺點。
   2). 問題點（Salient points/issues）
      a. 除了條例式的查核問題之外，也應規劃一些在任意情境下如何符合其設置目的的問題，此類問題通常於查核前不易匯聚想法或突顯出來，直至查核開始後並配合現場情況時問題才會浮現，如檢查時發現一些值班的消防隊員在家待命或從事其他工作，應詢問其如何維持應變等級（此係真實且不只一次於查核中發現的案例）。

b. 應從整個系統考量，而非僅測量或計算數目。

c. 應準備一些情境題，即“若…應如何處置呢（what if）？”，緊急狀況發生時，若負責溝通協調之現場指揮官的手持式無線電對講機發生故障，應如何處置呢？

3). 檢查後評估：檢查員應考量正常及異常作業期間，以系統之觀點檢視其人員或運作是否與規範規定相符，尤其必須考量機場通常的交通密度、複雜度及能見度條件。

## 3.7 檢查之計畫和規劃

安全監督查核應包含檢查的類型、檢查範圍、檢查頻率、檢查步驟、檢查結果紀錄、後續改善計畫、豁免等八大要項及程序，茲分節說明如下：

### 3.7.1 檢查的類型（Types of Inspection）

1. 初始認證
2. 定期（監督）檢查
3. 更新檢查
4. 改善措施完成檢查
5. 特別查核

### 3.7.2 檢查範圍

1. 若檢查係屬初始檢查或更新檢查，則檢查員必須確認下列項目均已符合國家要求，另於初始檢查前下列項目應爲有效且明確的記載於機場手冊之中：

   1). 對安全的管理作爲，應呈現在建立之安全管理系統及其管理成效之中。

   2). 組織及人員的能力

   3). 安全績效，此係機場安全管理系統就其所訂定安全目標之達成率。

4). 航空資料的提供及其正確性。

5). 機坪管理。

6). 幾何特性。

7). 障礙物淨空面。

8). 地面活動及導引系統，包括目視助航設施及燈光。

9). 維護作業規劃。

10).場面檢查機制。

11).電力供應。

12).飛航管制（通常由飛航管制之國家管理者執行檢查）。

13).救援與消防設施及緊急應變計畫。

2. 若係屬定期監督檢查，如同檢查週期一般，各國甚至各機場的做法均不儘相同。然而，國家管理者均需對安全管理系統之功能、安全管理績效及國家標準的符合情形進行確認。

   1). 同初始查核及更新查核，機場手冊及安全管理系統的成效列爲監督查核的重點，同時也針對前次缺失的後續改善措施進行檢查。

   2). 爲了確保檢查程序足夠的深入及有效性，國家應考慮將檢查任務分成兩大主要範圍，並於定期檢查時實施；兩大主要範圍包括：

      a. 於每次檢查必檢的核心區域。

      b. 目標或主題區域、及自上次檢查後新增的安全關切事項。

   3). 定期檢查可在某一固定（3 年）週期分年執行檢查或搭配國家年度安全計畫執行檢查。

| 核心區域 | 主題區域<br>（可搭配國家年度安全計畫） |
| --- | --- |
| ● 公布資料的完整度<br>● 機場手冊<br>● 安全績效：<br>■ 指標及目標<br>■ 管控（Monitoring）<br>● 運作安全之能力<br>● 檢視任何與規範不符但接受之相關事項 | ● 緊急應變計畫<br>● 鳥擊危害控制<br>● 油料品質<br>● 跑道安全管理<br>■ 跑道入侵及衝出跑道<br>■ 跑道識別混淆<br>■ 道面狀況及外來異物危害 |

3. 改善措施完成檢查及特別檢查之範圍，則由實施該項檢查的緣由而決定其檢查範圍，如下說明：

   1). 於重大運作改變時，實施安全管理系統或航空資料查核。

   2). 機場管理矯正行動計畫，包括違反國家規範的改正措施。

   3). 國家管理者關切之安全事項。

3.7.3 檢查頻率

1. 定期（監督）檢查均按預先決定的頻率排定，通常都是每年執行一次查核，檢查週期可縮短到 10 個月或延長到 14 或 15 個月，藉以檢查因季節變化導致機場運作環境改變的相關作業情形。
2. 認證檢查、改善措施完成檢查及特別檢查通常是單一檢查，非屬年度監督檢查計畫中預先規劃之檢查。
3. 依各國預先決定的期限進行更新檢查，通常爲 3 或 5 年。

3.7.4 檢查的步驟

1. 準備

   1). 與機場管理單位間的溝通聯繫

   2). 與其他利害關係人間之協調，如

      a. 民航局其他法規管理者，如飛航管制管理（ATM）、航務管理（Flt Ops）

b. 保安單位

c. 供油單位

d. 地面勤務公司

3). 文件審查，包含

a. 機場手冊，含

a). 安全管理系統（含預期的安全績效）

b). 緊急應變計畫（含演練）

b. 准予豁免項目

c. 前次查核紀錄及相關之改善措施計畫

d. 儀器進場圖及障礙物圖，包括 Type A 障礙圖

e. 相關飛航情報指南及飛航公告內容

f. 失事及意外資料、安全績效紀錄及安全研究或評估資料

g. 中止的發展計畫或文件

h. 機場職員訓練紀錄及航空內部安全績效查核紀錄。

i. 野生動物管理

j. 因應當地機場環境，機場自行訂定與安全相關的規定。

4). 準備必要之檢查裝備

2. 現地檢查，包含檢查前簡報、室內文件檢查及場面實勘檢查。

1). 查核前簡報應包括下列事項：

a. 確認

a). 檢查內容、檢查時段（包括夜間檢查或裝備測試，並請機場管理單位視檢查需要協調管制塔台配合檢查）。

b). 機場運作狀態、機場管理單位發展計畫之推動情形。

b. 與權責主管審視

a). 前次查核後待改善事項辦理情形，或任何新增議題。

b). 機場內部檢查或查核機制及其查核結果。

c). 機場安全委員會的決議事項，請機場提供最近會議的紀錄。

d). 從上次檢查後發生的歷史飛安事件資料。

e). 豁免事項的現況。

f). 面談及文件資料之需求

g). 發現重大缺失，即時通知權責主管，以便

i. 提供額外佐證資料以證明該檢查發現係錯誤判定。

ii. 給予時間考量此重大缺失，是否可以採取即時改正措施，包括立即發布作業程序、限制使用或發布飛航公告。

iii.決定改善措施的完成期限，以便於檢查結束前通知檢查小組。

2). 場面實勘，依查核前會議共識及以下內容執行場面檢查：

a. 每日的檢查計畫，另應包括每日查核結束的簡報及檢查報告之相關內容。

b. 由哪個單位配合、何時及檢查事項，包含：

a). 地面活動導引系統

b). 障礙物現況

c). 與機場職員會談

d). 現場文件檢視。

c. 夜間檢查之規劃

3. 檢查後簡報

4. 後續改善計畫及撰寫報告

3.7.5 檢查結果紀錄

檢查發現一定要作成紀錄，包含符合規範項目之確認或不符合項目

之逐項表列，國家管理者可將查核不符合項目分爲三類以助於後續改善措施之推動，並以下列方式陳現：

第1類：重大缺失，將提升安全風險至不可接受之等級。

第2類：一般缺失，可能會違反機場宣告之可接受的安全風險等級。

第3類：待觀察項目，本類待觀察項目則可能導致無法符合最低之安全標準。

3.7.6 後續改善計畫

1. 若機場當局不以理會查核發現的話，先前所有的努力將不具任何意義，機場當局制定具體的階段任務及日期並確保如期完成的後續改善計畫，此計畫才可能被國家管理者所接受。
2. 因此，國家管理者制定一個管制程序以確保相關改善行動均已納入規劃且付諸執行。

## 4. 心得與建議

1. 本訓練課程係新加坡民航學院首次針對機場安全監督檢查員所舉辦，以新加坡推動樟宜國際機場機場標準化的成果，的確吸引許多歐洲國家前來參加本課程，且依該課程簡介，原本期望在空側設施與作業的實務檢查技巧方面可獲得相關經驗，惟課程內容仍偏向理論，多著重在ICAO文件的相關說明，此一落差職已於課後問卷中表達，希冀以後課程能多偏向實務方面的檢查。
2. 課程中另安排了半日的停機坪作業觀摩，雖未能上跑道或滑行道上實地勘查，然新加坡樟宜國際機場願意配合開放一處停機坪讓其他各國參訓學員參觀並詢問作業問題，足見其對停機坪的安全管理深具信心，於停機坪檢查時，仍可發現少許如斷裂木材、螺絲等外來異物（FO）；另觀察到勤務車輛（升降平台車）於靠機過程中，除駕駛操縱車輛之外，另有一地勤人員手持一支塗以紅白漆的長桿，鄰近機身，同時指揮地面車輛駕駛的靠機操作，經洽詢樟宜機場航務人員表示，此係國泰航空公司自行與地勤單位訂定的措施，該地面持桿勤務人員，係於車輛靠機過程協助車輛駕駛判斷其與裝備與航機之安全間距。
3. 課程中與講師請教有關跑道地帶不足的問題，講師提供英國相關作法供參，第一是限制該跑道僅能於乾跑道狀況下起降，第二是加大航空器起飛之側風限制，因這些做法皆與航空器操作性能相關，目前本國係採宣告爲特殊機場之方式，兩者限制間異同，可於後續相關會議中進一步研商及討論。
4. 本國國家航空安全計畫甫於今（100）年11月頒布，後續應要求已建置安全管理系統之航空站（機場公司），配合本國之國家民用航空安全計畫之安全指標及安全目標內容，制定各航空站（機場公司）之安全指標及安全目標；雖然新加坡因國家可接受的安全水準（Acceptable Level of Safety）的制定，迄今尚未正式對外頒布該國之國家航空安全計畫，然此次參訓於進行安全管理系統查核情境演練課程時，新加坡樟宜國際機場學員提供其機場安全管理系

統手冊供其他學員模擬查核時使用，下表係該新加坡樟宜國際機場及實理達機場(Seletar Airport, XSP)機場訂定之安全目標及安全績效指標，可供後續推動安全管理系統制定相關安全指標或目標之參考。

| S/N | Safety Performance Indicator | Changi Aerodrome Safety Target | Seletar Aerodrome Safety Target |
|---|---|---|---|
| 1 | Number of aircraft accident & serious incident | 0 | |
| | Number of aircraft incident | To maintain at < 2.8 aircraft incidents per 100,000 movements | |
| 2 | Number of runway incursion | 0 | |
| 3 | Number of foreign object debris (FOD) incident | To maintain < 0.62 FOD incidents per 100,000 movements | |
| 4 | Number of wildlife strike | To reduce to < 3.8 wildlife strikes per 10,000 movements | To maintain at < 0.6 wildlife strikes per 10,000 movements |
| 5 | Availability of runway/approach lighting system | To maintain at > 95% availability of runway / approach lights | To maintain at > 85% availability of runway / approach lights |
| 6 | Runway friction value | To maintain at > 0.47 for runway friction value | |
| 7 | Airport Emergency Service emergency response time | To maintain at < 2 mins response time for 1st AES vehicle and < 3 mins for last AES vehicle to any point of each operational runway<br><br>To maintain at < 3 mins response time for 1st AES vehicle and < 4 mins for last AES vehicle to any other part of the movement area<br><br>To maintain at < 6 mins response time for 1st arriving AES sea rescue appliance to Paku Buoy (based on worst timing from the response time tests conducted by AES every month). | |

Table 2.1: Key Safety Performance Indicators & Safety Targets

5. 因講師具備多年有關航空運作、法規及機場安全監督、法規文件之研擬及訓練之相關經驗，並曾於ICAO及下轄之技術合作局（Technical Cooperation Bureau, TCB）、歐盟EU等相關組織擔任航空顧問等工作，於會中曾向講師

洽談有關本國機場驗證業務擬洽請ICAO及下轄之技術合作局（Technical Cooperation Bureau, TCB）之任何可能性，並獲其明確表示無任何技術合作之可能。

## 5. 附件

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# SAFETY OVERSIGHT INSPECTOR COURSE (AERODROMES)

**12th to 16th September 2011**

Introduction and Course Objective -What is Safety Oversight, and what is the purpose of Aerodrome Safety Oversight Inspection/Audit?

## Course Objective – a definition first - what is Safety Oversight?

Safety oversight is defined in ICAO Doc 9734, Safety Oversight Manual, Second Edition 2006 (Para 2.2.1) as:

**A function by which States ensure effective implementation of the safety related SARPs and associated procedures.**

## Course Objective – teaching/learning outcomes

- To convey to Delegates an understanding of Safety Oversight, its purpose and tools/competence requirements, in order to equip Delegates better for undertaking the function of Safety Oversight (or Safety Performance Monitoring for Service Provider Delegates)
- To present, discuss and practice through exercises, aerodrome inspection/audit techniques.
- To meet, to the extent practicable within the constraints of time and "hands-on" opportunities, Delegates' personal objectives .

## Course Objective – a pot-pourri of why to inspect and audit

To be satisfied about:

- Confirm compliance - yes, the what and how, and not always at the minimum compliance level.
- Safety performance – yes, but how measured?
- Service provision competence – yes but how, and what about the Inspector's competence and credibility?
- Resolution of safety concerns raised previously – yes, but how assessed and pursued?
- As part of the process for certification – yes, and what should the overall process comprise?

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## *Thank You*

Questions or Comments Please

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# SAFETY OVERSIGHT INSPECTOR COURSE (AERODROMES)

**12th to 16th September 2011**

Review of regulatory requirements, obligations and objectives



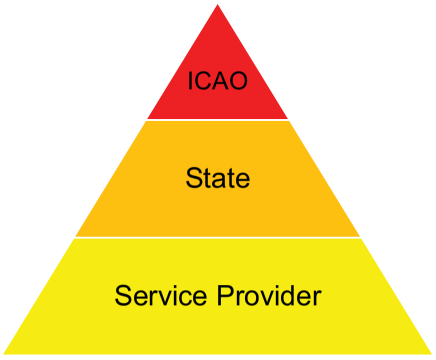
## Review - Objective

This presentation is a high-level review, not an in-depth, coverage of Safety Requirements, Obligations and Objectives.

It provides the framework of requirements, against which Safety Oversight (for the Regulator) and Safety Performance Monitoring (for the Service Provider) should be conducted.

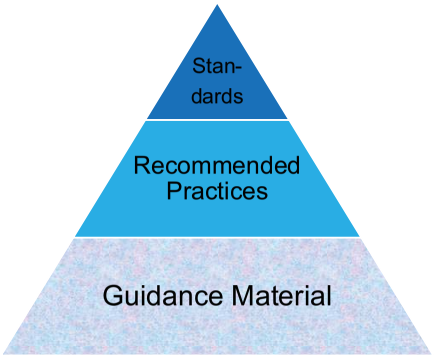


## Review – Safety Requirements






## Review – ICAO Safety Requirements






## Review – Relevant ICAO SARPs and guidance

Annex 14 (reflected in State Law and Regulations) – in a Note to section 1.4 – Aerodrome Certification:

The intent of these specifications (in 1.4) is to ensure the establishment of a regulatory regime so that compliance with the specifications in this Annex can be effectively enforced. It is recognized that the methods of ownership, operation and surveillance of aerodromes differ among States. The most effective and transparent means of ensuring compliance with applicable specifications is the availability of a separate safety oversight entity and a well-defined safety oversight mechanism with support of appropriate legislation to be able to carry out the function of safety regulation of aerodromes.

*There was an extension of this note in Amendment 10: - Important because it calls for continued monitoring of compliance with specifications, and the need to promulgate the certification status in AIPs.*



## Review – Relevant ICAO SARPs and guidance (cont)

Guidance material (reflected in State practice and guidance material):

- Doc 9774, Manual on Certification of Aerodromes.
- Doc 9734, Safety Oversight Manual.
- Doc 9859, SMS Manual.

## Review – State Regulator Obligations

- Compliance with ICAO SARPs through State Legislation and Regulations.
- Develop a State Safety Programme (SSP).
- Identify the duties and responsibilities of the State Safety Regulator for the regulated service providers, including aerodrome providers.
- Provide the necessary qualified, competent and trained staff, with the necessary support and resources to effectively undertake those duties and responsibilities.

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## Review – State Regulator Obligations, cont

- In the context of Safety Oversight:
  - Develop, implement and monitor/improve a Safety Oversight System, as an element of State Safety Assurance, a component of the SSP, and taking account of the eight Critical Elements – see Chapter 3 of ICAO Doc 9734, Safety Oversight Manual.
  - Impose appropriate sanctions as part of safety oversight follow-up, where there is non-compliance with the provisions of State Regulations or an unresolved safety concern.

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## State's safety oversight (ICAO SSP Course Module 3, slide 20)

- Safety oversight is defined as a function by which States ensure effective implementation of the safety related SARPs and associated procedures


- The implementation of an effective safety oversight system is based upon the eight critical elements for safety oversight (CE)

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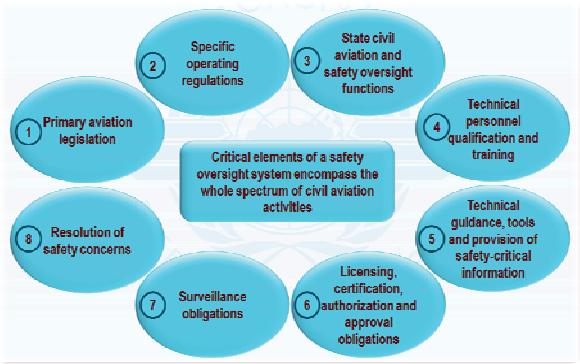
## Critical Elements (ICAO SSP Course Module 3, slide 21)

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## Review – State Regulator Obligations, cont

Q – Who monitors State compliance with its obligations?

A – ICAO, via the Universal Safety Oversight Audit Programme (USAOP).

Before exploring ICAO's audit role and its evolution let us review more of the content of ICAO Doc 9734, some of which underlines what has previously been stated, inc paras:

- 2.3.2.2 – issue of exceeding SARPs;
- 2.4.6 – non-delegation;
- 2.5.3 – characteristics of a Safety Oversight System;
- 3.4.2 – staff resources and competency
- 3.8.1 – surveillance obligations and provider competency

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## Review – State Regulator Obligations, cont

Doc 9734 Part A, para 2.3.2.2 – issue of exceeding SARPs:

To ensure that the State system is appropriate to the level and scope of their aviation activity, each of these obligations will require consideration of the critical elements of a safety oversight system. This should include the State policy to systematically manage the safety-critical pressures, dependencies and conflicts affecting the community from internal as well as external sources, some of which are noted in 2.5.2. **Part of that management process calls for States to consider the adoption of national requirements that exceed ICAO SARPs in some areas for some circumstances.**

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## Review – State Regulator Obligations, cont

Doc 9734 Part A, 2.4.6 – non-delegation:

States need to carefully consider the public interest when establishing the various safety oversight functions and to ensure that a proper system of checks and balances is maintained. The State should retain effective control of important inspection functions. **Such functions cannot be delegated; otherwise .....**

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## Review – State Regulator Obligations, cont

Doc 9734 Part A, para 2.5.3 – characteristics of a Safety Oversight System (paraphrased) include:

- A robust and effective (regulatory) approach.
- A coordinated approach.
- A well balanced allocation of responsibility between regulator and service provider.
- Cultivation and maintenance of harmonious relationships between State and industry, including communication and consultation.

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## Review – State Regulator Obligations, cont

Doc 9734 Part A, para 3.4.2 – staff resources and competency (3.4.2.1 paraphrased):

To effectively fulfil its responsibilities, the State civil aviation system must be **properly organised and staffed with qualified personnel capable of** accomplishing the wide range of technical duties involved in safety oversight.

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## Review – State Regulator Obligations, cont

Doc 9734 Part A, 3.8.1 – surveillance obligations and provider competency (paraphrased):

An ICAO contracting State's obligation and responsibility for a safe and orderly international civil aviation system does not end with the issuance of licences, ratings, certificates or other approvals. **Maintenance of continued safe operations, particularly during significant change, demands that a State also establish a system of ensuring continuing organisational ....competence (of service providers).**

Now something on the ICAO audit role via:
http://www2.icao.int/en/CMA%20Forum/Pages/cmainteractive.as

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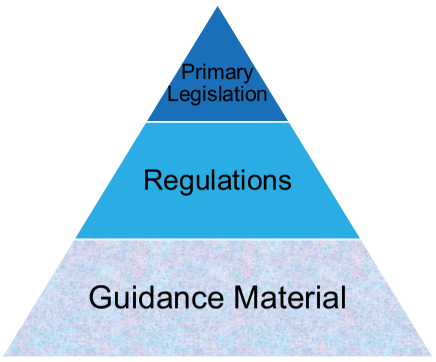
## Review – State Safety Requirements

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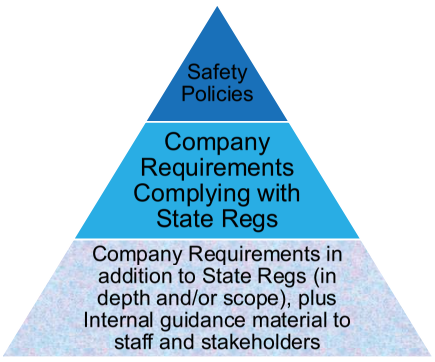
## Review – Service Provider Safety Requirements

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## Review – Service Provider Obligations

- Comply with State Regulations, advising the State Regulator where there is non-compliance, why and how they will be rectified or, in exceptional circumstances, how unacceptable risk levels will be mitigated and restored to the level intended by the Regulations.
- Develop, implement, adhere to, and monitor performance against the company Safety Management System (SMS), including remedial follow-up from State Safety Oversight activity and its own Safety Performance Monitoring activity.
- Seek improvements in safety performance where appropriate.

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## Safety Objectives – The what and intent

| State Regulator: | Service Providers: |
|---|---|
| As expressed in the SSP | As expressed in the Safety Management Manual |

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## Safety Objectives; State Regulator – How, the action

Implement an SSP; inc a safety audit programme, as part of safety oversight, in order to:

- confirm initial compliance by new certificate applicants;
- ensure that existing certificate holders meet all applicable requirements; and
- monitor and follow-up on certificate holders' safety performance.

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## Safety Objectives; Service Provider – How, the action

Implement an SMS, including a safety performance monitoring/measurement programme (as part of safety assurance, a component of the SMS), in order to:

- confirm to the Company & the Regulator that the aerodrome facility and operation complies with Company & Regulatory safety requirements; and
- ensure that:
  - compliance is continued, particularly against any change in the operating environment; and
  - performance objectives are met.

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## *Thank You*

Questions or Comments Please

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Draft version June 2nd

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# SAFETY OVERSIGHT INSPECTOR COURSE (AERODROMES)

**12th to 16th September 2011**

**Aviation System**



## Aviation System - Objective

This presentation reminds us that aviation is a system that needs a systematic approach to its regulation, as well as its operation; something relevant to:

- Those assembled here.
- Many of the areas of high risk to safety.
- ICAO,s Universal Safety Oversight Audit Programme, including Continuous Monitoring Approach (CMA)



## Aviation System - Definition

**One way of defining is:**

- A set of inter-related components or elements that work or function together within an environment to achieve an intended outcome or purpose. These components and elements can be made up of equipment, tools, infrastructure, people or procedures, both at an individual, as well as sub-system level.
- Within the environment or activity that these sub-systems, components and elements operate there will be interfaces, dependencies, which may also be synergistic (working together, rather than in conflict), vulnerabilities and occasional conflicts.



## Aviation System – Interfaces

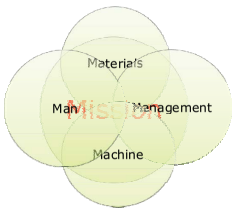
**These are the linkages between the components and elements of the sub-systems and overall system?**

- They can be creators of:
  - conflicts, which can lead to areas of vulnerabilities (outcomes from safety risks); as well as
  - opportunities for synergy (cooperative working and where the sum of the parts can also be greater than the parts taken individually).



## Aviation System – Interfaces, 1

5M Diagram




Source – Commercial Aviation Safety by Alexander Wells



## Aviation System – Interfaces, 2

SHEL(L) Model:

## Aviation System – Conflicts & Synergies, some examples

- Safety and the Environment.
- Safety versus Profit.
- Aviation and Non-Aviation Airspace Needs.
- Economic or Competition Rules versus Safety, for example the European Ground Handling Directive.
- Capacity Increases versus Time requirements for Runway and Other Manoeuvring Area Maintenance .
- Maintaining Passenger Flow Rates and Capacity Increases versus Security Needs.
- Service provision and Regulation; Service Providers and Regulators.



## Aviation System - Vulnerabilities

- We have referred to interfaces, dependencies, synergies and conflicts but what about vulnerabilities (outcomes from safety risks) as a threat to the working of the system?
- Understanding and having strategies, processes and interventions to manage vulnerabilites is vital to the task of reducing the rate of accidents.



## Aviation System – Safety Inputs

**What can safety regulators and providers contribute in terms of regulatory policy and approach, attitude and core disciplines ?**

- Take a systems approach to:
  - identify system deficiencies, and formulate actions to rectify them;
  - minimise system conflicts; and
  - maximise system synergies.
- Not make assumptions within the confines of one's own discipline, particularly with respect to other interface disciplines.
- Ask the "what ifs".
- Managers to ensure that staff:
  - have the necessary skill sets, including communication skills;
  - are given the necessary tools and guidance; and
  - receive initial and continuation training, for career progression purposes and to meet emerging, or changing, safety risk needs .



## Aviation System – ICAO Docs

**ICAO convention, annexes & guidance documents as part of the system**

- They provide a legal foundation for safe and efficient flight operations at the global and national level.
- Must be adopted by ICAO Member States via national statutes, translated into national legislation and requirements.
- Reflect a systems approach with interfaces between the Annexes to the Convention –the SARPs for SMS in Annexes 6, 11 and 14 are good examples.



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## *Thank You*

Questions or Comments Please

http://www2.icao.int/en/CMA%20Forum/Pages/cmainteractive.aspx

Final Draft July 27th

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# SAFETY OVERSIGHT INSPECTOR COURSE (AERODROMES)

## 12th to 16th September 2011

Techniques for Safety Audits and Inspections – Part 1



## Safety Oversight Inspections & Audits – Part 1; Objective

This presentation:

- Gives one interpretation of what is meant by inspections and audit in the context of safety oversight and safety performance monitoring.
- Outlines the techniques that can be used for such audits and inspections – in effect a toolbox. At this stage it is high-level content without detail.
- Also references ICAO documents that cover the techniques.
- Invites Delegates to consider what of the techniques discussed would be suitable for aerodrome audits and inspections.



## Safety Oversight Inspections & Audits – Part 1; Audit & Inspection?

- Inspection is:
  - Traditionally used as an umbrella term, as is Inspector as a job title. Whilst this maybe changing to audit and auditors in some States, let us stay with that traditional use for the purpose of this course.
  - In addition, a particular mechanism, one that generally takes a snapshot by physical examination, observation, measurement or counting of a physical characteristic, such as runway strip width or the number of RFF vehicles.
- Safety Audit is:
  - Another mechanism; that looks deeper at processes for how something is used or how a document meets a requirement, and can involve interaction with people.



## Safety Oversight Inspections & Audits – Part 1; Audit & Inspection?

Safety Oversight/Safety Performance Measurement

Safety Inspection as an umbrella term, *and the basic activity*, usually using both

Mechanistic inspection of the ***What***

Systematic and objective audit review of the ***How, and Who etc***

The mix of the ***What*** **and** ***How etc*** for a specific inspection can vary as a function of aerodrome size, complexity and regulatory development level of the State

## Safety Oversight Inspections & Audits – Part 1; Audit & Inspection?

- Inspection:
  - Other than during observation, concentrates more on the ***What*** rather than the ***How***.
  - There maybe reference to safety assurance documentation, but minimal probing.
  - Operates at the working level.
  - Is generally quick.
- Audit:
  - Concentrates on the ***How, why and who***, but also includes some of the ***what***.
  - Probes safety policies and objectives, and seeks evidence to verify.
  - Interfaces with those accountable at senior level.
  - More time and resource consuming than inspection.



## Safety Oversight Inspections & Audits – Part 1; basic techniques

- Mechanistic inspection.
- Observation.
- Written and face-to-face questions, and interviews.
- Document examination/review.

## Safety Oversight Inspections & Audits – Part 1; basic techniques

**Mechanistic inspection:**

- Physical examination, often just visual.
- Measuring.
- Counting.

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## Safety Oversight Inspections & Audits – Part 1; basic techniques

**Observation:**

- Passive observation, as in watching a scheduled process or function/action without intervention.
- Active observation, as in requesting a procedure or action to be followed, in order to:
  - determine compliance;
  - assess competence;
  - test functionality; and
  - identifying weaknesses and one way of obtaining safety data that will help in predictive risk management, e.g. evidence of "drift" from SOPs.

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## Safety Oversight Inspections & Audits – Part 1; basic techniques

**Questioning/Interviews:**

- Written audit questions sent prior to an overall inspection.
- On-site with relevant staff during the course of an inspection of a specific functional area.
- At a specific briefing or during a requested interview, using:
  - pre-prepared questions that may have been given to the interviewee prior to the interview;
  - questions that arise during the course of the discussion/interview; or
  - a mixture of the above.
- Can contribute to "predictive" risk management.

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## Safety Oversight Inspections & Audits – Part 1; basic techniques

**Document review:**

- This is not just a review for readability and format. These are important from a human factors point of view (for example, to avoid mis-interpretation or ambiguity). But, a document review is a more comprehensive review of:
  - content against requirements, including document control;
  - the document for:
    - "fitness for purpose", including integration and compatibility with other documentation; and
    - documented evidence, such as compliance with stated intentions and follow-up to implementation or other action plans.

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## Safety Oversight Inspections & Audits – Part 1; basic techniques

In order to review content against requirements there needs to be:

- Documented statements of requirements.
- Knowledge of the scope of the operation/facility to which the documents apply. This requires a system description.
- A structured process, with a (simple as possible) tool to compare and record document content against content requirement: the process is commonly called a gap analysis. Part of a gap analysis should be to determine if the system description adequately covers the scope of the operation/facility.

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## Safety Oversight Inspections & Audits – Part 1; applicability

These basic techniques are used in the inspection and audit of the components of the aviation system, but are they all suitable for all components? What are the most suitable techniques for:

- The aircraft operation?
- The air traffic management operation?
- The aerodrome facility and operation?

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## Safety Oversight Inspections & Audits – Part 1; guidance documents

ICAO guidance documents on or with elements relating to Inspection and Audit include:

- The aerodrome facility and operation:
  - Doc 9774, Manual on Certification of Aerodromes.
- The Air Traffic Management operation:
  - Doc 9910, Normal Operations Safety Survey (NOSS).
- The aircraft operation:
  - Doc 8335, Manual of procedures for Operations Inspection, Certification and Continued Surveillance.
  - Doc 9803, Line Operations Safety Audit (LOSA).
- General or non-specific to these 3 system areas:
  - Doc 9734, Safety Oversight Manual, Part A.
  - Doc 9735, Safety Oversight Audit manual.
  - Doc 9806, HF Guidelines for Safety Audits Manual.

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## *Thank You*

Questions or Comments Please

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# SAFETY OVERSIGHT INSPECTOR COURSE (AERODROMES)

**12th to 16th September 2011**

Techniques for Safety Audits and Inspections – Part 2

1

## Safety Oversight Inspections & Audits – Part 2; Objective

This presentation:

- Extends depth of Part 1, delivered on Day 1.
- With Delegate involvement, discusses the application of the various techniques for the elements of the aerodrome component of the aviation system, including:
  - aerodrome design;
  - aerodrome facilities;
  - Interface operations, including aprons;
  - documentation; and
  - confirmation of conformance with requirements.

2

## Safety Oversight Inspections & Audits – Part 2; technique recap

- Mechanistic inspection.
- Observation.
- Written and face-to-face questions and interviews.
- Document examination/review, including gap analysis.

3

## Safety Oversight Inspections & Audits – Part 2; technique detail

- **Mechanistic inspection**:
  - Physical examination, e.g.:
    - condition of pavement surfaces;
    - condition of non-paved surfaces, such as RESAs; and
    - visual navigation aids.
  - Measurement - direct, such as RESA size using measuring wheel.
  - Measurement – indirect, such as RESA size using ?? and ??
  - Counting, e.g. an inventory check of equipment.

4

## Safety Oversight Inspections & Audits – Part 2; technique detail

- **Observation, active and passive** - usually of an operation, procedures, such as Standard Operational Procedures (SOP), or people - in order to:
  - Confirm if an SOP or inter-facing SOPs are being followed and, if appropriate, assess "fitness for purpose".
  - Assess competence - usually a licence or certificate holder, but can also be a contribution to assessing organisational competence.
  - Test functionality of an item of equipment.
  - Identify areas of weakness/hazard, particularly from emerging hazards due to change or SOP deviation.

5

## Safety Oversight Inspections & Audits – Part 2; technique detail

**Written and face-to-face questions & interviews**:

- With senior and line managers with significant safety accountabilities, such as the "Accountable Manager" - see ICAO Doc 9859, Safety Management Systems for more on the "Accountable Executive" (page10-APP 1-4).
- Line management, supervisory and operational staff with functional responsibilities that bear:
  - directly on safety management policy or safety performance, such as watch managers of 24 hr functions; and
  - indirectly on safety management policy or safety performance, such as non-technical budget setters or holders, such as an HR or Training Manager.

6

## Safety Oversight Inspections & Audits – Part 2; technique detail

**Written & face to face questions & interviews (cont):**

- The purpose is to:
  - confirm conformance (that cannot be ascertained during the pre-inspection process); and/or
  - probe or answer questions, queries or concerns that may have been raised in the Inspection Team's minds during pre-inspection preparation.
- They can be:
  - Part of a formal, structured part of an overall Inspection, such as an interview with the "Accountable Executive" at the beginning of an overall inspection.
  - On an opportunity basis during the overall inspection, as needs and findings dictate.

7

## Safety Oversight Inspections & Audits – Part 2; technique detail

**Face-to-face questions and interviews (cont)**
interview principles – some main points:

- Adequate, appropriate and relevant preparation.
- Appropriateness of questions posed to the level of staff being interviewed.
- Openness about intent and outcomes, including sharing of evidence and findings, so that the interviewee has the opportunity to correct any false understanding.
- Objectivity.
- Fairness.

8

## Safety Oversight Inspections & Audits – Part 2; technique detail

- **Face to face questions and interviews (cont)**
  Audit questions – principles:
  - Universality of questions posed to licensees, whilst being relevant to the scope of operations at a specific aerodrome;
  - Use an appropriate mix of open and closed questions.
  - Appropriate level and hierarchy of questions
  - Selected questions being relevant to the issue being probed.

9

## Safety Oversight Inspections & Audits – Part 2; technique detail

Area being probed:

- Accountable Executive

Question:

- Does the Accountable Executive have the authorities and decision-making powers specified in the State Regulations? If so:
  - Where are they specified?
  - If appropriate, ask for the interview to show you the text (the "show me please").

10

## Safety Oversight Inspections & Audits – Part 2; technique detail

**Document examination/review, including gap analysis:**

- In Part 1 we said that such a review is a comprehensive check of :
  - content against requirements;
  - the document for:
    - "fitness for purpose", including integration and compatibility with other documentation; and
    - documented evidence, such as compliance with stated intentions and follow-up to implementation or other action plans.
- We also said that in order to review content there needs to be documented requirements, a system description and a structured gap analysis format.

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## Safety Oversight Inspections & Audits – Part 2; technique detail

System Description:

The concept of a gap analysis that compares requirements against content, for example in an Aerodrome Manual or Safety Management System, may be relatively straightforward.

But <u>why do we need a System Description?</u> Before answering that question let us view the ICAO gap analysis format in Doc 9879 (pages 7-APP 2-1 to 7-APP 2-8).

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## Safety Oversight Inspections & Audits – Part 2; technique detail

To answer the question why do we need a System Description - let us take the example of an aerodrome that has recently accepted a major change in the mix of traffic. In its priority for revenue generation over safety management, it overlooked the need to amend its SMS Manual, in particular the Hazard Log. The aerodrome also omitted to revise the description of its operations (systems description). If the aerodrome operator had undertaken the necessary revisions to its System Description, it should have been prompted by its SOPs to review its Hazard Log, revise its SMS Manual, and upgrade its facilities. Instead it suffered 3 significant incidents and the imposition of severe regulatory restrictions.

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## Safety Oversight Inspections & Audits – Part 2; application

So, what of these techniques would be most appropriate to use for an aerodrome inspection? Let us discuss their potential use in an inspection of the following areas:

- Confirming conformance with State and company Regulations, including:
  - aerodrome design and aerodrome facilities; and
  - organisational competence.
- Aerodrome and interface operations, including apron operations.
- Documentation, including consistency of records.

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## Safety Oversight Inspections & Audits – Part 2; application

Now, as a Group exercise, let us examine their potential use in an inspection of the following areas:

- Surface Movement Guidance and Control System (Annex 14 and ICAO Doc 9476, Manual of SMGCS).
- Aerodrome and interface operations – specifically apron operations.
- Documentation- the SMS Manual.

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## *Thank You*

Questions or Comments Please

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# SAFETY OVERSIGHT INSPECTOR COURSE (AERODROMES)

**12th to 16th September 2011**

Tools and Mechanisms to meet Safety Objectives



## Tools and Mechanisms to meet Safety Objectives – Objectives

This presentation:

- Outlines the tools and mechanisms with which the Inspection function and Inspectors should be provided.
- Links with the 8 Critical Elements (CEs) of ICAO's Universal Safety Oversight Programme (USOAP).
- Offers a service provider's equivalent of the 8 CEs for consideration.
- Identifies some of the weaknesses in the scope of tools that the presenter has met in his experience of working with ICAO States.



## Tools and Mechanisms to meet Safety Objectives – The toolbox

- People
- Legal Statutes, Processes, Procedures and Guidance.
- Facilities, including support systems.
- Personal Equipment for Inspectors.



## Tools and Mechanisms to meet Safety Objectives – People

- Sufficient trained and experienced inspectors, with the individual and collective skill- set that is necessary for the individual and collective work-load associated with the Safety Oversight task and stated Safety Objectives.
- Adequate numbers of Managers and Senior Inspectors to provide the leadership and support for the function and staff.



## Tools & Mechanisms to meet Safety Objectives–Statutes/Processes/SOPs

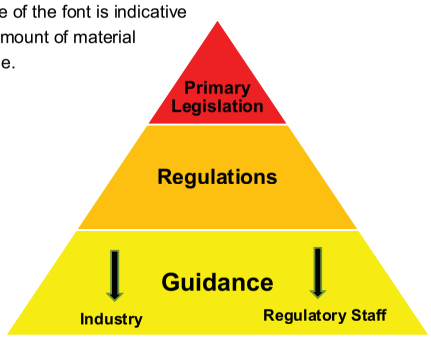
- Primary Legislation – e.g. a CAA Act
- Regulations "Authorised by the Primary Legislation" – e.g. Civil Aviation Regulations (CARs).
- Guidance:
  - For Service Providers that expand on the Regulations; e.g. Civil Aviation Publications (CAPs) or Advisory Notices.
  - Staff Policies and Procedures for the Safety Oversight task – ideally reflected in a Staff Manual/Inspectors' Handbook.

*Graphic representation on the next slide.*



## Tools & Mechanisms to meet Safety Objectives–Statutes/Processes/SOPs

The size of the font is indicative of the amount of material available.



## Tools & Mechanisms to meet Safety Objectives – Facilities/Support

- Offices and associated equipment, including computers with internet access.
- Support systems, such as:
  - Accident and Incident data.
  - Comprehensive Technical Library.
  - Other documentation, such as previous inspection & follow-up reports, and aerodrome characteristics data; ideally via an electronic & easily accessed/interrogated database, with hard copy back-up.
  - Initial and development training.
  - In addition to personal issue equipment (see next slide), centrally held, accessible and well maintained equipment that may not be suitable for personal issue.

7

## Tools & Mechanisms to meet Safety Objectives – Personal Equipment

- Laptop, loaded with all necessary inspection templates and pro-formas.
- Mobile telephone.
- Necessary protective clothing, in order to undertake field work in likely weather conditions.
- Specialist inspection equipment, such as:
  - ?
  - ?
  - ?
  - ?

8

## Tools & Mechanisms to meet Safety Objectives – ICAO CEs

- These are specified in ICAO Doc 9734, and are in a handout given on Day 1

9

## Tools & Mechanisms to meet Safety Objectives – Service Provider CEs

- These are specified in another handout.

10

## Tools & Mechanisms to meet Safety Objectives – Weaknesses

- Insufficient Inspectors.
- Insufficiently trained/qualified Inspectors.
- Poorly supported Inspectors – equipment, documentation/guidance/decision-making data and when wanting to take regulatory action.
- Gaps in the Statutes, Regulations or guidance to industry.
- Lack of State Safety Objectives
- Lack of regulatory action when aerodromes are not meeting expected safety standards – State regulators being in denial; relying on luck or fate!!.

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***Thank You***

Questions or Comments Please

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# SAFETY OVERSIGHT INSPECTOR COURSE (AERODROMES)

**12th to 16th September 2011**

Human Factors or
Factors in Human Performance

1

## Factors in Human Performance - Objectives

- To provide an introduction to what is meant by HF, covering:
  - What is HF?
  - Characteristics/Nature
  - Impacts
  - System Elements and Error
  - Examples of Human Error
  - Pro-active action to avoid

2

## Factors in Human Performance – What is HF?

- There are many definitions; here are 2:
  - A multi-disciplinary approach drawing on psychology, ergonomics, design, engineering and physiology to understand and facilitate the manner in which human beings interact with their environment.
  - Fitting the task to the person.

3

## Factors in Human Performance – Characteristics/Nature

- ICAO Doc 9683, HF Training Manual discusses the nature of HF, and says that HF is concerned:
  - To optimise the relationship between people and their activities, by the systematic application of human sciences, integrated within the framework of systems engineering.
  - With solving practical problems in the real world (whilst utilising academic sources of knowledge).

4

## Factors in Human Performance – Characteristics/Nature (cont)

- Doc 9683 also says that:
  - HF is practical in nature; it is problem orientated.
  - HF is about people in their living and working situations, their relationship with machines, procedures, their environment and other people.

*A conceptual model from Doc 9683 is on the next slide*

5

## Human Factors – SHEL(L) Model


6

## Factors in Human Performance – Impacts

- The human element is the most flexible, adaptable and valuable part of the aviation system, but is also the most vulnerable to influences which can adversely affect its performance.
- Many accidents have resulted from less than optimum performance, often classified as "human error".
- The terms "pilot, air traffic controller, or operative error" is of limited help in accident prevention as it may indicate ***where*** the system broke down, but not necessarily ***why***.

7

## Factors in Human Performance – Impacts (cont)

- It is easy to attribute blame to the "last pair of hands" on the task, but actual accident cause may have been design-induced, stimulated by poor training or badly designed or drafted SOPs and manuals.
- Furthermore, the term "pilot or operative error", as the last pair of hands on the task, may mask an underlying accident cause, depriving the system of valuable information and data that could be used in incident and accident prevention.

8

## Factors in Human Performance – Impacts (cont)

- An understanding of the predictable human capabilities and limitations that can lead to error and the application of this understanding is imperative in the context of reducing and managing risks to safety.

*So, let us consider what we mean by "error", which can be made anywhere in the system and have a negative impact on safety. They can be made by non-technical, as well as technical, managers. But first let us review the elements in the "Aviation System" that can generate error, not necessarily in any one level or discipline.*

9

## Factors in Human Performance – System Elements

- Machine and equipment design and certification, including interfaces with other elements, such as HMI.
- Regulations, SOPs and other documentation.
- Training
- Team make-up, including personal and culture conflicts.
- Working environment, including hours/shifts.

10

## Factors in Human Performance – System Elements (cont)

- Management and organisation, including relative priorities/objectives.
- Communication practices.

A breakdown in communications is one of the major factors in occurrences, so let us introduce the subject of "error" with some communication shortcomings:

- Lack of communication – *sometimes deliberate.*
- Incomplete communication – *forgetting or being distracted.*
- Mis-communication – *expectation, language, ambiguity.*
- Communication method – *face-to-Face; Tele; e-mail or RTF.*

11

## Factors in Human Performance – Errors

- **Mistake** – faulty actions, plans or intentions where somebody did something believing it to be correct when it was, in fact, wrong.

  *e.g. - error of judgement.*

- **Lapse** – missed action or omissions where somebody has failed to do something.

  *e.g. – neglecting to mention something at shift hand-over.*

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## Factors in Human Performance – Errors (cont)

- **Slip** – correct intentions but faulty actions, where action was not carried out as intended.
  *e.g. - "finger trouble".*
- **Violation** – deliberate "illegal"/non-standard action where somebody did something knowing it to be against the "rules" – albeit perhaps with good intentions.
  *e.g. – deliberately failing to follow an SOP.*

13

## Factors in Human Performance – Errors (cont)

Where does this knowledge get us, what are the implications of a company experiencing significant errors?

**Lots of mistakes** – *Training issues/inadequate procedures.*

**Lots of lapses –** *System, Organisation, Environment, Motivation.*

**Lots of slips** – *Design Problem.*

**Lots of Violations** – *Poor procedures, industrial relations, recruitment.*

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## Factors in Human Performance – Error Identification

- Human error is widely accepted as a common cause of accidents.
- It is easy to identify human failings after an accident, but it is much more valuable to be able to predict potential errors before they occur, so enabling action to be taken to avoid or mitigate any negative consequences.
- To do this a detailed understanding of work systems, human behaviour and their interaction is required.

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## Factors in Human Performance – Pro-active Action to Avoid Errors

- Following on from the points raised in the previous slide – only by studying and applying in the way outlined is it possible to address the underlying or predisposing factors that contribute to the likelihood of errors, including violations.
- As an example - the way in which information is presented to users influences how easy it is to understand and use:
  - By applying HF techniques it is possible to better identify necessary information that is required by the user to successfully complete tasks.
  - HF principles and guidance can then be used to ensure that information is filtered, organised and presented in an appropriate format, ensuring that a user is not overloaded with information and that their attention is focused on the task at hand.

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## Factors in Human Performance – Conclusions

- All aspects of aviation involve humans (machines are also designed by humans).
- Therefore, Human Factors is implicated in all aspects of aviation.
- Opinions vary, but 80+% of accidents and incidents have some HF cause.
- HF should be an integral part of an organisation's activity – not a cosmetic "add-on".
- HF will always be with us.
- Early attention to HF can save money and lives.

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## Factors in Human Performance – Error Example

- After B767 arrived in stand with RH engine running and the anti-collision beacon on, ground staff opened a cargo door - ??
- A/C taxied into a hole after passing a W.I.P sign - ??.
- Wingtip of ATP being marshalled onto stand passed over a bus roof whilst passengers were disembarking to board a/c on stand - ??.

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## Factors in Human Performance – Application in the Inspection context

So, with the knowledge of this presentation let us consider how we as Inspectors (or Auditors) should apply that knowledge:

- Use audit Qs to find out if and how the certificate holder applies HF practices. Etc
- Ask about training programmes and check if HF training is given.
- When observing operations check for any examples of practices or procedures that may create poor matches between man and "machine.?
- ?
- ?
- ?

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## *Thank You*

Questions or Comments Please

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# SAFETY OVERSIGHT INSPECTOR COURSE (AERODROMES)

**12th to 16th September 2011**

Service Provider Competence



## Service Provider Competence - Why

- Expectation of:
  - State Regulator.
  - ICAO and other ICAO member States.
  - User companies.
  - Passengers and the public.
  - Staff
  - Insurers.
  - Other Stakeholders.
- Company Objective.



## Service Provider Competence – How Achieved?

- Organisational competence.
- Appropriate company knowledge and competency objectives.
- Appropriate recruitment and training processes to ensure employee (and, by extension, contractor) competence.
- Resource provision.
- Maintenance of overall company knowledge and experience.
- Continuous assessment of organisational competence.



## Service Provider Competence – How Assessed?

An overall process or series of processes that:

- Identifies and articulates the safety related tasks that have to be undertaken.
- Ensures that there is the necessary levels of staff resource, knowledge and experience to undertake those tasks.
- Confirms that those levels are maintained, particularly in situations of change, such as:
  - nature or complexity of facilities, inc works-in-progress
  - level or mix of traffic; or
  - organisational structure.



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# *Thank You*

Questions or Comments Please

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# SAFETY OVERSIGHT INSPECTOR COURSE (AERODROMES)

**12th to 16th September 2011**

Planning & Programming Inspections



## Planning & Programming Inspections - Objectives

This presentation outlines the following components and processes for a Safety Oversight Inspection:

- Types of Inspection.
- Scope.
- Frequency.
- Phases of an Inspection.
- Recording of Findings.
- Follow-up, including corrective action plans.
- Exemptions



## Planning & Programming Inspections – Types of Inspection

- Initial for Certification
- Periodic Surveillance
- Renewal, if applicable
- Follow-up
- Ad Hoc



## Planning & Programming Inspections – Scope of an Inspection

For an initial, and renewal if applicable, the regulator must be satisfied about compliance with national requirements, including those covering:

- The management of safety, as reflected in an established and functioning SMS.
- Organisational competence and staffing.
- Safety performance, as an output of the SMS.
- Aeronautical data provision and integrity.
- Apron management.
- Physical characteristics.
- Obstacle clearance surfaces.



## Planning & Programming Inspections – Scope (initial cont)

- SMGCS, inc visual aids and lighting.
- Maintenance arrangements.
- Physical inspection regimes.
- Electrical and power supplies.
- ATM (often by a parallel process by the ATM regulator).
- Rescue and Fire-fighting facilities and AEP.

The adequacy in scope, content and validity of the Aerodrome Manual (AM) will be a primary focus for these inspections.



## Planning & Programming Inspections – Scope (cont)

- For periodic/surveillance inspections the scope, as well as the periodicity, will vary from State to State and even airport to airport. However, regulators must still be satisfied about a (functioning) safety management system and the safety performance, as well as continued compliance with national requirements.
- As with an initial and renewal inspections, the AM, including the outputs of the Safety Management System will be a particular focus for surveillance inspections, as will be follow-up actions to previous findings.
- In order to ensure adequate depth and effectiveness of the process States could consider spreading the task across periodic inspections by splitting inspections into two primary areas – see next slide.

## Planning & Programming Inspections – Scope (cont)

These two areas are:

- Core areas undertaken on every inspection.
- Targeted or themed areas to address areas of particular or raised safety concern since the last inspection.

These inspections can be scheduled to be undertaken separately or core with themed areas on a changing basis over a number of inspections, say over a three year cycle and/or to match a State's annual safety plan – see next slide.

7

## Planning & Programming Inspections – Scope (cont)

Examples of core areas:

- Integrity of published data.
- Aerodrome Manual.
- SMS.
- Safety performance:
  - Indicators & targets; and
  - Monitoring.
- Operational safety competence.
- Review of any accepted non-compliances.

Examples of safety concern themes/areas, maybe taken from or reflecting a State's annual Safety Plan:

- Emergency Plan.
- Bird hazard control.
- Fuel quality.
- Management of runway safety:
  - Incursions and excursions;
  - runway identification confusion; and
  - surface condition/FOD

8

## Planning & Programming Inspections – Scope (cont)

For follow-up and ad hoc inspections the scope will be determined by the reasons for such inspections, including such areas as:

- audits of SMS or aeronautical data, maybe after a major operational change;
- airport management corrective action plans, including those to correct violations of national standards;
- safety concerns brought to the attention of the regulator, either internally or externally.

Again whatever the scope, regulators must seek to satisfy themselves about safety management and performance at the airport.

9

## Planning & Programming Inspections – Inspection Frequency

- Periodic surveillance inspections are those programmed on a pre-determined frequency, usually annually. However, there are benefits to varying this, e.g. by going to 10 or 14/15 months periodicity, the inspections will be taking place during different times of the year when weather may present varying findings.
- Certification, follow-up, & ad-hoc inspections are usually one-offs, not pre-programmed as part of an annual surveillance inspection plan.
- For States that operate a renewal system this will be done on a pre-set periodicity, e.g. 3 or 5 years.

10

## Planning & Programming Inspections – Phases of Inspections

For all inspections there are common steps:

- Preparation:
  - Communication with the airport management.
  - Coordination with other stakeholders, as necessary, e.g. with:
    - Other departments of the CAA, e.g. ATM and Flt Ops.
    - Security provider.
    - Fuel supplier.
    - Ground Handling companies.
  - Document review as appropriate (see next slide).
  - Collection of the necessary inspection equipment.
- On-site Inspection; office and/or field, with a pre-brief with the applicant or certificate holder.
- Post-inspection brief with applicant/certificate holder.
- Follow-up and paperwork.

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## Planning & Programming Inspections – Phases, document review

Document review, as appropriate:

- Aerodrome Manual, including:
  - SMS, inc safety performance expectations; and
  - AEP, inc exercises.
- Any approved exemptions.
- Previous audit records, and any corrective action plans.
- Instrument approach and obstruction charts, inc Type A.
- Relevant A.I.P pages and NOTAMS.

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## Planning & Programming Inspections – Phases, document review (cont)

- Accident and incident history, records of safety performance and any safety studies or surveys conducted since the last inspection.
- Pending development plans and documents.
- Airport staff training and airport's internal safety performance audits.
- Wildlife management and Snow-Plan, as appropriate.
- Any other safety-critical administrative requirements dictated by local standards.

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## Planning & Programming Inspections – Phases, pre-inspection briefing

- Confirm:
  - The inspection agenda, including the hours to be worked and if there is to be any night inspection and testing of equipment – the airport to coordinate the inspection with ATC.
  - The airport's operational status, and development plans from the airport management.
- Review with the Accountable Executive:
  - outstanding issues from the regulators previous audits, and any that have come to light since;
  - the airport's inspection and audit regime and outputs;
  - the activities of the airport Safety Committee – ask to see the minutes of recent meetings (maybe the last year);
  - the airport's incident history since the last inspection; and
  - status of exemptions.

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## Planning & Programming Inspections – Phases, pre- brief (cont)

- Arrange interviews and request documents for any on-site document review considered necessary.
- Arrangements for bringing significant findings to the attention of the Accountable Executive in a timely way, in order for them to:
  - Provide additional evidence to demonstrate that any specific finding is unjustified.
  - To have time to consider a specific finding, take timely action, including the introduction of an immediate operational procedure, restrictions or NOTAM action, if necessary.
  - Determine any dates for corrective action so that the inspection team can be advised before the end of the inspection.

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## Planning & Programming Inspections – On-site Inspection

With the team confirm the details for the conduct of the Inspection:

- Programme for each day, including the end-of-day briefing and writing up of the report.
- Who does What and When, including the inspection of specific elements, such as:
  - SMGCS
  - Obstruction status
  - Meetings with airport staff
  - On-site documents reviews
- Arrangements for any night inspection

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## Planning & Programming Inspections – Inspection Report

The findings of the inspection must be recorded, either as acknowledgement of full compliance or to list non conformances. It is helpful in determining if and what regulatory action needs to be taken for findings to be categorised into 3 levels or priorities. These could be expressed as:

- Category 1 – Significant non-compliance which raises safety risks to an unacceptable level.
- Category 2 – Non-compliance which may breach the airport's declared acceptable level of safety risks.
- Category 3 – An observation of a situation that, whilst being compliant, may not ensure minimum safety standards.

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## Planning & Programming Inspections – Findings (cont)

The findings can be recorded in a number of formats, and ideal formats will vary from State to State. However, the following is an ideal set of "fit-for-purpose" characteristics that can be reflected in different formats/report templates:

- Clear, easily readable and unambiguous.
- Has dedicated fields for recording:
  - Aerodrome name
  - Inspection type, scope and dates
  - The inspection team
  - Airport staff met and interviewed
  - Areas inspected and documents reviewed

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## Planning & Programming Inspections – Findings (cont)

- Against the elements inspected, the reference of the corresponding national requirement.
- Findings, described in brief and clear text, cross referenced to the relevant national requirement.
- Nature of evidence leading to the finding:
  - observation, document reference; or
  - photograph, if appropriate and taking account of national and cultural sensitivities; or
  - a note from an interview or quote from airport or stakeholder staff.



## Planning & Programming Inspections – Findings (cont)

- Category of finding and agreed action to be taken by the airport, together with:
  - A realistic intended completion date.
  - Person accountable for the action.
- Signatures of the inspection team leader and the airport's Accountable Executive.



## Planning and Programming Inspections – Report format

- ?



## Planning & Programming Inspections – Follow-up

- All of the preceding effort would be pointless if findings are not pursued by the airport, in accordance with a corrective action plan and with specific milestone actions and dates; to be confirmed as completed by the airport and accepted as such by the safety regulator.
- Therefore, there must be a process for the regulator to be satisfied that corrective actions have been formulated and implemented.



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## *Thank You*

Questions or Comments Please

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# SAFETY OVERSIGHT INSPECTOR COURSE (AERODROMES)

**12th to 16th September 2011**

More on formats for Inspections and Safety Audits



## Inspection and Audits Formats – Objective

This presentation gives some suggestions on some wider aspects of Inspections and audits; the:

- Scope of an inspection/audit for the inspection/audit of the various aerodrome elements/areas.
- More on the concept of separating inspection/audit areas into core and themed focus areas.
- Format and approach for the inspection/audit of the various aerodrome elements/areas.



## Inspection and Audits Formats – Scope

Suggested minimal scope during a complete cycle of initial to renewal inspections; for all areas the following:

- Confirmation of full compliance with the State safety requirements, including their characteristics and location, as well as application; this includes frangibility requirements where applicable.
- For any area of non-compliance to be acceptable to the Regulator, satisfaction that adequate safety-risk control measures are in place. This will require an assessments of the risks to be undertaken by the applicant/licensee before acceptance by the Regulator.
- This confirmation and satisfaction can be achieved by a mixture of physical inspection, i.e. measuring, counting and observing, and audit style inspection.
- One suggested list, breaking down the aerodrome elements/areas to be inspected/audited, appears on the next slide.



## Inspection and Audits Formats – Scope (cont)

- Aerodrome mgt systems, manuals and procedures as part of the AM.
- Runways and immediate environs.
- Taxiways and interface areas.
- Apron areas.
- Visual navigation aids other than the SMCGS, e.g. PAPIs.
- SMGCS.
- Obstacle Limitation Surfaces.
- RFF.
- Other operational facilities, e.g. fencing, and fuel farm, if applicable.
- Wildlife Management.
- Maintenance.
- Electrical Power.
- Organisational competence.
- ATS interface areas.



## Inspection and Audits Formats – Scope (cont)

Taking runways and environs as an example, each of the areas can be broken down into aspects that should be the focus of the inspection:

- The runway, shoulders, strips and RESAs must reflect the aerodrome reference code, determined by the characteristics of the aircraft being accepted by the aerodrome.
- Surface condition, including runway friction, as well as SMGCS elements, must meet the operational needs of the aircraft served, the traffic density, the aerodrome geometry and visibility condition.
- Declared distances must be capable of being demonstrably accurate by validated survey data and evidence of confirmatory measurement by the certificate holder/applicant.



## Inspection and Audits Formats – Core and Themed areas

Taking this further from the introduction in the previous presentation: for medium to large, as well as complex airports, it may be difficult to cover every area during every annual inspection.

So, rather than trying to cover every aspect , with the risk of being superficial and missing the identification of a non-compliance and/or safety concern, an alternative approach maybe to spread focus areas over a number of surveillance inspections, whilst covering certain core areas on each inspection.

## Inspection and Audits Formats – Core and Themed areas (cont)

- Taking the example of a State applying a four year life to an Aerodrome Certificate, with initial and renewal inspections in years 1 and 4, respectively, core areas would be inspected every year and the selected themed areas inspected in years 2 and 3.
- Additionally, the regulator could consider varying the annual surveillance inspection period to 12 +/– 3 months, in order to:
  - Exercise more frequent safety oversight of airports in which they have least confidence, and less frequent safety oversight of airports in which they have greatest confidence.
  - Inspect airports at different times of the year over a period of years.

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## Inspection and Audits Formats – more on format and approach

We have discussed:

- In a previous PP overall planning and programming of an inspection.
- In this PP, the various areas for inspection and the scope of such.

Now let us finish Inspection Formats by considering an outline plan for inspections of specific areas; looking at:

- purpose
- salient points and issues to cover; and
- intended outcomes.

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## Inspection and Audits Formats – more on format and approach (cont)

Let us take, as an example area, the AEP and RFF - ***Purpose***; as well as to be satisfied about basic compliance with requirements, the inspector needs to be satisfied about:

- RFF - That the system of the vehicles, extinguishing agents, firefighters, procedures, management & training is "fit for purpose". Take account of the particular operational environment and traffic mix, e.g., does each watch have sufficient firefighters trained in all the tasks that could be expected to have to be performed during that watch, in all normal and likely abnormal situations?
- AEP – Consider those areas where potential latent weaknesses may emerge if one of the lines of defences fails, e.g. procedures and equipment for communication.

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## Inspection and Audits Formats – more on format and approach (cont)

***Salient points/issues (RFF and AEP)***:

- As well as the more obvious audit style questions others may need to be formulated to test any statements or assertions given about "fitness for purpose". Often these are not immediately obvious until the audit has started, e.g. on finding out that some of the watch firefighters are on standby at home or undertaking other secondary, tasks, questions about response capability arise (real cases experienced by the presenter when on audit – on more than one occasion).
- Think whole system and not just measurable or countable elements.
- Be prepared to ask the "what if" questions, for example, what if the hand held radio of a key player in the communication/coordination plan fails during an emergency situation?

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## Inspection and Audits Formats – more on format and approach (cont)

***Intended outcome of this area of inspection (RFF and AEP)***:

The inspector has to be satisfied about the match between the provision of staff and "things" and the demands that may be placed on the system provision, during normal operations as well as abnormal operations. In particular, with the prevailing traffic density and mix, as well as airport environment, including "visibility condition".

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## Inspection and Audits Formats – Reminder of Basic Techniques

1. Mechanistic inspection.
2. Observation.
3. Written and face-to-face questions, and interviews.
4. Document examination/review.

Let us revisit 2 of these areas; 3 and 4

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## Inspection and Audits Formats – Reminder of Techniques (cont)

Written and face-to-face questions, and interviews:

Audit questions.

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## Inspection and Audits Formats – Reminder of Techniques (cont)

Document examination/review:

Gap Analysis.

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## *Thank You*

Questions or Comments Please

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# SAFETY OVERSIGHT INSPECTOR COURSE (AERODROMES)

**12th to 16th September 2011**

Data

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## Data - Objective

The objective of this presentation is to highlight the importance of safety data and its management as a tool in safety management, both in the Service Provider and State Regulator context. The presentation covers:

- Data and its management in the context of SMS and SSP.
- Types of data.
- The expected use of data in safety management.
- Sources of data, and its management.
- How the need for data in predicting risks to safety influences Safety Oversight and Safety Performance Monitoring practices.

## Data – Objective (cont)

Instead of power point slides I will be using ICAO Doc 9859, SMS Manual, as the primary focus for this presentation: not just to illustrate, but to put the need for safety data and its management into the context of safety management and performance in aviation's complex environment of man and technology.

## Data – As a driver in SMS & SSP

SSPs and SMS cannot function without safety data and a means of analysing and managing that data.

The next 3 slides show extracts from Appendix 2 to Chapter 4 of ICAO Doc 9859. These extracts illustrate the vital nature of safety data in safety management and performance, and the need for its management.

## Data – As a driver in SMS & SSP

Quality safety data are the lifeblood of safety management. Effective safety management is "data driven".

***However***

## Data – As a driver in SMS & SSP

Information collected from operational and maintenance reports, safety reports, audits, evaluations of work practices, etc., generate a lot of data. So much safety-related information is collected and stored that there is a risk of overwhelming responsible managers, thereby compromising the utility of the data. Sound management of the organisation's databases is fundamental to effective safety management functions (such as trend monitoring, risk assessment, cost-benefit analyses and occurrence investigations).

***Therefore***

## Data – As a driver in SMS & SSP

The establishment and maintenance of a safety database provides an essential tool for corporate managers, safety managers and regulatory authorities monitoring system safety issues. *Appendix 2 to Chapter 4 goes into more detail of safety information management and databases*

Now let us have a wider look at some aspects of data, its uses and management, as covered in ICAO Doc 9859, in order to meet the objective of this presentation.

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## *Thank You*

Questions or Comments Please

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# SAFETY OVERSIGHT INSPECTOR COURSE (AERODROMES)

**12th to 16th September 2011**

Document Audit – SSP or SMS



## Document Audit - Brief

- The objective, or intended learning outcome, is to have practice in auditing a document.
- The task to meet that outcome is to start a gap analysis of one of your State's SSP (draft or final document) or Aerodrome's SMS, in order to check compliance with State and company requirements.
- We will be using the templates in ICAO Doc 9859
  - For SMS Manuals, Chapter 7, Appendix 2.
  - For SSP's, Chapter 11, Appendix 3.
- Due to constraints of time and the wide scope of Delegate interests, we do not expect to be able to complete this exercise today, so we will discuss your experience today and encourage you to complete the audit on your return.


# *Thank You*

Questions or Comments Please

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# SAFETY OVERSIGHT INSPECTOR COURSE (AERODROMES)

**12th to 16th September 2011**

Auditing an SMS



## Auditing an SMS - Objective

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An SMS that is robust, monitored, constantly updated, and improved where necessary, is vital for service providers in the aviation industry. Therefore oversight and auditing of service providers' SMSs is a vital function for the State safety regulator and the service providers.

This presentation outlines a framework for the task; it will be achieved by the use of a handout – questions, discussion, and by all means challenge, is requested and encouraged.

Following this we will undertake a group exercise, centred on the development of an action plan to address some findings of an audit of an SMS.



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## *Thank You*

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# SAFETY OVERSIGHT INSPECTOR COURSE (AERODROMES)

**12th to 16th September 2011**

Inspection and Audit Protocols



## Inspection and Audit Protocols - Objective

- The objective of this presentation is to outline the protocols for conduct under which an the Inspection should be undertaken.
- This is to assist both the Applicant or Certificate holder, as well as the Inspection team to make best use of people's time, as well as to produce the best result in terms of:
  - fairness and consistency;
  - transparency;
  - audit effectiveness; and
  - relevance and quality of outputs.



## Inspection and Audit Protocols

- There is no one model for inspection protocols.
- The following slides show one suggestion for a range of protocols that can be adapted by a the State's Safety Regulator, as well as service providers.
- Delegates are requested to consider:
  - Other protocols that they think would be appropriate in their State or airport company.
  - How these protocols should be promulgated and applied within an organisation, as well as where they should be documented.



## Inspection and Audit Protocols

- Inspector behaviour and regulatory approach.
- Implementation of the Annual Safety Oversight Programme.
- Areas of priority for the different types of inspection.
- Stages in the Inspection process.
- Safety Oversight follow-up.



## Inspection and Audit Protocols – conduct of the Inspection (cont)

- The expected attitude, approach and demeanour of Inspectors, as well as their responsibilities and accountabilities, should be stated in Departmental policy statements, ideally in a policy and procedures manual.
- The scope of these statements should include:
  - Options for enforcement action.
  - Requirements to:
    - Be consistent and act without fear or favour.
    - Be constructive, whilst applying regulatory resolve where necessary.
- Statements must be supported by initial and on-going training, as well as opportunities for Inspectors to share experiences with colleagues.



## Inspection and Audit Protocols – Safety Oversight Programme

- There needs to be a protocol for advising service providers of:
  - When they are expected to be inspected.
  - Alternative arrangements in the event that the safety oversight programme has to be revised;
  - Processes for advising them of safety-critical information discovered by, or brought to the attention of, the regulator.
  - Service providers' obligations in the context of safety oversight inspections, including:
    - information to be provided;
    - facilities to be made available to the inspectors; and
    - actions expected in the event of findings

## Inspection and Audit Protocols – areas of inspection priority

- The different types of inspection will have variable areas for inspection priority, e.g. An ad hoc or follow-up inspection will be focusing on very specific areas, whilst a programmed surveillance inspection will have a range of areas for inspecting that maybe tailored to a specific airport.
- To facilitate consistency whilst retaining some flexibility, a common checklist that serves these different needs is suggested. Such a checklist will have a number of characteristics, including a must of being "ASAP" and easily readable.



## Inspection and Audit Protocols – areas of inspection priority (cont)

Taking the example of a State using core and themed areas, the checklist would be grouped into these two area – presenting the material:

- in such a way that the checklist can be used for all types of inspection;
- in infrastructure and functional areas, including the areas of greater safety-risk consequences; and
- in a format that can potentially be considered for additional use as the inspection report; a simple and non-ambiguous, but multi purpose document.



## Inspection and Audit Protocols – common checklist (cont)

- For an initial inspection all areas would normally be covered. For the interim annual surveillance inspections the focus would be areas that:
  - are at the time presenting the greatest threats to safety, or that are expected to present such threats during the following year;
  - have been the subject of new or revised requirements;
  - are the subject of corrective action; and
  - may need previous conclusions or evaluations to be re-validated.
- For a renewal inspection all areas would be covered, but not necessarily to the same degree, and with the emphasis on the core areas and those not covered in surveillance inspections.
- Finally for a new site the checklist can be used to focus on areas that give an overall picture of the feasibility for the site to be suitable for an airport, including:
  - ?
  - ?



## Inspection and Audit Protocols – inspection stages and follow-up

The PP on Day 4 on Programming covered some aspects of planning and programming. Let us look further into this area, using the associated handout and discussion.



## Inspection and Audit Protocols – inspection stages and follow-up

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## *Thank You*

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# SAFETY OVERSIGHT INSPECTOR COURSE (AERODROMES)

**12th to 16th September 2011**

Inspectors' Handbook



## Inspectors' Handbook - Objective

This presentation outlines:

- The need for a Handbook.
- Application and usage.
- Suggested content.



## Inspectors' Handbook - Need

The needs for a Handbook include the following:

- In order to achieve inspection outputs that reflect the protocols previously discussed.
- To ensure that there are no gaps in the conduct of inspections.
- For use in inspector training for standardisation purposes.



## Inspectors' Handbook – Application

As well as achieving the desired outputs expressed in the previous slides the Handbook :

- Can be used as an easily accessible reference document for inspectors, in order to achieve regulatory consistency and rigour, and as an aide memoire.
- If it is to promulgated by the regulator, either wholly or in part, it can be used by service providers, in order to be familiar with the conduct of regulatory inspections and the regulator's expectations of service providers.



## Inspectors' Handbook – suggested content

A suggested content is outlined in the associated handout; to be used in the final exercise of the course.



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## *Thank You*

Questions or Comments Please