出國報告(出國類別:其他-國際會議)

出席國際飛航管制員協會聯盟
第 54 屆年會

服務機關：民航局飛航管制組

姓名職稱：熊時平 科長

赴派國家：保加利亞

出國期間：104 年 4 月 18 日起至 104 年 4 月 25 日

報告日期：104 年 7 月 9 日

目　　次

壹、目的

一、國際飛航管制員協會聯盟簡介

「國際飛航管制員協會聯盟」(International Federation of Air Traffic Controllers' Associations ，簡稱 IFATCA)為一非政治性之獨立專業組織，1961 年 10 月 20 日於荷蘭阿姆斯特丹成立，主要發起國為奧地利、法國、盧森堡、比利時、西德、荷蘭、丹麥、冰島、挪威、芬蘭、愛爾蘭及瑞士等 12 個國家，均為歐洲國家，隨後其他國家亦陸續加入，IFATCA 設立之主要目標為：

1. 有效率及有規律地提昇國際間之飛航安全。
2. 協助發展飛航管制之安全有序制度。
3. 促進國際飛航管制員間之學術交流。
4. 維護飛航管制員之應有權益。
5. 擴展與其它相關國際組織間之相互利益。
6. 致力發展泛世界管制員協會聯盟事業。

IFATCA 總會設於加拿大蒙特婁，主要分成四大地區：歐洲、美洲、亞洲/太平洋、非洲/中東，發展迄今已有 133 個會員國、約 5 萬名管制員為 IFATCA 會員。

亞太地區目前有 19 個會員國，包含澳大利亞、斐濟、香港、印度、印尼、伊朗、日本、哈薩克、澳門、馬來西亞、馬爾地夫、蒙古、尼泊爾、紐西蘭、巴基斯坦、新加坡、韓國、斯里蘭卡及臺灣。

非洲及中東(43)	美洲(27)	亞洲/太平洋 (19)	歐洲 (44)
Algeria	Antigua and	Australia	Albania

Angola	Barbuda	Fiji	Armenia
Benin	Argentina	Hong Kong	Austria
Burkina Faso	Aruba	India	Belarus
Burundi	The Bahamas	Indonesia	Belgium
Cameroon	Barbados	Islamic Republic of	Bosnia &
Comoros	Belize	Iran	Herzegovina
Congo Brazzaville	Bermuda	Japan	Bulgaria
Congo Democratic	Bolivia	Kazakhstan	Croatia
Republic Côte	Brazil*	Macau	Cyprus
d'Ivoire	Canada	Malaysia	Czech Republic
Djibouti	Cayman Islands	Maldives	Denmark
Egypt	Chile	Mongolia	EGATS Eurocontrol
Eritrea	Costa Rica	Nepal	Estonia
Ethiopia	Curacao	New Zealand	Finland
Gabon	Dominican Republic	Pakistan	Georgia
Gambia	Ecuador	Singapore	Germany
Ghana	El Salvador	Republic of Korea	Greece
Guinea-Bissau	Grenada	Sri Lanka	Hungary
Kenya	Guyana	Taiwan	Iceland
Lebanon	Haiti		Ireland
Madagascar	Jamaica		Israel
Mali	Mexico		Jordan
Mauritania	Saint Lucia		Italy
Morocco	Suriname		Latvia
Namibia	Trinidad & Tobago		Lithuania

Niger Nigeria Roberts FIR Sao Tomé Senegal Seychelles Sierra Leone Somalia South Africa Sudan Swaziland Tanzania Togo Tunisia Uganda Yemen Zambia Zimbabwe	United States of America Uruguay		Luxembourg FYR of Macedonia Malta Moldova Montenegro Netherlands Norway Poland Portugal Romania Russia Serbia Slovenia Spain Sweden Turkey Ukraine United Kingdom

二、中華民國飛航管制員協會簡介

我國於 1978 年首度受邀以觀察員身份參加在丹麥哥本哈根舉辦之 IFATCA 第 17 屆年會，開始瞭解 IFATCA 之宗旨並邁出我飛航管制國際化之腳步。1979 年我國獲邀參加在比利時布魯塞爾舉行之第 18 屆年會，並進一步與 IFATCA 理事會討論我入會之可行性。1980 年「中華民國飛航管制協會」正式成立，並

以 ROCATCA (Republic of China Air Traffic Controllers’ Association)名義正式申請加入 IFATCA，註冊名稱為”ROCATCA (TAIWAN)”，開啟我飛航管制國際化之新頁。

三、參加 IFATCA 年會

我國退出聯合國後，在國際間受到許多的限制，以航空產業部分而言，聯合國所屬國際民航組織(International Civil Aviation Organization，簡稱 ICAO)為一專業國際航空組織，其主要制定全球民航安全標準與規章，我因非屬聯合國會員，ICAO 拒絕我方參加任何由其主辦之會議、研討會、座談會，使我無法有暢通管道瞭解國際民航相關技術及安全標準與規範。

目前 IFATCA 在 ICAO 佔有舉足輕重的地位，主要係因 ICAO 多為學術界人士，而非具有技術能力的第一線管制員，因此由學術團隊提出的標準及規定，有時會與實際管制作業產生衝突或矛盾；而以飛航管制服務來說， IFATCA 成員均為各國的管制人員，對於 ICAO 訂定的標準及規定有窒礙難行處時，IFATCA 會成立專業團隊，經過不斷的研究、討論並符合管制員實際作業狀況及需求後，將建議及相關資料提供 ICAO 參考。

我方藉由參加 IFATCA 相關會議，雖無法在第一時間確實掌握到 ICAO 在飛航管制作業上的最新動態，但可以透過 IFATCA 年會瞭解到相關的進展，也因次我飛航管制員協會每年均積極爭取參加年會，亦可強化與各國之交流與合作，培養國際會議人才，拓展國際視野。

四、 行程

4 月 18-19 日	由桃園國際機場搭乘長榮航空公司至奧地利維也納。 由奧地利維也納搭乘奧地利航空至保加利亞蘇菲亞。

4 月 20-24 日	參加國際飛航管制員協會聯盟第 54 屆年會。
4 月 25 日	由保加利亞蘇菲亞搭乘奧地利航空至奧地利維也納準備返台。

保加利亞

抵達保加利亞蘇菲亞機場接待人員送上的國花~玫瑰

貳、過程

IFATCA 每年 3-5 月固定召開一次年會，會議期程均安排 5 天，今年已經邁入第 54 屆，本屆會議日期為 104 年 4 月 20 日至 24 日，舉行地點在歐洲保加利亞蘇菲亞。經統計後，此次年會共計有 61 個會員國出席參予，大約有 400 位管制員代表參加。

4 月 20 日上午舉行開幕典禮，舉行地點在 Kempinski Hotel 會議中心，由 IFATCA 協會聯盟理事長 Mr. Patrik Peters 主持，開幕典禮貴賓包含保加利亞交通部部長 Mr. Lvaylo Moskovski、保加利亞民航局局長 Mr. Mincho Tzvetkov 以及保加利亞管制員協會理事長 Mr. Assen Tabakov。

IFATCA 會場

開幕典禮節目安排保加利亞傳統民謠，並以風笛伴奏，對保加利亞人來說，他們可是比蘇格蘭更早使用風笛的民族。

開幕典禮節目

表演結束後，隨即唱名本次出席的會員國，各會員國代表需至台前領取名牌，根據統計，本次出席的正式會員國共有 61 國，未能出席而委託其他會員國代表則有 13 國。以協會目前共計有 133 個會員國計算，本次出席及委託共計為 74 國，已超過全部會員國 2 分之 1，主席宣布本次年會正式開始。

IFATCA 主席唱名領取名牌

我方參加人員

IFATCA 年會分為 A、B、C 三組同時進行：

1. Committee A: (Administration & Management)：討論內容以國際飛航管制員協會聯盟行政事物為主，如聯盟之政策、組織、行政、財務(含次年預算)、季刊及管理及各地區(Regional)分會業務報告。

2. Committee B (Professional & Technical) ：討論內容注重航管專業技術，如飛航程序、術語、管制案件分析、法規制訂、硬體及裝備檢討。

3. Committee C (Working environments) ：討論管制員待遇、訓練、工作環境、人力配置、獎懲制度、權益、責任及法律等有關事項。

本屆年會各組工作會議較重要的討論內容，摘要如下：

一、 A 組主席為 Paul Robinson (紐西蘭)，秘書為 Julian Ogilvie(英國)。

1. 2016 年 IFATCA 協會聯盟年會訂於美國賭城拉斯維加斯舉行，會議時間為 2016 年 3 月 14 日至 18 日，會議地點在 Bally’ s Hotel 想參加的會員在 2015 年 11 月底前完成註冊，費用約 195 美金，之後註冊所需費用將提升至 215 美金。

2016 美國拉斯維加斯宣傳海報

2. 2017 年 IFATCA 協會聯盟年會由突尼西亞爭取主辦，突尼西亞於會中提出簡報以爭取會員國的支持，規劃在 2017 年 5 月 8 日至 12 日於 RAMADA PLAZA hotel 舉行。 在突尼西亞完成簡報後，有數個會員國提出在今(2015)年 3 月曾於突尼西亞發生恐怖攻擊事件，因此擔心在突國舉辦年會對於所屬會員會造成潛在的風險及危害，埃及則力挺並支持突尼西亞，埃及提出沒有人可以確保在哪個國家不會有恐怖攻擊事件。本案後來在 44 個會員國投票贊成、14 個會員國反對、2 個會員國棄權下，以過半數通過。

突尼西亞的簡報

3. 2018 年 IFATCA 協會聯盟年會則有奧地利、加拿大、哥斯大黎加、埃及、迦納、約旦以及馬爾地夫等提出意願希望能爭取主辦。

二、 B 組主席為 Matthijs Jongeneel(荷蘭)，秘書為 Alasdair Shaw (紐西蘭)。

1. 針對 2015 年 2 月份在 ICAO 召開的高階安全會議(High Level Safety Conference)題出摘要報告:

   a. 全球航班追蹤系統(global flight tracking) :因應馬航 370 航班的消失，國際民航組織(ICAO)認為航空公司必須能掌握所屬航空器所在位置，而各個國家、飛航服務提供者、製造商等應利用現有技術提供協助，以因應緊急事件狀況的處理。

   b. 加強分享衝突區風險資訊(Conflict Zone):馬航 17 航班在烏克蘭境內墜毀的事件， 促使 ICAO 積極處理航空公司在飛越衝突區具有風險及複雜任務，讓各國及航空公司分享緊急與重要的風險資訊，未來可能成立新的系統，以即時分享相關的資訊。

c. 安全信息和相關資源的保護(Protection of Safety Information and Associated Sources):航空安全有相當大的程度倚賴在事件(incident)或失事事件(accident)分析後，從中學習到的經驗”lesson learned”，因此一個健全的主動提報系統對於安全是有幫助的，但是不見得所有的國家都已建置完善的主動提報系統，以及相互信賴的機制，因此”公正文化(just culture)”需要大家投注更多心力去推廣，ICAO 為促進安全管理和事故調查，將制定新的指導文件，並支持各國針對國情訂定合宜的做法，以建立基本互助信任及報告文化。

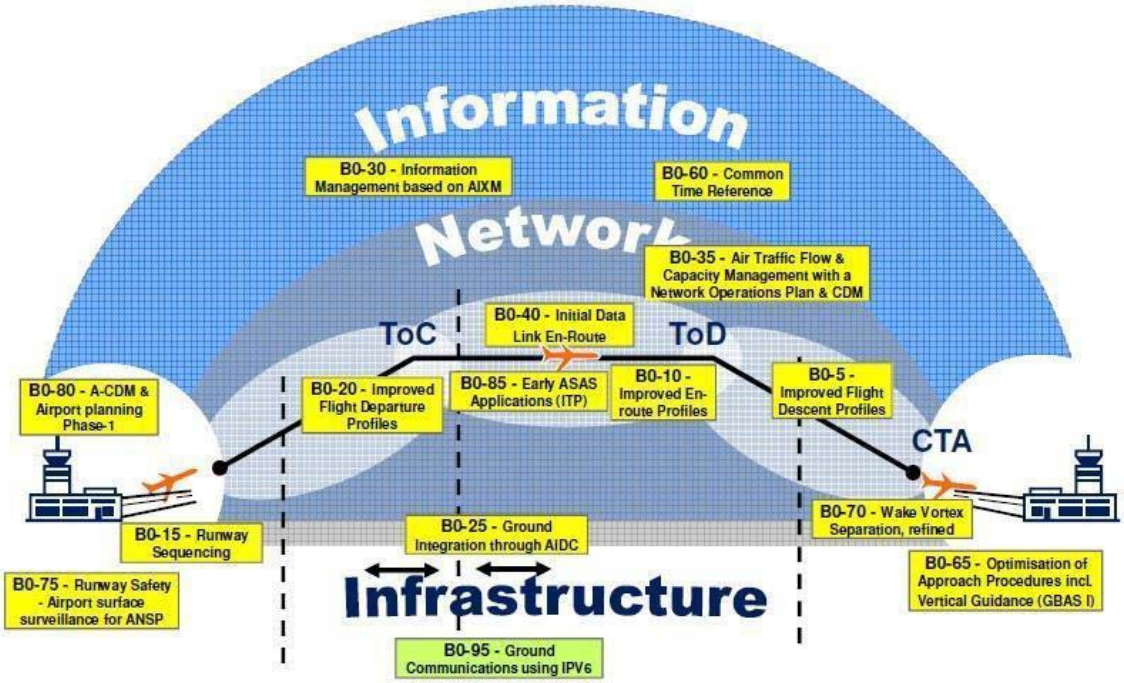
d. 無人載具(Unmanned Aerial Vehicle):國際航空運輸協會(International Air Transport Association，簡稱 IATA)向 ICAO 提交了一份文件，表達遙控飛機在機場附近活動帶來極具危險的嚴重問題，而現在購買無人機非常的方便，不論在店家或是透過網路均能輕易取得，而購買的人往往對航空相關規則和程序是沒有任何的知識跟認知。同樣的 IFATCA 對這樣的情形也感到十分憂心，所以 IFATCA 聯合 IATA 要求 ICAO 對於無人載具應提出具體的作為及措施，包括制定或修訂 RPAS(Remotely Piloted Aircraft Systems)相關法規、對於 RPAS 操作者建立一套完整的教育模式、制定相關罰責以處分那些以危險的方式使用 RPAS 的用戶，尤其是在靠近機場或接近商用飛機的人。

2. 全球導航衛星系統著陸系統(GNSS Landing Systems)

ILS(Instrument landing system)儀器降落系統多年來一直是各國用來提供精確進場裝備，但是該項裝備所費不貲且須定期維護進行校準。在全球導航衛星系統(Global Navigation Satellite System，簡稱 GNSS)發展之後，目前已廣泛被用於航路階段，GNSS 雖具有極高的精確性，但運用在進場階段仍有所限制，但藉由增強系統，包括地基增強系統（ground-based augmentation system ，簡稱 GBAS）和星基增強系統（satellite-based augmentation system ，簡稱 SBAS)，即能克服這個限制，目前 GNSS 已可運用在進場階段，類似於 ILS 的 CAT I，且將朝向 ILS CAT III 方向努力。

3. 全方位資訊管理，SWIM （System Wide Information Management）

SWIM 是一種通過 ATM 系統共享所有飛航資訊的概念，不只包含航空器的起飛時間、速度、高度等，亦會整合周邊如天氣、特殊用途空域等訊息。SWIM 最初是由 FAA 在 1997 年提出，現在則由 Eurocontrol 積極推廣，結合飛航、監視、機場、地形、容量需求、流量管理及氣象等資訊，讓機場、業者、航空公司、飛航服務人員及航機駕駛員等，依不同的需求直接取用資料。



在使用 SWIM，管制員僅需接收所需要的資訊，且管制員不應被納入 SWIM 系統管理影響的因子，除非這直接影響到飛航服務，另外在推動 SWIM 時，應以階段式方式推行，以便管制員融入其管制員作業。

三、 **C 組主席為 Mr. Peter Van Rooyen (南非)，秘書為 Maria Serrano Mule (西班牙)。**

C 組討論議題多為管制員之待遇、訓練、工作環境、人力配置、獎懲制度、權益、責任及法律等有關事項。

1. 疲勞風險管理系統(Fatigue Risk Management Systems)

有關疲勞風險管理是以科學方法、結合飛航資訊與實際飛航運作經驗的一種系統。一開始主要是針對飛航組員量身規劃的，以減少飛航組員因飛時過長、或休息時間不足而間接造成疲勞的發生，並希望可以增進飛航運作效能，並能同時維護飛航安全。

除了飛航組員，其實飛航管制員的作業也是 24 小時不間斷持續提供服務，因此針對管制員工作特性，也應配有相關的疲勞風險管理系統，避免因睡眠不足或長時間清醒，日夜顛倒的作息，影響到管制員的警覺性，反而對飛安造成潛在風險。

會中各國的管制員紛紛提出在該國輪值的方式，像是冰島管制員一次上班時間共計 13 個半小時，但其中有 3 個半小時是休息時間；捷克也是屬於長時間的班務，這樣的班務型態有很多人喜歡；挪威則是三班制，並且被容許可以連續上 16 小時，主要是因為班務期間有足夠休息時間，另外因為工作地點偏遠，大家希望一次來多上點時數，以減少車程往返的時間及次數。

而我國其實也考量到管制員工作型態的需求，為避免疲勞帶來的風險，因此已經訂有飛航管制員班務輪值的方式，要求白班及夜班時數的上限，也要求班與班之間應提供的休息時間，以確保管制員有足夠的時間休息，以達到皮老的管控。

2. 在職訓練交官的角色(the Operational Role of the OJTI)

新進管制學員在訓練期間，其指導教官負有飛航安全職責，IFATCA 並無法要求各國對於事件調查如涉及該國法律層面時該如何處理，但認同事件如果是發生在訓練期間，則應由指導教官負責並接受相關調查。

此種概念亦與我現行調查事件時的原則相同，教官對於學園附有完全的責任，在訓練期間，教官應時時掌握航情的動態，學員如有不合宜的管制，教官應立即介入，以飛航安全為第一優先。

3. 在工作場合可能造成分心的狀況(Distractions at Workplace)

飛航管制是一份需要全時全心專注的工作，除了個人自我要求的專注力外，工作環境、系統等也都應避免造成管制員可能的分心，許多國家並未明確要求管制員不得攜帶手機進入管制室，但實際上手機的確會造成管制員的分心，另外馬爾地夫管制員提到所屬的上級機關在管制室裝置 24 小時錄影系統後，對於馬爾地夫管制員造成莫名的壓力，也在會中詢問此種做法是否合宜?與會國家並未有相同的狀況，此為馬爾地夫政府特殊的管制作為。肯亞則建議 IFATCA 或許可以對 ICAO 提出相關的建議，以確保在管制室裡面的工作紀律，

進而對飛安也有保障。

四、 亞太區地區會議

IFATCA 會員國/地區主要分成 4 大區塊，包含歐洲、美洲、亞洲/太平洋、非洲/中東四大地區，每年年會均會在最後一天的上午召開地區性會議。有關亞太區會議由執行副主席（EVP）Mike O’ Neil(香港)主持。今年大家關心的議題包括公正文化的推廣以及事件調查的方式，職也於會中分享目前我國針對航管違規事件的處理及調查的方式。

亞太地區會議

有關 2015 年亞太區年會由尼泊爾管制員協會主辦，時間訂於 11 月 23-25 日於嘉德滿都舉行，會中尼泊爾管制員熱情邀請大家共襄盛舉。之後稍晚在尼泊爾發生了大地震，亞太區的各會員國也紛紛寄出電子郵件，希望在尼泊爾德管制員一切平安。至於會議是否要更改地點，則需等待亞太區副主席再行通知。

2015 年年會圓滿結束-參加人員合影留念

叁、心得與建議事項

一、 保加利亞管制員協會在今年年會的安排上，其實讓與會人員相當滿意，一抵達機場就送上保加利亞的國花~玫瑰，並安排專車接送至旅館。而第一天的會議可以看出保加利亞管制員協會在會議上安排的用心，當然 IFATCA 負責監督年會的運作多年，也提供主辦單位不少意見跟建議，從一開始需要準備超大會議廳來完成開幕典禮，隨即需在極短的時間將會議廳立即分割成三間會議室，以提供 A、B、C 三組使用，整個流程順暢，絲毫未造成與會人員的不便。而在告別晚宴時，我身旁坐了一位保加利亞女士，本以為她是管制員，聊天後才知道原來這次的活動，保加利亞管制協會請了當地專門辦理國際會議的顧問公司協助，所以 5 天會議的進行相當的順暢。而最令人感動的是最後一天，因班機時間的關係，預計早上 6 點就要離開飯店，主辦單位非常貼心已經在事先安排計程車，當我們到大廳辦理退房時，居然看到保加利亞的管制員已經在等候我們，還幫忙搬運行李上車，我們表達萬分的感謝，希望他有機會來臺灣遊玩，對方很開心的說他在 1997 年以及 2006 年均有參加由我們舉辦的 IFATCA 年會，他對臺灣有非常好的印象跟回憶，而在這次換我們對保加利亞留下非常美好的記憶。

二、 藉由 5 天的研討會，我們利用中場休息時間或是會後與各國管制員交流，人脈的建立其實是需要時間累積的，很多人知道我們是從臺灣來，第一反應都是 1997 年台北年會及 2006 年高雄年會不但熱情招待各國來的管制員，讓他們有賓至如歸的感覺，且年會圓滿成功，因此對於台灣的印象非常好，甚至有他國的管制員詢問我們何時要在爭取舉辦年會，他們可是非常期待。

三、 在這次會議雖針對無人載具進行報告，但實際上不管是 IFATCA 或是 ICAO 並未提出具體的政策或建議，以臺灣來說，目前是以施放有礙飛航安全物體的方式管理，並針對特定對象、視任務特殊性進行個案的審查，但或許可以有更積極的方式進行管理，如對特定重量以下的無人載具，在特定高度以下活動由地方縣市政府自行管理，並針對機

場、限航區、特殊用途空域等公告禁止或有條件式的申請活動，而大型的無人載具，目前 ICAO 並未規範在管制空域內，管制員如何提供航空器及無人載具之間的隔離，因此在臺灣仍以隔離空域的方式進行管制，以在不增加管制員工作量及不改變管制作業的前提下，確保航空器間的安全。

四、 IFATCA 在國際上地位日益重要，IFATCA 亦積極參予 ICAO 相關會議，其專業與意見亦獲得 ICAO 重視。我們每年均能以 ROCATCA 會員身份參加 IFATCA 的年會，不但可以了解到世界各國民航事業發展趨勢，獲得最新的航管資訊外，也藉此機會跟其他國家管制員交流，建立國際協調溝通管道。在會後我們主動詢問其他國家的管制員，交換一些管制作業上的意見，像是本區目前在研擬的縮短跑道隔離作業(reduced runway separation minimum，簡稱 RRSM)，香港管制員就提供不少意見供我們參考。

五、 這次參加會議發現其實許多國家至少都會有 1-2 位管制員每年固定參加年會，並帶領其他的同事一起與會，不但可以維繫固有的人脈，也提攜其他有意願的同事一起參予，不但可以增廣見聞，亦能學習到國際會議運作流程，對於人才的培養很有助益；因此對於 IFATCA 年會我們均應持積極的持續派員參加。

INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

54th ANNUAL CONFERENCE – Sofia, 20th to 24th April 2015

Agenda Item: B.1 **IFATCA 15**

WP No. 75

Report of the Executive Vice-President Technical

Presented by EVPT

Summary

Report of the Executive Vice-President Technical for the time from Conference 2014 in Gran Canaria until March 2015. Where necessary, verbal updates will be provided at Conference 2015 in Sofia.

1. Introduction

1.1. This report covers the activities of EVPT for the period from Conference 2014 until February 2015.

1.2. The entire year has been a busy period for me, in addition to the daily workload of emails and other documents, I have travelled for both internal IFATCA meetings and to represent the Federation externally on the global level. This of course is in addition to working as an operational controller in Sydney - thankfully so far much of my IFATCA time has been on time released from work by my employer, which is greatly appreciated. Assuming I am elected for another term, I will probably delegate a few meetings over to others that reside closer to the rest of the world to reduce my workload.

1.3. As a Federation we have been making significant progress towards many of our goals. Several of the various 'action items' from last year's conference were related to terrain clearance - some of these are being addressed as part of the SID/STAR work by me on the ATMOPS Panel, and others will be raised at a later stage together as a terrain issues package. Another outcome from last year was to encourage ICAO to develop requirements, standards and procedures for remote or virtual tower operations. This will be raised at the ATMOPS Panel meeting during the week preceding conference in Sofia, I will provide an update verbally if necessary. We have also been making progress towards implementing our policies related to Unmanned Aircraft Systems, Service Priority and Fatigue Risk Management Systems. I am hoping we can take advantage of the Regional Seminars this year to address several issues at once under an overarching theme relevant to the region.

2. Discussion

2.1. ICAO Participation

2.1.1. We continue to have a significant level on involvement at ICAO, both at the regional and global level. While at times this may appear expensive, I assure you that the outcomes we are realising are worth the expense. We have been making significant progress in maintaining an operational viewpoint at the decision making level where all too often the impact of procedures to the operational personnel are overlooked.

2.1.2. ICAO is in the process of a "panel modernisation process" to rationalise the amount of panels, study groups, ad-hoc working groups, task forces and so on. It was raised as an issue during the 38th Assembly that the overall number of these groups needs to be reduced to limit the financial burden on States and Organisations. This should benefit IFATCA in the long term, however in the past 12 months and I expect in the immediate future the reshuffling process may have a higher than normal impact on the ICAO budget.

2.1.3. We continue to have significant participation on many panels and other groups, you will find their reports in the other Committee B papers. I would like to thank all our representatives as they sacrifice personal time to advocate for the Federation and for controllers worldwide.

2.1.4. There will be several new panels that I would like to have IFATCA representation on in the future, such as meteorology. This is in response to some policies from the last few years, and expected policies in the future. This will obviously cost us some extra funding, however the money will be well spent in influencing the future direction of the industry.

2.1.5. The Multi-disciplinary Working Group on the Economic Challenges related to the introduction of the Aviation System Block Upgrades (MDWG-ASBU), is working on amendments required to support initiatives in the ASBU's of the Global Air Navigation Plan. It is pleasing to see that some of our IFATCA ideas such as time or airspace based service priority concepts are making their way into this draft material.

2.1.6. We have been providing assistance and feedback to ICAO on their development of an online training program for Performance Based Navigation. At this stage we are providing feedback on the content, to ensure it is relevant, interesting and useful for controllers. We may be able to provide ICAO with a group to trial the course on.

2.2. Throughout the year we provided responses to several ICAO State Letters. Shortly after conference last year we provided a response to proposed emergency descent procedures, which we had also been heavily involved in the development. In October we provided a response on amendments to Annexes 6, 13 and 19 proposed by the ICAO Safety Information Protection Task Force. We recently provided supporting feedback on the proposed changes to Annexes 6 and 11 on Fatigue Risk Management Approaches, which included provisions for air traffic controllers. Unfortunately we missed the opportunity to support the changes to PANS-Training including air traffic controller competencies due to internal coordination. There is an increasing level of professional rather than technical related work coming from ICAO and we are developing a more structured internal process to address state letter that will prevent a recurrence of this in the future.

2.2.1. The 2nd ICAO High Level Safety Conference took place during the first week of February in Montreal. There is a full report on this meeting as another paper, you can refer to that for more information.

2.2.2. In March this year ICAO will host a UAS Symposium where IFATCA will be well represented. I expect there will be some report on that for you.

2.2.3. The conference in Sofia will see the end of Ruth Stilwell's term as the IFATCA representative to the ICAO Air Navigation Commission (ANC). Ruth will be retiring soon and it appears she will henceforth spend her time competing in Marathons on a weekly basis in various locations around the globe. Having been in this role for five years now, Ruth has tirelessly worked to further both the Federation's influence and our reputation at ICAO. Ruth has sacrificed a significant amount of her personal time to spend in Montreal for the cause of the Federation and we thank her greatly for that. She will remain around until later in the year to provide a handover to her successor. I thank Ruth personally for all the support she has provided and wish her all the best for the future.

2.3. **Technical & Operations Committee**

2.3.1. The first TOC meeting for the year was held in Miami during September. The facilities organised by Ruth were impressive, and the meeting was extremely productive. We were joined by representatives from ICAO and IATA, in addition to our usual representative from IFALPA. This recent increase in external cooperation and coordination adds valuable perspective to the committee's discussions, and also places our eventual policies in a much better form to take action on.

2.3.2. The second meeting was held during January at Austrocontrol in Vienna. Again, the facilities organised by Alfred and his colleagues were excellent, and it was a very productive meeting.

2.3.3. For more information you should refer to Chairman Ben's report on the TOC.

2.4. **Executive Board**

2.4.1. The week after the ATMOPS in September was the EBM which I hosted in sunny Sydney. It was a pleasure to invite the rest of the EB travel all the way to Australia. The new EB is functioning very well and it has been great working on the team for the past 12 months. I am glad to see that most, if not all of us will continue working together for the near future. There is much the Federation can accomplish, but we need a strong and ambitious leadership to achieve to achieve this.

2.4.2. As EVPT I was pleased to attend the Africa & Middle East Regional Meeting held during November in Lusaka, Zambia. This gave me a valuable insight into the unique aviation environment that is Africa. The EB is working with EVP AFM to develop some initiatives that can assist in this region. I am committed to providing all the support I can to this region and at this stage will be returning to the next AFRM in Accra later this year.

2.4.3. I am currently on a plane on the way to the second Executive Board Meeting in Las Vegas, followed immediately by the NATCA Communicating For Safety (CFS) conference, also in Vegas. The CFS conference is a great example of an educational seminar that should be reproduced albeit on a smaller scale in other regions. Next year (2016), NATCA will host the IFATCA annual conference the week following CFS, so if you have time to take leave for the week before you will be able to attend the CFS, I highly recommend it.

2.5. **Global teams**

2.5.1. The Executive Board is looking at reincarnating the Global Teams and will be reviewing the structure and roles of the various teams. This will be an ongoing process designed to make the most out of the resources we have and to better align their roles to functions that we require. Over the next few months we will look at the best options

available and it is likely that some Global Teams will be dissolved, and some others will take shape. This is no way a reflection on the excellent work that all the teams have been doing, it is just a restructure to make us as effective as we can be.

2.6. **Moving Forward**

2.6.1. As many of you would know, the Technical and Professional Manual (TPM) contains all the approved policies of the Federation. These policies are essential, and provide guidance to our Member Associations and also all our representatives at the regional and global levels. These policies are used as guidance by our experts to consider changes in technology and procedures, and they also present our position on issues to other organisations - and the world in general. We must therefore always consider the purpose of any policy – we must ask, what is the aim of this statement? A simple statement of "no" *can* serve a purpose, but rarely – more often than not this will lead to our exclusion from the development process, removing any opportunity for influence that existed, no matter how futile that may have been. We should consider more statements that aim for an outcome – if we want something then say it – make policies clearer and less ambiguous or as you know I like to say "less fluffy". A policy stating basically that "things should be more better" is far less useful than a policy that "supports the concept of [thing] provided that the following criteria are met…". Sometimes I do think we spend a disproportionate amount of the very limited time in Committee B debating the capitalisation of a letter, or some other thing that is editorial in nature, rather than the purpose and overall substance of the policy in question. I am similarly concerned that there is a misconception that a paper without a policy proposal is a waste of a paper; this is definitely not the case. One of the greatest opportunities a conference paper presents is to educate – this is one of our objectives as a Federation- this does not require a policy of any sort. Do not treat information papers as any less than their counterparts. When we consider policy, we must ensure it is actually required and has a clear purpose. It is about quality, not quantity.

2.6.2. At this stage I expect to be re-nominating for another term, I am currently negotiating arrangements for release for IFATCA duties with my employer and assuming this is somewhat successful I look forward to working with everyone for another two years. It has been a pleasure and I still have many things I would like to do. I want to continue what I have started. I would be pleased to be your EVPT for another term.

3. Recommendation

It is recommended that;

3.1. This paper is accepted as information material.

- END -

INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

54th ANNUAL CONFERENCE, Sofia, Bulgaria, 20th to 24th April 2015

Agenda Item: B.3* **IFATCA 15**
WP No. 76

Report of the Technical and Professional Secretary

Presented by Joy Bhattacharya

1. Introduction

1.1. This report covers my seventh year as TPSec.

2. Discussion

2.1. Annual Conference 2014 reappointed me as TPSec for a period of two years.

2.2. Technical and Professional Manual (TP Manual)

2.2.1. The TP Manual 2014 updated till Gran Canaria Conference was published in July 2014 in coordination with the EVPT, EVPP, Chairman TOC and Chairman PLC.

2.2.2. From the 2010 ed., TPM was divested of the Working Papers which led to the POLSTATs. Ever since only a reference is made at the end of the POLSTAT about the Working Papers that were involved. The reason was to make the TPM more portable and concise. This though became a problem as one had to go hunting in order to reference the WPs to research how a recommendation was arrived at.

2.2.3. Bill Holtzman (TOC-USA) found the solution to this by putting together the TPM online alongwith the WPs. Now apart from the Manual which defines the Technical and Professional policies of IFATCA, one also has the facility to search them online alongwith the relevant WPs through the Online TPM.

2.2.4. The online TP Manual with the WPs is available at www.ifatca.us through an online registration process.

2.3. Meetings

2.3.1. I was unable to attend any of the TOC/PLC Meetings this year.

2.3.2. The EVPT has indicated that depending on the reorganisation of TOC and PLC, the TPSec will most likely not be funded by TOC to attend TOC/PLC meetings due to budget constraints.

2.4. IFATCA Weekly E-mail News (IWEN)

2.4.1. IWEN has been regularly published every week during the period of the report. IWENs are emailed weekly to all MAs, EB members, IFATCA Reps, TOC, PLC and entities like the IFALPA etc. The documents accompanying the IWEN as well as the archives can be accessed through www.atcguild.com/iwen/iwennet.asp.

2.4.2. The IWEN is sent to 219 individuals by email at the last count. There are two types of information in the email version. Some of the information is visible to all while others require a member to login into the IWEN website to read them. The ones which require login are those which are little sensitive in nature and is

deemed not suitable for viewing by non-IFATCA members (e.g. Meeting reports of IFATCA reps).

2.4.3. ICAO State Letters / Bulletins are coordinated through the Office Manager and Liaison Officer to ICAO Air Navigation Commission (LOANC) for subsequent promulgation to the members through IWEN.

2.4.4. Presentations given by IFATCA Reps at various forums are disseminated to the members through IWEN.

2.4.5. My concerns about readership of IWEN by our MAs remain. Despite the IWEN being published every week only some 750 visits were logged in the IWEN website during the last year. To augment readership, notices are posted in the IFATCA facebook page to inform members when a new edition is published.

2.4.6. All reports or documents for distribution within the Federation should be sent to iwen@ifatca.org for inclusion in the IWENs.

2.4.7. I request all MAs to send regular summary of activities being carried out by their respective associations to iwen@ifatca.org for inclusion in IWEN.

3. Conclusions

3.1.1. TP Manual ed. 2014 was released in July.

3.1.2. I was not able to attend IFATCA Meetings after the Conference in 2014.

3.1.3. IWENs are being published regularly. All MAs should ensure that they receive IWENs and further distribute it among individual members.

– END –

INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

54TH ANNUAL CONFERENCE – Sofia, Bulgaria, 20-24 April 2015

Agenda Item: B.4.1.1* **IFATCA 15**

WP No. 77

Report on the ICAO Air Navigation Commission

Presented by Liaison Officer to ICAO Air Navigation Commission

Summary

A review of ICAO activities and issues for the IFATCA ANC Representative for the year since last conference. This report covers those topics before the ANC that are particularly relevant to ATCOs.

1. Introduction

The activities of the Liaison Officer to ICAO Air Navigation Commission since conference in Grand Canaria included the 196th, 197th, 198th sessions of the Air Navigation Commission, 2 meetings of the Next Generation of Aviation Professionals Task Force, the NGAP Symposium, serving as Advisor to IFATCA's Panel member on the Remotely Piloted Aircraft Systems Panel, the RPAS Symposium, the ICAO High Level Safety Conference, two joint meetings of TOC and PLC, 7th Conference of the International Association for the Advancement of Space Safety, 2nd Manfred Lach International Conference on Global Space Governance, the Multidisciplinary Workgroup on the Economic Challenges for the Implementation of Aviation System Block Upgrades, and various Commission Group meetings. It was a very productive year for IFATCA issues and our participation in the ICAO process continues to increase.

2. Discussion

2.1. *ANC 196th Session*

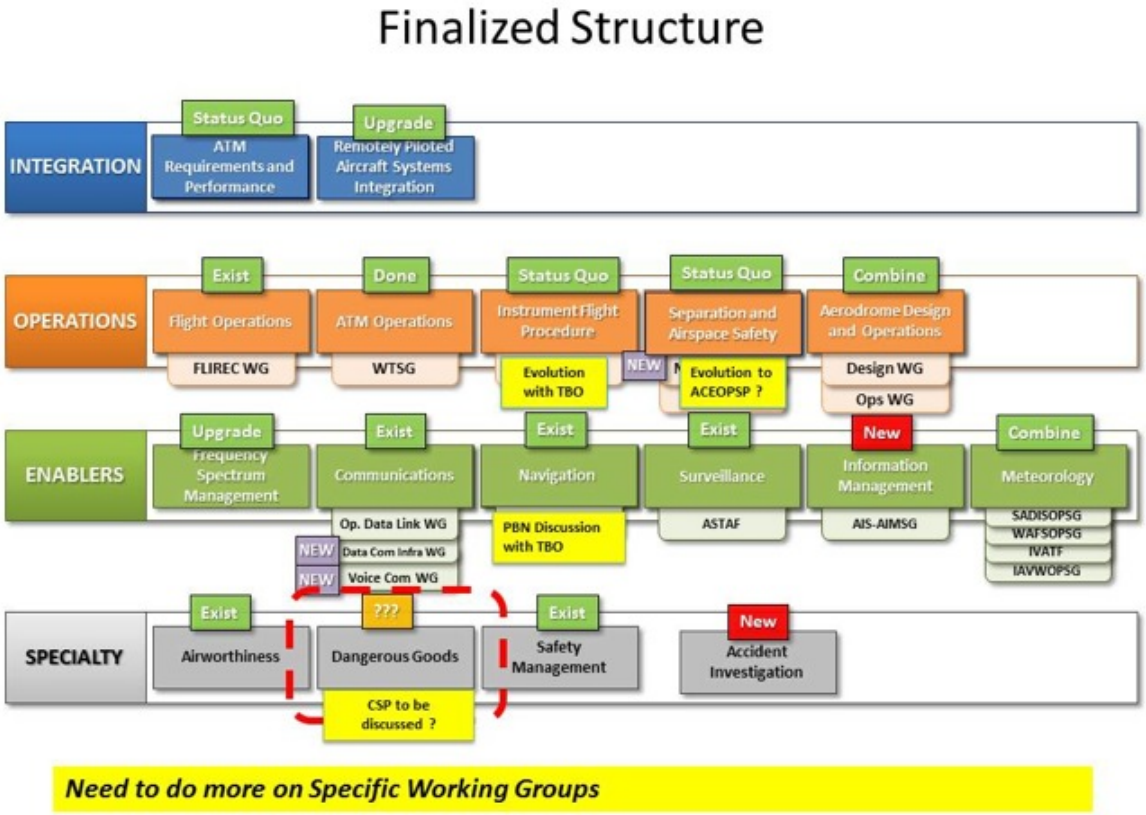
2.1.1. Within the work of the Air Navigation Commission, the reorganization of panels as a portion of the restructure of the ICAO work plan continued to make progress.

2.1.2. The UAS Study Group was formally transformed into the RPAS Panel. It is not expected that the day-to-day work of the group will be disrupted, however this change is appropriate to allow for the next phase of work, which will include the development of SARPS.

2.1.3. The Commission made several modifications to the internal administrative ICAO documents regarding the conduct of meetings, including the Air Navigation Commission Procedures and Practices document. The modernization of these documents will provide the panels with additional meeting latitude particularly with regard to requirements for translation services.

2.1.4. The overall ICAO work programme prioritization effort continued several panels were restructured or renamed. There is still some ongoing discussion regarding the transition of the Dangerous Goods Panel to the Cargo Safety Panel.

2.1.5.



2.1.6. The work product from the Safety Information Protection Task Force (SIP-TF) progressed to preliminary review and was sent out for State Consultation over the Summer. It included amendments to Annexes 6, 13, and 19. The implementation of these amendments may present specific challenges as a result of the need to coordinate with judicial authorities. There was debate as to whether the proposal should be sent out for state consultation now, or if it should be held back until the entire package of proposals from the Safety Management Panel is complete. Based on the anticipation that additional coordination will be required by the States, it was decided to move forward with State consultation.

2.1.6.1. The term non-punitive was replaced with the concepts of appropriate and inappropriate use to determine levels of protection. This approach provides greater clarity and is not subject to different cultural perception of “punitive” and with regard to protection of data, the concepts can be applied to both voluntary and mandatory reporting systems. The proposal advocates for the development of voluntary reporting systems, and recognizes that these systems will not exist in a valuable way if the protection mechanisms for both the data and the submitters are not in place. The ability to use the data for corrective, remedial, or preventive actions depends on a healthy safety reporting process. Specific attention was given to information generated through accident or incident investigation. The TF worked to identify guidelines for the development of a balance test between ensuring the integrity of an accident investigation and the administration of justice.

2.1.6.2. Safety information exchange was elevated from a should to a shall. This provision is specifically to allow the free exchange of safety data among users of the aviation system. This would expand the global availability of systems similar to the ASIAS.

2.1.7. The final review of proposed amendments to Annex 14 and PANS Aerodromes consumed a considerable amount of the schedule, as did the proposals on the transport of dangerous goods, particularly the proposal to ban transport of lithium metal batteries on passenger aircraft. The FAA test videos from the Tech Center were particularly useful in illustrating the risks involved with continuing to allow the transport of these batteries. The Dangerous Goods Panel had lengthy and extensive meetings that were often very contentious. While is it an important safety issue, the air traffic controller requirements are limited and my engagement was on the handling of an emergency aircraft transporting these goods.

2.1.8. The Commission approved amendment 6 to the PANS-ATM which included CPDLC in In Trail Procedure (ITP), ADS-C, Volcanic Ash, SLOP, Terminal Separation, and consequential amendments related to Phraseology. Amendment approval is the final stage in the ICAO process and as such is the completion of work on these proposals.

2.1.8.1. The CDPLC amendment for ITP included the insertion of definitions for ITP aircraft and ITP distance. The CPDLC proposals related to Data Link initiation is follow on work from problems identified with CPDLC log on in identified in the investigation of AF447. New language was introduced to ensure that flight crew and ATC are notified when an initiation failure occurs and provides the actions to be taken in that event.

2.1.8.2. The separation standards included the need for additional separation for aircraft turning via a flyover waypoint due to the requirement for the aircraft to fly over a point prior to initiating a turn, this is not required for flyby waypoints. GNSS was added to the separation provisions for NDB and VOR navigation, which included a requirement that the standards are only to be used when SLOP is not being applied. Dead reckoning was deleted as a navigation means for the application of procedural separation. Longitudinal separation standards were included for ITP. Bjarni Stefánsson, IFATCA's rep on the SASP was instrumental in the development of these standards and ensuring they progressed successfully through the ICAO process.

2.1.8.3. Chapter 11, Air Traffic Services Messages was amended to delete WATER PATCHES and FLOODED and instead a definition for STANDING WATER was included. Phraseology for surface friction to include medium to good as well as standing water was added.

2.1.8.4. Procedures for ADS-C agreements were added to chapter 13 which included the need for deviation event contracts.

2.1.8.5. The ATS unit procedures in the event of a forecast or reported ash cloud were incorporated in PANS-ATM following the multi year work of the International Volcanic Ash Task Force. The provisions were updated to reflect the Manual on Volcanic Ash, Radioactive Materials and Toxic Chemical Clouds. It also made changes to eliminate generic requirements that would cause excessive reporting to unaffected aircraft and reinforced the pilots in command authority regarding transit through areas of forecast or reported ash. Again, Bjarni Stefánsson provided invaluable support to ensuring this amendment did not have an adverse effect on air traffic controllers.

2.1.8.6. The amendment included substantial clarification to text regarding Strategic Lateral Offset Procedures (SLOP) specifying the coordination requirements and defining the airspace in which SLOP can be authorized.

2.1.9. The Commission was tasked with review of the consolidated annual of the Planning and Implementation Regional Groups (PIRG) and Regional Aviation Safety Groups (RASG). Among other administrative reviews, the Commission reviewed the need for and approved a 2nd High Level Safety Conference, the 197th ANC work programme, and a MET divisional meeting.

2.1.10. The recommendations of the Flight Recorder Panel (FLIREC) regarding definition of automatic deployable flight recorders for airplanes and helicopters advanced through preliminary review and was sent for State consultation. This proposal has been under development for some time and the proposal for the carriage of ADFR was advanced last fall. However the definition of ADFR was sent back to the panel for further consideration. This proposal was the adoption of the definition portion.

2.1.11. The NGAP advanced a large amendment to PANS-TNG (Training) to facilitate the transition to a competency based model. The amendment went through preliminary review and was sent for State consultation. This work was sparked by the PLC activities in 2011 that helped guide the ICAO approach on developing training requirements.

2.2. ***ANC 197th Session***

2.2.1. The ICAO proposal on Emergency Descent was advanced through Final Review with minor changes as a result of the State Letter process. IFATCA agreed with comment in coordination with TOC. Most changes to the proposal as a result of the state comments were editorial in nature with the exception of the decision to strike reference to setting ACAS to TA mode when in an emergency descent. There was significant disagreement between aircraft manufacturers with regard to the appropriateness of this action. In addition, IFALPA, IFATCA and IATA shared the concern that this may not be the preferred course of action in all emergency descent situations and were concerned that its inclusion in the list would imply a mandatory action. The secretariat agreed to strike the explicit reference and leave in place a note referring to ACAS operations when an aircraft is in a degraded mode as referred to in PANS-OPS Vol I, Part III, Section 3, Chapter 3. That reference states, "The normal operating mode of ACAS is TA/RA. The TA-only mode of operation is used in certain aircraft performance limiting conditions caused by in-flight failures or as otherwise promulgated by the appropriate authority." It was accepted that this reference would provide the necessary latitude for the operators without creating pilot confusion.

2.2.2. The recommendations from the Aerodromes Panel were processed early in the session and had little or no implications for air traffic control. Runway arresting systems continue to be a significant area of debate.

2.2.3. The IATA led, and ICAO counterpart, Task Forces on aircraft tracking continued work this session. Both groups are adopting a course of action that the responsibility to track aircraft for the purposes defined by the task forces are the responsibility of the operator and not an air traffic control function. However, the proposal offered by the secretariat prior to the High Level Safety Conference was an increased reporting requirement in procedural airspace. While the intent may be to use means other than ATC, it is not clear in the proposal. The state comment period will be following the 198th session.

2.2.3.1. There continues to be discussion on the obligations or necessity for general and business aviation operators to meet future aircraft tracking requirements. While IFATCA is not a direct participant on these task forces, we continue to monitor the activities to ensure there is not confusion between tracking aircraft for the purposes of air traffic control and tracking for purpose of locating an aircraft by the airline operations center. This effort was initiated in response to the disappearance MH370.

2.2.4. The ATMOPS panel met during the first week of the ANC session and provided a comprehensive debrief of their work regarding the proposal for amendment related to SID STAR phraseology. Both the ATM OPS and the FLT OPS Panels have reviewed this material and devoted considerable resources to identifying a workable and globally adaptable solution. It appears that "VIA" has gained acceptance and will be

adopted however there continues to be discussion regarding the use of "UNRESTRICTED" as a means to cancel published level restrictions. While "UNRESTRICTED" is the preferred phraseology, there are difficulties with pronunciation in certain regions. In addition, the question of published speed restrictions is called into question when "UNRESTRICTED" is used. The panel has developed a comprehensive proposal that would address these concerns however work is not yet complete.

2.2.5. The report of the MET division was processed this session as well as NATSPG. Neither report generated changes relevant to air traffic controllers at this stage.

2.2.6. The Global Aeronautical Distress and Safety System Concept of Operations, GADSS CONOPS, was reviewed in the ANC Strategic Review and Planning process. While the report is regarded as fairly mature, there were concerns about the validity of the cost estimates. Work is ongoing in this area and the next session will consider the topic as well as the High Level Safety Conference.

2.2.7. The Task Force Related to Conflict Zones continued to meet and the report of the TF RCZ will be presented at the High Level Safety Conference in 2015. Following this event, ICAO will work to determine what standards will need to be developed in response to these groups.

2.2.8. In preparation for the HLSC, the commission discussed the proposal from states that policy documents like the GASP and GANP should have a consultation process when they are updated. ICAO believes that the HSLC is the venue for state consultation for these documents. There was substantial concern that while states may be in a position to propose modifications to the GASP and GANP at the HLSC, they may not be able to offer the level of consultation that would be achieved if changes to the documents are sent out through a state letter process. In my assessment, if the update process for high level policy documents are structured to have the same level of consultation as required for SARPS, these kind of documents lose some of their value. The documents provide a framework for the States, but do not impose specific requirements on them. The full state consultation process is designed for amendments that impose specific burdens on the states, which is why guidance material does not go through this process. States and International Organizations who are interested in specific topics have the opportunity to participate in the development and modification of ICAO documents in expert groups. While the process may not always produce the exact outcome an individual participant may desire, as the material does not result in a standard or recommended practice, the consequences of material that does not meet a particular State's need is negligible. These documents should be seen as a tool for the States and not place additional burdens, even for consultation upon them.

2.2.8.1. Fundamentally, the ICAO document framework is structured for specific purposes. Amendments to PANS and Annexes are subject to a comprehensive review and state consultation process specifically because they impose a burden on the States. This ensures that the states have the opportunity to intervene whether or not they participated in the expert group forming the proposal. The process is, by design, an extremely slow and cumbersome one, specifically because of the burden it imposes. Guidance material and high level policy documents are designed to serve as a resource to the States, providing information and support on emerging issues, but without imposing a regulatory burden. For guidance material, it presents an opportunity to get quality information out to all States by building on the expertise and experience of the participants in the expert groups. The utility of these documents rely on the ability of ICAO to produce material in a timely fashion. While individuals may posit from time to time that guidance material should not be produced prior to SARPS, this is a debatable concept. Certainly, complex SARPS should include guidance

material to support their implementation, however the absence of agreed standards should not prevent ICAO from producing supporting materials for States facing new challenges, particularly as it relates to rapidly emerging technologies.

2.2.9. The session included a great deal of discussion on the proposed amendments to aerodromes. As always the topic of arresting systems and RESA generated discussion. One of the significant concerns with arresting systems is that the protection is provided for overruns but not undershoots, while the runway end safety area provides protections for both. While runway excursions are a highlighted area, the Asiana crash in 2013 serves as a reminder that undershoots remain an existing concern. The amendments package for aerodromes included questions of accommodation for people with deficient color vision in the runway lighting proposals. This issue will be developed further. It is important to note that he rapid development in new technologies need to be coordinated across many domains, for example, synthetic vision systems are being developed to support low visibility operations based on current lighting standards. At the same time, new lighting standards utilizing LED lighting at airports to reduce costs and maintenance. Many synthetic vision systems rely on a heat signature from the lights that does not emanate from an LED system.

2.2.10. With regard to the Panel Modernization process and the transition of full Panels into new Panels, working groups into Panels or Panels into work groups of other Panels, has not been without challenges. The bureaucracy of having members reappointed seems to have slowed the process. Also, as we saw from the creation of the Safety Management Panel, the creation, or perceived creation, of a new panel generates a great deal of interest for participation. The RPAS Panel, while intended to address the unmanageable size of the UASSG had the opposite effect and the Panel is now the largest in ICAO, even to the extent that it limits the ability for the Panel to meet due to the size of the rooms needed to accommodate the group. Hopefully, the number of advisors will be reduced for future meetings and the enthusiasm will wane for future meetings. ATMRPP will remain a stand alone panel with its existing membership, the invitations are being determined for METP and AIGP.

2.2.11. ATCO FRMS became a surprisingly controversial issue, due in part to the arrival of new commissioners that were unfamiliar with the preceding work. Although the issue had been a product of the 12th Air Navigation Conference, was endorsed by the Commission, and an expert group had produced comprehensive recommendations that were consistent with the work on Pilot FRMS, two commissioners made an attempt to derail the effort and preclude it from moving forward to the state consultation process.

2.2.11.1. One effort was to define fatigue as a medically disqualifying condition within the context of Annex 1. That would essentially place the entire burden for fatigue management on the license holder. This proposal did not reflect an understanding of the difference between a medical condition and a physiological state. Fatigue is a physiological state for which medical treatment is unnecessary and as such would not be appropriate to identify as a medical condition within the scope of Annex 1. In addition the obvious deficiencies in the proposed approach, the identification of fatigue as a medical issue could lead to industrial issues, particularly if an employer deemed symptoms as common as yawning were a cause for certificate action.

2.2.12. The Commission Ad Hoc Working Group on Standards making organizations produced their final report including specific recommendations for developing suitable arrangements for working with standards making organizations, the proposal was forwarded to the Secretariat and is expected to be presented to the Commission in the 198th session.

2.3. ***ANC 198th Session***

2.3.1. The 198th session will not conclude before the deadline for submission of this report, however, it will have concluded prior to the IFATCA Conference and a verbal update will be provided for the delegates.

2.3.2. The proposal for a 15 minute reporting requirement for aircraft tracking purposes progressed through preliminary review prior to the HLSC. IFATCA expressed concern about using the ATC communications infrastructure for this purpose and TOC members, particularly Rick Taylor, provided valuable real world experience with both the HF and CPDLC systems. This feedback was introduced into the discussion, however given the timing of the HLSC and the pressure from MH370 remaining missing, the proposal was advanced to the States for comment without protections for the ATC communications networks. The ICAO secretariat was sympathetic to our concerns but early State feedback was desired, as the proposal did not go through the Panel process.

2.3.3. The proposal for separation of aircraft on arriving and departing runways is a new procedural standard for PBN approaches is a fairly straightforward proposal but the illustration provided for guidance created some confusion. The illustration was sent back to the panel for clarification and the proposal is before the ANC for preliminary review.

2.4. ***High Level Safety Conference***

2.4.1. While I anticipate a full report to the Conference from the Chief Delegate for IFATCA on the HLSC, there were a few noteworthy items related to the work of the ANC that were of interest to IFATCA during the event.

2.4.2. IATA offered a paper on the need for ICAO to encourage States to promulgate regulations and take enforcement actions against violators on the operation of UAS in the vicinity of aerodromes. IFATCA fully supported this paper and has been working with IATA in raising this as a priority.

2.4.3. There were several papers with regard to the protection of safety information and its sources, IFATCA supported most of the papers in the batch and intervened in that regard. In addition, IFATCA partnered with IFALPA to ensure the conclusions of the meeting included the protection of the sources of safety information in addition to the protection of the data.

2.5. ***7th Conference of the International Association for the Advancement of Space Safety***

2.5.1. The Conference included a number of topics of interest to aviation and air traffic control, particularly with regard to the collision risk with space debris. There were a number of presentations made on the state of the technology available to track space objects and debris and the ability to model the trajectory of debris in orbital decay. Some presentations on the collision risk to civil aviation were challenged at the conference on the premise that there have been no civil aircraft accidents attributed to collision with space debris. One presenter pointed out that while there is not a specific attribution to space debris, there are accidents where consideration is given to collision with unknown objects.

2.5.2. The International Association for the Advancement of Space Safety advocates for ICAO to expand its role to include commercial space operations. ICAO has agreed to host a learning group to begin the discussions in this area. There have been suggestions along these lines for several decades and it appears there is now movement in that direction. It is clear that ICAO has an interest in the operational phase below FL600, it is unclear where that interest ends. In addition, the

contribution of unmanned aircraft systems particularly those designed to operate for long periods of time at high altitudes to provide a communications network to compete with satellites will further blur the regulatory lines.

2.5.3. ICAO will host a joint Symposium with the UN office of Outer Space Affairs prior to the Conference, a verbal update will be provided.

2.6. ***RPAS P***

2.6.1. I served as advisor to the IFATCA Panel member at the RPAS P and was assigned to the Detect and Avoid subgroup (report attached). The IFATCA Panel member served on the ATM Integration working group which met concurrent with the Detect and Avoid group. The group will review the various Annexes to identify where amendment is necessary to address the RPAS detect and avoid issues. I am the assigned coordinator with the working group for ATM Integration with regard to Annexes 2 and 11.

2.6.2. One of the challenges facing the detect and avoid group is in determining what value is assigned to pilot visual acquisition of traffic in airspace where all aircraft are under positive control. Since this is not always available to manned aircraft, i.e. IMC, what standard should be applied to a detect and avoid system operating in this airspace when see and avoid is not required? I confirmed with the SASP that no credit is given to visual acquisition or TCAS in the development of separation standards and the safety modeling. In the development of a detect and avoid standards, the presumption is that it should be equal to manned aircraft, but there is a question whether it is rational to produce standards that are higher than those for manned aircraft. I have presented this question to the ICAO secretariat.

2.6.3. Members of the remote pilot licensing group sought information on the relationship between pilot training and air traffic controller success rates. I was able to identify some FAA studies on the topic and deliver some perspectives from other countries thanks to timely input from TOC members and other participants in IFATCA technical work. However, there is little data that makes a definitive link between ATCO training success and pilot experience as some studies show a negative correlation while others showed a positive correlation.

2.6.4. In the informal discussions with the RPAS P and members of the Commission, one Commissioner raised the issue (which has been brought up before) of the creation of an entirely new Annex for UAS operations. While this is not a Commission position, the question has caused a considerable amount of discussion. On the surface, this may appear to simplify the work of the Panel when compared to the integration of RPAS into the existing annexes, however, an examination of the proposal illustrates that it is not the case. The creation of a new annex does not absolve the Panel of the requirement to identify areas where they would conflict with existing ICAO documents. In addition, the integration of UAS into civil airspace is not an exclusive function of the RPAS community. The very premise of integration of UAS into the existing civil airspace is antithetical to the development of a segregated annex. While the operation of UAS may be appropriately contained in a stand alone part of Annex 6, in the same manner that GA or Helicopters have their own part of Annex 6, the issues addressed in the other annexes will require incorporation of UAS.

2.7. ***Multi-Disciplinary Work Group on the Economic Challenges for the Implementation of Aviation System Block Upgrades***

2.7.1. This work group was formed at the urging of IATA in order to examine the viability of operational and financial incentives to encourage investment in equipment to allow for the implementation of advanced procedures called for in the Global Aviation System Block Upgrades. IFATCA presented a paper on equipment based service priority at

conference in 2014 that was well received by the delegates and supported by IATA. Many of the elements of the paper were included in the recommendations under development by the MDWG.

2.7.2. The mandate of the work group has been expanded by the secretariat which may dilute the focus and has caused some concern for the participants.

2.8. ***The Next Generation of Aviation Professionals Task Force***

2.8.1. These meetings represented the transition from the development to implementation stage for NGAP Activities as they relate to the competency based framework. During these meetings I also transitioned out of the position and transferred IFATCA responsibilities to Jean-Francois LePage of CATCA.

2.8.2. The Symposium provided some excellent briefings on the experience from ANSPs who have implemented a competency based framework, illustrating how it can provide additional tools to On-the-Job Instructors to address issues during the training process and before formal assessments. The presentations were very effective and will lead to the ICAO roll out of regional workshops.

2.8.3. ICAO will present a workshop designed for the controller audience at the IFATCA annual conference in Sofia. This will not only provide the opportunity for controllers to get a detailed presentation on the competency based training processes, but will also facilitate ICAO's identification of regions and states where workshops will generate the most interest. All IFATCA Conference delegates should attend the workshop.

2.9. ***Global Flight Tracking Meeting***

2.9.1. Largely in response to the difficulties in the recovery efforts for MH370, ICAO convened a Global Flight Tracking meeting to discuss the issues and potential solutions. The initial two-day meeting led to a task force headed by IATA and the formation of a multidisciplinary ad hoc group at ICAO, comprised of Panel Chairmen, senior members of the Secretariat and three Air Navigation Commissioners. Despite certain misinformation reported in the Press, the meeting did not support the use of cloud technology for the collection of in flight data. The meeting made it clear that the target for tracking would be an airline responsibility, not air traffic control. IBAC and IAOPA operators were not targeted for new requirements. IFATCA was not invited to participate in either the IATA task force or the ICAO ad hoc group however we monitored the work of both groups and intervened on the proposals for increased reporting requirements, expressing our concern that ICAO must ensure this requirement does not strain the ATC communications infrastructure rendering it unavailable or unreliable for ATC purposes.

2.10. ***2nd Manfred Lach International Conference on Global Space Governance***

2.10.1. There are ongoing discussions regarding the need for an international agency to provide more technical regulatory support for the conduct of commercial space operations. In addition to the developments in the area of space tourism, satellite launches are becoming an increasingly commercial, rather than state, operation. Existing regulatory frameworks related to ownership, liability, and access are not appropriate or adequate for the emerging environment. For example, the global liability scheme places the liability with the state of launch. While this may have been appropriate in an environment where the launch was a state operation, it does not reflect the current state of operation. In addition, ownership of the satellite could be transferred after launch. Decades later, due to time, abandonment, or inadequate maintenance, orbit decay could cause a hazard to citizens of another state. Under the current legal framework, only the state of launch bears responsibility for any damage caused by debris from the degraded orbit.

2.10.2. With regard to space transport or tourism, issues become more complex. While passengers are treated under the framework of informed consent, there are not adequate liability frameworks for risks to people not engaged in the transport. This area crosses into traditional airspace policy as the “space” vehicle must transit civil airspace in exit and re-entry. In addition to collision risk, environmental risk, and noise concerns, the issue of airspace access needs to be addressed. The proximity of a spaceport to a commercial airport, or as in the case with the envisaged space plane, launching at commercial airports, is a significant disruption to civil aviation operations. The balance of access between commercial aviation and commercials space operations is as yet, unaddressed.

2.11. ***RPAS Symposium***

2.11.1. The RPAS Symposium will occur after the submission deadline for this report and a verbal update will be given to Delegates at Conference.

3. Conclusions

3.1. IFATCA had continued to build its input and influence at ICAO. The work of our representatives is apparent in the materials as they progress through the ICAO process. It is important to maintain our influence not only through the professional products we produce at conference, but by supporting the work of our representatives at every level. This progress reflects tangle benefits for the air traffic control profession and our member associations.

4. Recommendation

It is recommended that this paper be accepted as information.

- END –

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- Attachment

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- IFATCA Meeting Report	
Meeting attended:	RPAS Panel – Working Group 3
Place/Date:	**Montreal, CANADA/ 17-21 November 2014**
Attendee Name:	**Ruth Stilwell**
E-mail:	**Ruth.stilwell@gmail.com**

Next Meeting	
Place:	Montreal, QC
Date:	23-27 March 2015

Executive Summary

Attended meeting as Advisor to IFATCA Panel Member, Chris Stephenson at first meeting of RPAS Panel, following the dissolution of the ICAO UAS Study Group. This transition was part of the overall ICAO Panel Modernization process and as the first major transition in this process, the transition was of particular interest to the Air Navigation Commission. Throughout the meeting, I participated in the breakout sessions of Working Group 3, Hazard detection & Avoidance, ACAS interoperability, at the direction of and in coordination with our Panel member.

Report

The transition to a new panel and subsequent new working groups was not without organizational challenges. The primary change for the former Detect and Avoid WG was to transition from the development of guidance material to the identification of possible SARPS to be developed and drafted by the Panel.

Much of the meeting was spent in a discussion of the standards needed for a Detect and Avoid (DAA) system to operate in various classes of airspace and what allocation can be assigned to the conflict management systems in the safety equation. The ICAO document 9854 paragraph 2.1.8 states, “Conflict management will limit, to an acceptable level, the risk of collision between aircraft and hazards. Hazards that an aircraft will be separated from are: other aircraft, terrain, weather, wake turbulence, incompatible airspace activity and, when the aircraft is on the ground, surface vehicles and other obstructions on the apron and manoeuvring area. The working group discussed whether the standards for a detect and avoid system needs to increase in the airspace classes where conflict management services are not provided to all aircraft. The issue of non participating aircraft, vehicles, objects and other hazards continue to present challenges for standards development.

While this group will serve to identify the areas where standards are needed, the engineering standards and technical analysis will require the inputs from areas with additional expertise. The initial work of the group will be to evaluate each of the ICAO Annexes and relevant PANS to identify areas where amendment is needed to reflect the integration of RPAS and to coordinate with the other Panel Working Groups. I was assigned the review task for Annex 11 and the coordination role with WG6. During the week I held an initial meeting with the 3 members of WG 6, Strategy, integration into Air Navigation System, also tasked with the

Annex 11 review. We developed a coordination strategy for the development of the work before the next meeting.

Essentially, the WG spent most of the time this week structuring the work programme and activities to meet the requirements of the job cards. Substantial progress is expected between the meetings in preparation for the March meeting.

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INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

54nd ANNUAL CONFERENCE - Sofia, 20th to 24th April 2015

Agenda Item: B. 4.1.3 **IFATCA 15**
WP No. 78

Aeronautical Surveillance Panel (ASP)
Presented by Christoph Gilgen

Summary

The Aeronautical Surveillance Panel (ASP) of ICAO held one working group meeting since the last IFATCA Conference. Starting 2015 the ASP-Panel was renamed "Surveillance Panel", with the official abbreviation "SP". Some new sub-working groups were added to the SP, in particular the ASTAF Task Force – a sub-group that, through a last-minute decision by ICAO will be called AIRBWG, Airborne Surveillance Working Group. ASTAF/AIRBWG has finished its work on the Airborne Surveillance Applications Manual (ASA), a manual that is currently in its final stages of production. The ASA-Manual is due to be published at the end of this year. ASTAF (or better AIRBWG) has recently started the production of a new ICAO-Manual regarding ground-based Safety Nets (SNETs).

1. Introduction

1.1. This is the last report of ASP – Aeronautical Surveillance Panel to the annual conference of IFATCA. The ICAO Panel reorganization process has been terminated in late 2014 and the ASP-Panel has changed name to become the "Surveillance Panel". The official ICAO-abbreviation for the Surveillance Panel is "SP".

1.2. The first SP-Panel meeting (SP1) is taking place in Montreal/Canada at the same moment as the annual World Conference of 2015 of IFATCA in Sofia, Bulgaria. This is the reason why I (most regrettably) will not be on-site in Sofia to present this WP to Committee B. It is very important to be present in Montreal for SP1, as the setting-up and the initial organizational decisions related to a new – or better a reorganized ICAO-panel - is of utmost importance.

1.3. This report to IFATCA-Conference not only convers information regarding ASP-Panel activities, but has also remarks and comments regarding the work of ASTAF, the Airborne Surveillance Task Force. In light of the ICAO-reorganization process it was decided to set-up ASTAF under the umbrella of the new Surveillance Panel/SP. Initially, ICAO had planned to keep the name ASTAF (for branding reasons), but in January 2015 it was decided to rename ASTAF, and so it will be called AIRBWG, standing for "Airborne Working Group".

2. Discussion

2.1. In the past years the ASP-Panel was informed of many interference issues of the ATS-surveillance spectrum, and in particular interference on 1090 MHz (used by ADS-B and Mode-S). Additional to this, ASP has become aware of disturbances affecting as well the GPS-signal spectrum. This disturbance on 1090 MHz is mainly due to new tele-communication systems that are fielded. Notably systems such as WiMAX or U-NII (Unlicensed National Information Infrastructure) have been identified as source of disturbances and/or interference. And many of the GPS-interference issues can be attributed to LightSquared, high-frequency transmissions used by several mobile wireless telephone companies. The concern is that - as telecommunication systems are currently spreading exponentially - the fight for more spectrum and more band-width is becoming tougher and tougher.

2.2. Several technical and operational issues affecting Mode-S - but also ADS-B - are currently under discussion at ICAO-level. These problems are most of the time related to the use of Mode-S (or ADS-B) data. Both of the above-mentioned ATS-surveillance systems are able to transmit dozens of airborne – and/or of avionics-derived data to the outside world, including to ground ATC. The challenge of the coming years is to regulate, and by doing this making sure that these new technologies are getting safely integrated into the aviation- and the ATM-system (e.g. through official rules and/or procedures). For instance there is a need to adopt officially rules and procedures making it “clear” to the operators – for instance ATCOs, of how (and to which extend) these airborne-derived data received automatically, of how they should be used operationally (used safety)? For sure a modernization process of these rules and procedures is needed here with the aim to adapt all to the operational reality of today.

2.3. Some European ANSPs (Air Navigation Service Providers) have started to implement Safety Nets (SNETs) based on Mode-S data received automatically. All is based on DAPS, Down-Linked Aircraft Parameters of Mode-S enhanced – EHS Transponders. The United Kingdom - for the TMA of London - is using for quite some time now the BAT-Tool (Barometric Pressure Setting Advisory Tool) that is capable of identifying significant QNH-setting (altimeter setting) errors. This tool uses downlinked Mode S Barometric Pressure Setting (BPS) data coming directly from the Mode-S EHS-transponders. If the BAT-systems detects a significant difference (of 6 HPA or more), then an advisory warning is triggered. In order to permit this kind of alerts the aircraft must be equipped with Mode S Enhanced Surveillance (EHS) transponders, as only these transponders are able to transmit automatically particular flight deck parameters (e.g. DAPS) to the ground. UK NATS confirms that this particular feature has brought a significant increase in safety, as numerous wrong altimeter settings were detected. So, this safety tool has enabled the London ATCOs to act/react well before something more serious has occurred. It is a pity that the fitting of Mode-S Enhanced Transponders (Mode S EHS) is not yet fully enforced in Europe.

2.4. Several European ANSPs use another Safety Net or Safety Tool that compares automatically – in the background of the ATM-system the cleared ATC-altitude (cleared flight level, often called CFL) with the Selected Altitude (SEL ALT) selected in the cockpit. That SEL ALT is transmitted by Mode – S (as well as it is on ADS-B) to the outside world, and so the ground ATM-system is able to capture this value. For this particular Safety

Net/Tool the ATM-system is comparing the cleared flight level (the cleared Flight Level/CFL) inserted by the ATCOs with the SEL ALT transmitted by the air frame (reported through the Mode-S EHS Transponder). The suitably equipped ATM-Systems will trigger an alarm/alert if there is a discrepancy detected (after a "grace period" of roughly 10 to 25 seconds, time-out used to permit the operators to update their equipment, and avoiding nuisance alarms). Results and monitoring do indicate that the preventive effect – for instance avoiding level-busts - is "very significant". The operational use of this particular SNET is dependent on the correct feeding (updating) of the Cleared Level (or ATC-Altitude) into the ATM-system. And, at the same it depends as well on the dynamic updating of the SEL ALT on the flight deck (of Mode-S EHS – equipped aircraft). Even if many SOPs (Standard Operating Procedures) of Aircraft Operators (AOs) do mandate this updating of the SEL ALT, curiously nothing of this all is mandated via ICAO (for instance in Manual 8168 (Aircraft Operations)). Not all aircraft do operate with SOPs, for instance many smaller aircraft and private operators do not. So, there is an urgent need that ICAO-Manuals are getting updated and get amended accordingly. Safety improvements gained through the smart use of such new advanced technologies is quite impressive and speaks for itself.

2.5. The correct transmission of ARCID (Aircraft ID) for Mode-S, as well as via ADS-B is still an open and partially unresolved issue. For instance for the rules of transmission of the ARCID on ground. ICAO has detected major differences between Mode-S- and ADS-B-regulations, including as well for the MOPS (Minimum Operational Performance Specification) requirements. There are significant differences present in the regulations for the transmission of ARCID. There are differences of behavior between the two ATS-surveillance systems. Consequently, ICAO is aiming at implementing a harmonized and universal solution as soon as possible. But this cannot be achieved single-handily. RTCA and EUROCAE must get as well get involved into this process, as these two entities are the editors and owners of the relevant MOPS. The transponder behavior on ground – according to relevant transponder-MOPS, is not the same when looking at ADS-B, and then compare it with Mode-S. A good example is the requirement whether a TRSP must retain the last ARCID – or not. There is still a lot of work to be done. But all stakeholders do by now agree that the behavior, and the transmission of the ARCID on all ATS-surveillance systems should be exactly the same. That all must be fully harmonized. Currently this work is still on-going.

2.6. Indirectly linked to this is an IFATCA-proposal trying to change some of the ATC-procedures contained in Document 4444 (PANS-ATM). The work is related to the handling of discrepancies between the ARCID and the aircraft call-sign (flight plan call-sign) of a controlled flight. This all is related to field 7 of the ICAO flight plan (FPL), where the aircraft call-sign is informed for each flight with a FPL. This work has started within the ASP-Panel, but by now the required actions are more sitting within ATMOPS, where Duncan Auld (EVPT IFATCA) is trying to resolve the issue with the help of his fellow panel members and ICAO. The current PANS-ATM procedure sitting in Chapter 8, ATS-Surveillance systems, dictates the following actions to be performed by the ATC-operators (this all is related to the handling of erroneous ARCIDs in flight/during operation):

8.5.3.5 If, following confirmation by the pilot that the correct aircraft identification has been set on the Mode S identification feature, the discrepancy continues to exist, the following actions shall be taken by the controller:

-inform the pilot of the persistent discrepancy;

-where possible, correct the label showing the aircraft identification on the situation display; *and notify the erroneous aircraft identification transmitted by the aircraft to the next control position and any other interested unit using Mode S for identification purposes.*

2.7. This particular PANS-ATM provision (marked in bold in 2.6) made sense when it was adopted by ICAO (several years ago). But by now, with the start of the widespread use of Mode-S and ADS-B - in particular with the fitting of airborne displays in the cockpit (e.g. CDTIs - Cockpit Displays of Traffic Information) the visibility and perception of ARCID of surrounding traffic gets more and more common. So, airborne situation displays becoming more and more available (getting fitted), this procedure of 4444 that allow or invites ATCOs to change (or correct) manually the aircraft-label on an ATC SDD (Situation Digital Display) using the Flight Plan Data Processing System (FDPS), this is not safe anymore. Fact is that the source of the data-error is still being present – so, is staying uncorrected (the source of the error is not totally eliminated). Furthermore, to use different sources (and means) of identifying aircraft is of concern. On the airborne displays is seen and observed what is set (and transmitted-out), whereas for ATC a changed and/or system-transformed value is shown. This is clearly of concern and ultimately it is a safety-issue as to designate differently aircraft labels on traffic- and/or situation displays is of simply not a good idea. In particular as by now not only ICAO, but as well as many States and ANSPs are working to develop the first operational procedures where the assistance and use of airborne traffic displays, EFBs (Electronic Flight Bags) or CDTIs will be required. A good example of this are the In-Trail Procedures in remote or oceanic airspace. Other examples of this future use is Basic AIRB (basic situational awareness) or the SURF-provisions for ground or surface operations. It is good to know that ICAO shares the view of IFATCA - that this particular PANS-ATM provision is in need of change or improvement - due to the obvious safety-reasons stated above. Work is still on-going.

2.8. The ASP-Panel continued to work on several issues regarding airborne Safety Nets. For TCAS II not a lot can be reported. The only hot news related to TCAS II is that only very recently some TCAS II-issues were detected in Europe. Spurious TCAS RAs, Resolutions Advisories occurring in an unexpected and unexplained manner have been discovered during the year 2014. All cases - so far identified - do concern TCAS II Version 7.1, the last software release that is using hybrid surveillance (having active surveillance data - coming not only from the on-board antennas), but also making use of ADS-B position data (GPS-data) that is used by the CAS-software). Eurocontrol and the DSNA of France are leading the European investigation. They are trying to find out what is causing these false RAs - and why they do occur.

2.9. As said before, all identified spurious TCAS II RA-cases have in common that Hybrid Surveillance is involved. And in all monitored cases the miss-distance is much higher than what is expected for the triggering of a TCAS-RA. The simulations of the relevant monitoring–data has shown that the problems normally do occur when a switching of the surveillance method occurs (the switching is airframe internally). For instance a surveillance antenna switching from one antenna sitting along the airframe, changing to another antenna on the aircraft body. There is a strong suspicion that during the switching of the antennas also a switch of the surveillance data source does occur (between active and passive surveillance). Meaning that a switching of the surveillance method occurs – back and forth, very quickly. If there is a small difference in distance (or range) between active surveillance tracks and the ADS-B (GPS) tracks, this can create so-called “jumps” in position and/or range. If this jump (occurring within one second) is multiplied to the minute

and/or computed for the ground speed, or the closing-in speed, this can alter in a significant way the results, and as well the threat-calculation of the CAS-Logic. But much more testing and additional technical monitoring is needed here. What is very interesting – by the way - is the fact that only one TCAS-Manufacturer seems to have this kind of problem. The other two don't have shown this behavior so far.

2.10. A subject of great interest for ASP is the development and testing of ACAS-X, a safety net that is expected to become the successor of TCAS II as last-ditch airborne safety-net. The development of ACAS-X (officially all is part of NEXT GEN) occurs in so-called "runs", or development steps. The ACAS-X development is progressing rather well - all occurs also quite fast. The flight test phase of ACAS-X is due to start very soon, maybe already this year – in 2015. ACAS-X has four planned under-systems, or sub-system developments. All of them are catering for different variants and special operational uses. They are:

ACAS-XA is the standard ACAS-X variant that is due to replace TCAS II. It is a general purpose ACAS X variant that makes active interrogations to establish the range of intruders (but GPS-data is used as well).

ACAS XP is a variant of ACAS X that relies solely on passive ADS-B (GPS) to track intruders. It does not make any active interrogations and is intended for general aviation aircraft.

ACAS XO is a variant of ACAS X designed for particular or special operations for which ACAS XA would be unsuitable and/or might generate an unacceptable high number of nuisance alerts. A possible application of ACAS-XO could be for pair-wise aircraft operation, such as for instance for Closely Spaced Runway Operations and/or closely-spaced approaches.

ACAS XU is designed for Unmanned Aircraft Systems (UAS). Part of the idea is that the ACAS-XU equipped UAS would communicate between each other in order to perform Detect & Avoid manoeuvres well in time – well before actually an anti-collision manoeuvre will be required.

It is envisaged that ACAS X MOPS (Minimum Operational Performance Standards) would be developed by 2018, and that ACAS X might become operational before 2025.

The current working status on ACAS-X is: The last runs of ACAS-X (runs 14 and 15) are tested and analyzed by the different partners (including SESAR in Europe). Coupled to that are also the required certification activities that will be required (e.g. the MOPS), including the development of possible ICAO SARPS. One fact that must be considered with care is the transition phase – the hand-over time required (the time-frame) to permit a safe switching from TCAS II, moving towards ACAS-X only. This will take a lot of time (possibly close to 10 or 15 years). So, it must be ascertained that TCAS II and ACAS-X can work (and interact) flawlessly together, without any deterioration of the anti-collision function during this transition phase. Europe (mainly under the SESAR-project) is not only helping the FAA to test the safety (and the correct functioning) of the different ACAS-X development runs, but Europe is a well in the process of developing airspace encounter-models (that will be of help when the certification of ACAS-X has to occur). There is general consensus between all aviation stakeholders that TCAS II has by now reached (slowly but surely) the end of its life-span. And that the development of a new next-

generation airborne anti-collision system is required with priority. It is very likely that this will be ACAS-X.

2.11. A very recent ASTAF-activity is work on ground-based Safety Nets. This work was initiated at the 12th Air Navigation Conference, where a proposal to develop such an ICAO-Manual was accepted by the States and the delegates of ANC/12. ICAO has decided to convey this work to ASTAF, as they thought that this Task Force would be best suited for this type of work. The drafting work has started by now, and in late January 2015 a first Teleconference has taken place. The following ground-based safety nets (SNETs) will be handled in the proposed new ICAO-Manual:

STCA (Short Term Conflict Alert);
MSAW (Minimum Safe Altitude Warning);
APW (Area Proximity Warning);
APM (Approach Path Monitoring).

The publication is expected (if all goes well) at latest by 2017. As said earlier, ASTAF will become a special sub-group, or better a working group of the new ICAO Surveillance Panel. And it will be renamed to AIRBWB, standing for Airborne Surveillance Working Group. The particularity will be that the Air Navigation Commission still remains directly linked to the AIRBWG, and so can give instructions and/or directions directly to the AIRBWG of the SP. And this all without passing via the SP-panel structure.

3. Conclusions

3.1. ASP has been renamed by ICAO to Surveillance Panel (SP) and is preparing for the April-meeting to be held in Montreal, Canada. The SP1 working group (and panel) meeting will take place at the same time as the annual IFATCA world-conference of 2015 in Sofia/Bulgaria.

3.2. ASTAF has worked extensively on the production of the Airborne Surveillance Applications Manual (ASA-Manual), which is by now in the ICAO-pipeline to be published very soon (hoped to occur by the end of this year (2015)).

3.3. ASTAF will be renamed by ICAO to be called AIRBWG, standing for Airborne Surveillance Working Group. The work program of AIRBWG will mainly be on some initial (basic) Airborne Surveillance Applications, such as AIRB, SURF or VSA (Visual Separation on Approach), but as well on the new planned ground-based Safety Net Manual.

3.4. IFATCA continues to be represented in the SP, and as well within the AIRBWG. The participation of our Federation in this field of activity (at ICAO-level) is important, as it permits not only to participate and so being involved into this work. But this involvement permits as well that we are remaining informed (and so are fully aware) of what happens in the matter of ATS-surveillance, and generally speaking of all that touches the field of “surveillance” in general.

4. Draft Recommendations

4.1. It is recommended that this report is accepted as Information Material.

- END -

INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

54th ANNUAL CONFERENCE – Sofia, Bulgaria, April 20 - 24, 2015

Agenda Item: B 4.1.6. **IFATCA 15**
WP No.79

ICAO FLT OPS Panel
Presented by Raimund Weidemann

1. Introduction

IFATCA is member of several ICAO Air Navigation Commission (ANC) Panels. Those panels function as ICAO expert bodies; amendments and updates to the 18 ICAO Annexes are developed and discussed in those panels. In the near past ICAO has modified names, work programmes and composition of the ANC panels. For instance the OPS Panel was renamed into Flight OPS Panel (FLT OPSP), the Aerodromes Panel was renamed into Aerodrome OPS Panel, and a new Air Traffic Management OPS Panel (ATM OPSP) was constituted.

The ICAO FLT OPS Panel took over the work programme from the OPSP, which is basically maintenance and improvement of ICAO Annex 6, but was in addition tasked with work performed previously in the ICAO Flight Recorder Panel. This work will be continued in a new sub-group of the ICAO FLT OPSP.

This working paper covers the time from the 53rd IFATCA Conference on Gran Canaria in May 2014 until February 2015. In the reporting period the FLT OPSP had one meeting as a working group of a whole in June 2014, and one panel meeting in late October 2014, both meetings held in Montreal at ICAO premises. While the IFATCA ANC Representative, Dr. Ruth Stilwell, was able to partly cover the June 2014 meeting on behalf of IFATCA, the author of this report attended the panel meeting in October as the IFATCA member of the ICAO FLT OPSP.

2. Discussion

2.1 Wrap up of ICAO FLT OPSP 1 (Montreal, 27 – 31 October 2014)

Status of FLTOPSP work programme

The secretary of the panel informed the meeting about his coordination with the International Airways Volcano Watch Operations Group (IAVWOPS) secretary, regarding improvements to current ICAO procedures in regard to operation of aircraft in presence of volcanic contamination at airports and in the air, prepared by the International Volcanic Ash Task Force (IVATF) to avoid duplication of work. Based on the results of the coordination it was agreed that the FLTOPSP will add the following items to it's work programme:

- Operators safety risks
- Pre-flight and inflight information
- Avoidance of visible ash

The meeting was informed that during the review of comments from States and international organisations to State letter AN 11/1.1.28-13/46 concerns were expressed regarding the ACAS mode of operation during an emergency descent. As a result the ANC agreed that the issues of ACAS mode of operations during emergency descents should be sent back to the FLTOPSP for review. The meeting discussed the safety impact of the ACAS mode during an emergency descent and concluded that the issue should be added to the work programme of the panel.

The panel further reviewed timelines of existing job cards and updated the composition of the existing panel sub-groups.

The panel was briefed on the new dispositions from the ANC in regard to impact assessments that would need to be included with any amendment proposal. He explained that the intent was to get a general indication acknowledging that regional and national considerations could vary widely.

Update on panel coordination activities

Icing phraseology

During OPSP/WG-WHL/14 in September 2012 the panel was made aware of an issue regarding a multitude of scripts using similar but different phraseologies for communications between de/anti-icing service providers and flight crews causing confusion. Furthermore, the panel recalled that to address the issue, the SAE-IATA-ICAO Council (similar to ICAO panels) was formed under SG-12 and that one of the issues identified was the lack of standard phraseology.

The SAE-IATA-ICAO Council recognized that the most appropriate document for that phraseology was the Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444) and that the Council would need to work with the FLTOPSP (OPSP then) to propose an amendment in that regard. Over the course of several telecoms, e-mails and as presented at the OPSP/WG-WHL/16 and FLTOPSP/WG/1 meetings the work of standardizing phraseology had concluded. The meeting reviewed the proposed provisions, made suggestions and agreed to recommend that these be submitted to the ANC for preliminary review.

SID/STAR provisions

The Secretariat gave an overview of the latest developments in the work of ATMOPSP regarding the issue of SID/STAR. The meeting was, more specifically given feedback with regards to the solution chosen by ATMOPSP tabling previous FLTOPSP comments related to phraseology options used to lift altitude or speed restrictions.

The meeting noted that the ATMOPSP was in the final stages of producing an amendment to reinforce PANS-ATM provisions related to SID/STAR by giving explicit indications to flight crew as to whether they should abide by speed and level restrictions. Of specific interest to the FLTOPSP was the question of the expression used to lift restrictions. The ATMOPSP was proposing that the expressions “cancel level restriction(s)” and “cancel speed restriction(s)” be used, alone or combined. Furthermore, the ATMOPSP was also proposing that the expression unrestricted be used to lift both speed and level restrictions. This dual possibility was felt to cater for the pronunciation issues associated to the use of the expression unrestricted, while at the same time to take due account of an already widely used expression.

The Secretariat explained that in the course of its proceedings the ATMOPSP identified a number of charting issues that would need to be resolved. However, it was confirmed to the FLTOPSP that the ATMOPSP had proposed procedures, which did not rely on any consequential amendment to charting procedure to ensure successful implementation. Finally, the Secretariat highlighted that even though PANS amendments could sometimes mark the end of the work of a panel on a given issue that would not be the case with the SID/STAR issue as the proposed solution entailed significant training efforts that would have to be undertaken worldwide to ensure a uniform application.

Furthermore, the meeting discussed that pursuant to the implementation of SID/STAR provisions, sound design principles were going to be instrumental in the successful implementation and use of the procedures. It was also felt that the charting issues, though no longer of direct importance to the successful resolution of SID/STAR issue, remained of prime importance and were to be addressed. An addition to the FLTOPSP work programme in this regard is included in the future work programme.

ACAS improvements

The Secretariat presented a revised proposal prepared by the Aeronautical Surveillance Panel (ASP) to amend the PANS-OPS (Doc 8186) provisions related to airborne collision avoidance system (ACAS) so that they may take into account the integration of ACAS to the automation of modern aeroplanes (e.g. new altitude capture features to reduce the occurrence of unnecessary RAs and automatic following of ACAS resolution advisories). The revised proposal included all the comments that the FLTOPSP (OPSP then) provided to the ASP when they reviewed the original and subsequent proposal during the OPSP/WG-WHL/16 and FLTOPSP/WG/1 meetings. The meeting reviewed the proposed provisions, made minor suggestions and agreed to recommend that these be submitted to the ANC for preliminary review.

Performance-based communications and surveillance

During the FLTOPSP/WG/1 Meeting held in June 2014 at ICAO Headquarters, the panel was presented with a draft proposal to incorporate provisions in Annex 6, Part I, II and III regarding performance-based communications (PBC) and performance-based surveillance (PBS) which was being prepared by the OPLINKP. The feedback provided by the FLTOPSP can be summarized as follows:

- A requirement for a specific approval which would need to be included in the OPSPECS needs to be accompanied by a safety risk assessment that justifies why no other alternatives exist to ensure safety and a cost benefit analysis; and
- In-depth consideration should be given for the introduction of PBCS to general aviation (GA) as a framework such as OPSPECS does not apply to GA under the current ICAO provisions.

Subsequently, the OPLINKP used the draft provisions that the FLTOPSP was developing for PBN and formulated amendment proposals for PBC and PBS using the same framework. The OPLINKP also re-assessed the need for specific approvals and determined that, using the PBN framework, they were not necessary at this time. The FLTOPSP was very supportive of the revised proposal. The meeting reviewed the proposed provisions for Annex 6, Parts I, II and III and made minor adjustments primarily to incorporate subsequent adjustments to the PBN provisions and to keep the proposed PBC and PBS provisions consistent.

Autonomous runway incursion warning systems (ARIWS)

The meeting recalled that the FLTOPSP/WG/1 meeting agreed to collaborate with the AP/Visual Aids Working Group in preparing an amendment proposal to incorporate autonomous runway incursion warning system (ARIWS) procedures in PANS-OPS and PANS-ATM using the ACAS provisions as guidelines. Subsequently, a similar paper was presented to the ATMOPSP. The ATOMPSP recommended that the introduction of ARIWS should be accompanied by procedures in PANS-ATM and that it was important that ARIWS procedures were consistent with stop bar procedures due to their visual similarity. Furthermore, the ATMOPSP was of the opinion that since procedures in PANS-ATM apply to both pilots and controllers, perhaps it would not be necessary to have additional procedures in PANS-OPS.

The FLTOPSP agreed in principal but requested more time to review the proposed amendment to PANS-ATM. The initial general comment to the proposal was that the procedures for pilots need to be more assertive and needed more detail. Furthermore, some concern was expressed on the ability to disable the system without a proper procedure. The FLTOPSP was of the opinion that abuse of a “kill switch” could generate miss trust and deter implementation.

Implementation of global reporting format – Annex 6, Part II amendments

The Rapporteur of the GASG presented the results of the review of the proposed global reporting format (GRF) provisions for Annex 6, Part II as tasked during the OPSP/WG-WHL/16 Meeting. The meeting recalled that the Aerodromes Panel Friction Task Force (FTF) had formed an Annex 6/8 ad-hoc sub-group

to address the concerns expressed by the FLTOPSP regarding a holistic approach for developing airworthiness and aircraft operations complementing provisions for the implementation of the GRF being proposed for Annex 14 — Aerodromes and PANS-Aerodromes. Furthermore, the meeting recalled that the provision for Annex 6, Part I had already been agreed upon and the GASG was tasked by the panel to review the proposed provisions for Annex 6, Part II.

The meeting agreed with the GASG assessment that the proposed amendments to Chapter 5 of Annex 6, Part I would be equally applicable to Chapter 3.5 of Annex 6, Part II.

The Secretariat was tasked by the panel to inform the Aerodromes Panel Friction Task Force of the results of the proposed GRF for Annex 6, Part II.

Active work programme items

Harmonization of applicability, terms and language across Annex 6, Parts I, II and III

The Rapporteur of the Helicopter Sub-group (HSG) presented the work on the task of reviewing Annex 6, Part III and comparing it to the relevant provisions in Annex 6, Parts I and II to identify instances where applicability, terms and language may need to be harmonized. The meeting recalled that State letter AN 11/1.1.28-13/46 included most of the proposed amendments to Parts I and II. The result of that exercise was an extensive review of Annex 6, Part III and, in that process; provisions in Annex 6, Part I and II were identified for harmonization. The meeting reviewed the proposed amendments and agreed that the proposals, as contained in Appendix A to this agenda item, be submitted to the ANC.

In addition to the review conducted by the HSG, the Secretariat informed the meeting that the Editorial Unit (EDL) of ICAO was consulted in reference to the best way to address the change of “an operator” to “the operator” in all instances where it appears in all Parts of Annex 6. The feedback received was that the indefinite article "a/an" was normally used before general, non-specific nouns or to indicate membership in a group; that it should be used in instances when referring to operators in general and not to a specific operator. "The" was generally used before singular or plural nouns that were specific or particular. In that regard, the definition of the “The State of the Operator” when referencing operators was specific: State of the Operator. The State in which the operator’s principal place of business is located or, if there is no such place of business, the operator’s permanent residence.

The recommendation was to amend the definition of “Operator” to align it with the “the State of the Operator” and subsequently search and replace practically all instances of “an Operator” with “the Operator”. The meeting agreed that the Secretariat would be in the best position to make that judgement.

The proposed modification to the “Operator” definition would be as follows: Operator - The person, organisation or enterprise engaged in or offering to engage in an aircraft operation.

The meeting then considered a proposal from the HSG as a result of the review and harmonisation of Annex 6, Part III, where several significant omissions, instances of insufficient guidance or a lack of clarity were identified to align them with the provisions of Parts I and II. In this regard, the meeting agreed the following proposals should be added to the work programme:

- Review and revision of the All Weather Operations Manual (AWOM) to provide helicopter specific guidance;
- Development of Annex 6 Part III Fatigue Risk Management Provisions;
- Review and Evaluation of Annex 6 Part III Section III International General Aviation Helicopters;
- Review and clarification of Annex 6 Part III Section II Chapter 3 Helicopter Performance Operating Limitations; and
- Dangerous goods considerations for Annex 6 Part III.

Alignment of Provisions in Annex 6, Parts II and III with Part I

The Rapporteur of the General Aviation Sub-group (GASG) updated the panel on the work of the GASG with regard to the progress on the Fatigue Management Guidance Manual for General Aviation Operators of Large and Turbojet Aeroplanes. The manual, which was considered to be 95% completed, was being reviewed by the Fatigue Risk Management Systems Task Force (FRMSTF) to ensure consistency with other ICAO fatigue management documents.

PBN operational implementation issues

The Rapporteur of the Performance-based Navigation (PBN) Operations Sub-group (PBNO-SG) provided a presentation on the status of the PBNOSG and Job-cards OPSP013 – Reciprocity-Harmonization of PBN Ops Approvals, OPSP014 – RNAV on Conventional Routes and Procedures, OPSP015 – Next Steps for CDFA, OPSP020 – Embed PBN and into traditional operations, respectively. Regarding Job-card OPSP013, he presented a proposed amendments to Annex 6, Parts I, II, and III. The proposal had, for general aviation (both fixed wing and helicopters), a suggestion for a special approval template that resembled a commercial air transport OPSPEC template.

The meeting reviewed a referral from the IFPP related to the application of visual RNAV approaches and a concept of operations to describe the operational considerations that should be considered by those responsible for the design, dissemination and use of a new type of approach using the RNAV capabilities of the aircraft in visual conditions. The meeting was of the opinion that a concept of operations which proposed high level criteria related to the conduct of visual approaches aided by the use of on board aircraft coded procedures needed to be developed. An addition to the FLTOPSP work programme in this regard is included in future work items.

EASA presented three proposals related to the work of the PBNO-SG:

- One proposal amending the commercial air transport OPSPECS templates in Annex 6, Parts I and Part III based on the language being proposed for the GA specific approvals templates. The meeting agreed to this suggestion and further agreed that it should be incorporated into the PBN proposal.
- Another proposal providing further guidance concerning recommendations for descriptions of PBN aircraft capabilities. The meeting was of the opinion that the material should be reviewed by the PBNO-SG to determine whether it could compliment the guidance contained in the Performance-based Navigation (PBN) Operational Approval Manual (Doc 9997) and/or the Performance-based Navigation (PBN) Manual (Doc 9613).
- The third proposal is concerning pilot training for PBN was presented. The meeting discussed this proposal with a great amount of interest, noted the importance of the subject and how best to align efforts with worldwide progress, and referred open comments to the PBNO-SG.

Furthermore, the meeting agreed that follow-on work to Doc 9997 and Doc 9613 with regard to the “complex PBN operations” language needed to be addressed before the amendment proposal becomes applicable in 2016 (i.e. Q3 2016). Additionally, the meeting agreed that, in coordination with the PBN Study Group, the title of Doc 9997 be re-considered to better reflect the revised content and that these changes be referred to the PBN Study Group for review and consideration to changes in the next revision to Doc 9613.

Finally the meeting was of the opinion that the Authorisation, Approval and Acceptance Sub-group (AAA-SG) should consider how specific approvals such as those being proposed for complex PBN operations might be applied to other provisions in Annex 6 that are referenced in the OPSPECS templates.

Harmonization of low visibility/surface movement guidance control systems (SMGCS) operations

The Rapporteur of the Low Visibility Operations Sub-group (LVO-SG) informed the meeting that the sub-group completed work on the process for moving forward towards harmonisation of international low visibility operations as outlined at the June 2014, Montréal meeting and that the LVO-SG recommended a revision to the Manual of All-Weather Operations (Doc 9365), after revision four was published, to

incorporate current international low visibility operations policy for LVP. That revision would also include proposed LVO harmonization changes presented to the panel during the 2012 to 2014 FLTOPSP meetings.

Additionally, the LVO-SG also recommended minor editorial changes to Doc 4444 to reflect updated LVP policy contained in Euro Doc 013. Following those actions the LVO-SG would coordinate edits to other affected documents for consistency across ICAO documents.

The meeting was of the opinion that prior to spending time and resources, a gap analysis of the different practices and ICAO documentation should be conducted. Accordingly, the time lines for Job-cards OPSP008 – Harmonization of low visibility/surface movement guidance control systems SMGCS) operations and OPSP010 – Technology for runway safety (visual aids) should be amended to reflect the additional time required to accomplish this task. The LVO-SG expected that this could be prepared for a 2018 applicability and as such suggested to amend the deliverable dates to Q2 2016.

Cargo compartment fire suppression systems diversion requirements

On behalf of the CCFS-SG Rapporteur the meeting was informed that the CCFS-SG had completed the drafting of an amendment proposal for Annex 6, Part I addressing the consideration of the time limitation of cargo compartment fire suppression systems. The proposal, as amended by the meeting is contained in Appendix F to this agenda item. He recalled that the tasking originated from the conclusions of the work performed by the SOTF (Special Operations Task Force) on extended diversion time operation (EDTO) amendments. While the SOTF confirmed the requirement to consider the time capability of the Cargo Fire Suppression systems for aircraft engaged in EDTO, it was also noted that further work was necessary to confirm whether similar requirements should also apply to non-EDTO operations.

The meeting noted the CCFS-SG review of identified in-service events on incident and accident data accumulated over the past twenty years. The review indicated that:

- no new accidents came had come to light; and
- a small number of extra incidents were found (3), one of which occurred in 2013.

Based on the above, the CCFS-SG concluded that cargo fire events are rare, occurrences are in the order of 10 exp-8 per flight hour. Nevertheless, a cargo fire event beyond the CCFS coverage time would be considered catastrophic

The amendment proposal reflects the conclusion of the work performed by the CCFS-SG, in particular the review of the in-service incidents and accidents related to cargo fire.

Rescue and fire-fighting systems guidance material

The meeting reviewed under this agenda item the progress of the RFFS guidance material for Annex 6, Part I and the commensurate rescue and fire-fighting provisions for general aviation.

RFFS Guidance material

The Rapporteur of the RFFSG updated the panel on the work of the RFFS with respect to the review of Attachment J to Annex 6, Part I. The meeting recalled that the guidance contained in that attachment corresponded to the assessment by an operator of what constitutes an acceptable rescue and fire fighting protection level at aerodromes the operator specifies in its operational flight plan.

The main issues being addressed consist of:
- Introducing more flexibility, by clearly allowing different RFFS protection levels from those defined in the current Attachment J. This flexibility may be used by the operator following a risk assessment performed under it SMS (development of the principles already referred to in standard 4.1.4);
- Giving guidance on the criteria to be used for the risk assessment; and

- Addressing specific cases not currently mentioned, mainly temporary downgrades.

The RFFS SG was of the opinion that further coordination was needed with AOS WG to determine if changes in Annex 14 would be required. It was therefore proposed that the timelines in Job-card OPSP017 – Guidance to operators on assessment of the level of rescue and firefighting service be amended for deliverables in Q4 2015.

Commensurate RFFS provisions for general aviation

The Rapporteur of the GASG updated the panel on the work of the GASG with respect to the commensurate RFFS provisions for general aviation task. He explained that as a continuing activity of Job-card OPSP007, and as specified in Job-card OPSP021, the GASG worked with the AP and RFFWG to develop commensurate rescue and fire-fighting provisions for general aviation. An agreement in principle was reached by the AP and FLTOPSP on amendments to Annex 14 and Annex 6, Part II and the need to develop appropriate guidance material in Doc 9137, Airport Services Manual, Part 1 — Rescue and Fire Fighting.

Re-structuring and rewrite of PANS-OPS Volume I, Parts I and II

During the FLTOPSP WG/1 meeting guidance was sought from the Secretariat on the best course of action, including timeframes, to address the issues raised by the IFPP regarding material related to cockpit procedures that is proposed to be moved to Part III of PANS-OPS, Volume I during the IFPP restructure of Parts I and II. Also it was suggested that the FLTOPSP consider a similar restructuring of Part III at the same time. In this regard, the Secretariat conferred with the IFPP and some AWOHARC members and came to the following conclusions:

- PANS-OPS, Volume I should be restructured in the 2016 amendment cycle.
- A “freeze” on new provisions would take place so that, similar to the Annex 19 introduction, the focus would be on a reorganization of the existing material with additional text limited to editorial changes for clarity. Subsequently, once the restructure is adopted all new amendment proposals would be incorporated in the 2018 amendment cycle.

Furthermore, the meeting discussed whether the re-write should be in the same document or in a new one. After careful consideration the meeting was of the opinion that the re-structured Part III would better serve the community if it were in a different document.

Requirements on flight deck activities, checklist and standard operating procedures design (Topic 3.2 of the High-level Safety Conference 2010)

The meeting was informed that the Human in the System Sub-group (HITS SG) had an initial action plan to address a few task initially. He explained that, basically, it would focus on selected item(s) initially and the initial list could be expanded in due course. In that regard, he explained that the SG would focus on maintaining situational awareness and the factors involved that cause pilots to lose that awareness; the relationship and influence (if any) of auto-flight systems; modern flight avionics; and mode change notification in that process.

Use of the terminology “authorization”, “approval” and “acceptance”

The AAA-SG contributed to the work of the PBNO-SG and GASG in particular as regards to the terminology in relation with approvals and the new proposed template of specific approvals for non-commercial operations with aeroplanes and helicopters. The AAA-SG also contributed to the work of HESC-SG concerning the description of the approval process for operations with vision systems.

Furthermore, the AAA-SG agreed on the work schedule for the next six months.

Technology for runway safety (on-board equipment)

The meeting was informed that not much progress had been done primarily because the task in the job-card was not clear. The intention, therefore, was to form a small group to include IATA as well as subject matter experts from Air France, Airbus and Boeing. Initially the group would review the job-card and if required amend to reflect what the group perceives the task to be and make a recommendation in that regard at the next meeting.

All-weather operations

The meeting reviewed a rationale for removing the definitions of Category IIIA, IIIB, and IIIC instrument approach operations and the removal of RVR and visibility references for Category I, II, and III operations. The Category III definitions were deemed to be outdated because they were no longer utilized for aircraft certification or operational authorization.

The meeting agreed that removing those definitions would aid in international harmonization efforts, future landing minima reductions, and airspace system capacity improvements due to the implementation of performance-based operations. The removal of the visibility references would aid in the transition to flexible aerodrome operating minima.

The meeting agreed that it should be added to the future work programme.

Electronic flight bags (EFB)

The FLTOPSP noted that the EFBSG had concluded the work on the EFB manual and that it had been submitted to the Secretariat. Nevertheless, it was presented at this meeting to give panel members the opportunity to comment on the manual. The meeting agreed that comments on the draft manual should be sent to the Secretariat. The Secretariat would aggregate all the comments and coordinate with the EFBSG Rapporteur on the best course of action to address them.

HUD/EVS/SVS/CVS

The Rapporteur HESCSG, informed that the SG had been focused on the effort to update Attachment I to Annex 6, Part I (vision systems, HUD, auto-land system) with the view of making the contents more high-level and permanent in nature. That work had been conducted by means of e-mail exchange and in cooperation with the GASG and the HSG.

Furthermore, members of he HESC supported the AWOHARC activity under leadership of Mr. Chris Hope, to update the Manual of All-Weather Operations (Doc 9365) ensuring that the relevant material extracted from the attachment was captured in the next revision of the Doc 9365.

The HESCSG rapporteur presented an amendment proposal to Annex 6, Parts I, II and III as described above. Appendix I to this agenda item contains the proposed amendments to Attachments I, 2.B and I to Annex 6, Parts I, II and III respectively. Additionally the HESC updated the working paper to be used for coordination with ATMOPSP, ADP and IFPP regarding flexible aerodrome operating minima, which was presented at the FLPOPSP/WG/1.

The meeting recalled that the HUD/EVS/SVS and CVS SARPS were extensively revised in Amendments 38, 33 and 19 to Annex 6, Parts I, II and III. The revisions were the result of a major review of such systems and their use by the HUD, EVS, SVS & CVS (HESC) Sub-group of the OPSP. The proposed SARPS were subsequently incorporated into the OPSP report to the ANC, where they were accepted and included in a State letter 46. During the consultation process the SARPS were significantly modified from those proposed by OPSP. Concerns with some of the HUD/EVS/SVS and CVS SARPS in amendment 33 to Annex 6 Part II and the in amendment 19 to Annex 6 Part III (GA) were discussed at the FLTOPS/WG/1 meeting where it appeared that some of the modifications were intentional and some were inadvertent.

The Panel reviewed the provisions and proposed modifications to keep the original intent.

Flight data analysis programme (FDAP)

The FLTOPSP noted the progress on the FDAP and the agreed that if in the third attempt to start Work Area 1 was not successful; the sub-group should carry on so that the entire project is not delayed.

Furthermore, it was agreed to propose an extension of the deliverable date to Q1 2016 of Required Action 2 in Job-card OPSP012.

Proposed additions to the work programme

All open tasks in the current active job-cards assigned to the panel were reviewed and the panel concluded that, for the most part, the work was practically concluded. The panel, however, was reluctant to propose closing job-cards until initiatives were finalized (i.e. Annexes and PANS become applicable and manuals were published). In that regard, a considerable amount of work assigned to the panel was nearing completion.

The panel recommends that the following job-cards be added to the work programme of the FLTOPSP:

- Visual guided approaches

- Volcanic ash operational issues remnant of the IVATF

- Alignment of provisions in Annex 6 Part III

- SID/STAR charting

- Approach operations (Categorisation and visibility criteria update)

- Introduction of tiltrotor

- ACAS Procedures in Emergency Descents

- Enhancement and additional applications for vision systems

Job cards with a more detailed description of those tasks are available through the author of this report.

Any other business

Powerlift / Titrotor

The meeting reviewed the initial proposed work programme items to formalise the gap analysis of ICAO provisons and development of guidance material to support the introduction of Powerlift/Titrotor aircraft operations. An addition to the FLTOPSP work programme in this regard is included in the future work programme.

LED Lights

The meeting was briefed on a joint industry/regulator symposium held from 7 to 8 October 2014, on LED approach and airport lighting organized by the United States FAA. The objectives of the symposium were to identify needed areas of research and testing and establish a plan of action and the timelines to accomplish the safe integration of LED approach lighting into the National Airspace System of the United States. The first day consisted of presentations from industry and the FAA, which outlined the concerns of the stakeholders. The primary concern from the operator groups was the overpowering brightness and

glare from LED lights. A major concern of the FAA was that incandescent light bulbs would not be manufactured for much longer due to an energy savings law passed by the United States Congress. The second day of the symposium was dedicated to breakout sessions of three subgroups: the Science Group, the Infrastructure Group, and the Flight Operational Test Group.

Each group was tasked to come up with a specific tasks and milestones to achieve them. The primary tasks of the Science Group was to provide a list of areas requiring further, research and testing, provide a plan with timeline and estimated budget to complete the necessary work within the timeline, and submit a report to the FAA summarizing the work of the group. The first task of the Infrastructure group was to research the number of incandescent bulbs in inventory and determine when they can no longer support an incandescent approach lighting system. The next task of the Infrastructure group was to establish test sites for a LED approach lighting system at the Atlantic City Airport and Volpe Test Centre at Cape Cod, Massachusetts. The final report of the Infrastructure group contained changes that need to be made to existing airport facilities to support LED lighting. The third subgroup, the Flight Operational Test, was tasked to develop a flight test point matrix to be used in operational flight-testing. The Flight Operational Test Group would also research the possible use of simulators for testing. In summary, all three groups were tasked to ensure the highest degree of safety is maintained as these new lights are installed.

Future meetings

The meeting reviewed the timelines of deliverables in the work programme and amended the schedule of proposed meetings as follows:

- 2015 Panel WG 4 - 8 May TBD
- 2015 Panel 12 - 16 Oct Montreal
- 2016 Panel WG Apr - May TBD
- 2016 Panel Sep - Oct Montreal

3. Conclusions

IFATCA's membership and continued representation in the ICAO FLT OPSP remains important, as issues like improved aircraft emergency descent procedures, SID / STAR provisions, Autonomous runway incursion warning systems (ARIWS) and others need our continued attention and support.

New work items like SID / STAR charting issues, ACAS procedures for aircraft emergency descents, visual guided approaches, volcanic ash operational issues and approach categorisation and visibility criteria updates are waiting to be added to the FLT OPSP work programme.

The next ICAO FLT OPS WG meeting will take place from 4th to 8th of May 2015 in Rome, Italy.

4. Recommendations

It is recommended that this report be accepted as information material.

- END –

INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

54th ANNUAL CONFERENCE – Sofia, 20th to 24th April 2015

Agenda Item: B.4.1.7 **IFATCA 15**
WP No. 80

SASP
Separation and Airspace Safety Panel

Presented by Bjarni K. Stefánsson

1. Introduction

1.1 Since last conference there have been two SASP working group meetings. The first meeting 5 - 16 May 2014 in Montreal Canada and the second meeting 10 - 21 November 2014 in Sydney Australia. Both meetings were attended by Bjarni K. Stefansson for IFATCA and reports have been provided.

1.2 The terms of reference (TOR) and work program for SASP is as follows:

Terms of reference

- To undertake specific studies, as approved by the Air Navigation Commission (ANC) and reflected in the work program of the panel, with a view to advising the ANC on technically practical and operationally feasible ICAO provisions, as necessary, to meet the objectives specified in the work program.
- In fulfilling this mandate, the panel will develop separation minima and the required level and performance of communications, navigation and surveillance requirements needed to support such minima, taking into account future demand and airspace capacity. In addition, the panel will develop the related ATM procedures and techniques required as well as guidelines for the determination of ATM safety indicators, acceptable levels of safety and appropriate metrics for expressing these.

Work program

1) ATM safety management

a) undertake further development of SARPs, PANS and guidance material for the application of safety management to ATM systems, in accordance with the system safety approach as described in the report of the Eleventh Air Navigation Conference;

b) work in conjunction with other bodies as appropriate towards the development of the framework for a uniform system-wide approach to safety, and the harmonization of the approaches to safety in all Annexes and PANS, in accordance with Recommendation 2/1 of the Eleventh Air Navigation Conference; and

c) develop guidelines for the determination of ATM safety indicators, acceptable levels of safety and appropriate metrics for expressing these, with a particular emphasis on leading or predictive indicators.

2) ATM separation minima and procedures

a) develop techniques for determination of the level of communications, navigation and surveillance performance needed to support new separation minima and ATM procedures; and

b) apply safety analysis techniques to the development of separation minima and associated ATM procedures for use in an enroute and terminal airspace including but not necessarily limited to procedures based on RNAV and RNP and taking into account the recommendations of the Eleventh Air Navigation Conference; and the ongoing work of the ATMRPP on ATM system requirements.

1.3 The general safety management tasks have by all practical purposes been deleted from the work of the panel as a result of the Safety Management manual being published and other safety related activities that have been undertaken since the Eleventh Air Navigation conference. Safety management issues concerning generation and implementation of separation standards are however still on the work program.

1.4 The SASP work program is distributed amongst various Project Teams (PT). Meetings of some of the project teams overlap, therefore making it impossible for a single representative to attend all project team meetings.

1.5 I submitted two working papers for the Montreal meeting and six working papers for the New Delhi meeting in addition to writing a number of flimsies at the meeting.

2. Discussion

PANS-ATM update in November 2014

2.1 Several items from the SASP were included in the PANS-ATM update in November 2014. Those are:

a) Permission to use Global Navigation Satellite Systems (GNSS) for application of VOR track separation. (See ICAO Circular 322).

b) 5 NM lateral separation between aircraft approved for RNP 1, RNP APCH or RNP AR APCH and operating on SIDs and/or STARs. (See ICAO Circular 324).

c) 15 NM lateral separation between aircraft operating on non-intersecting tracks, approved for RNP 2 or equipped with GNSS and using direct controller-pilot VHF voice communication. (See ICAO Circular 334).

d) 7 NM lateral separation between aircraft operating on non-intersecting tracks, approved for RNP 2 or equipped with GNSS, applied while one aircraft climbs/descends through the level of another aircraft and using direct controller-pilot VHF voice communication. (See ICAO Circular 334).

e) 20 NM lateral separation between aircraft operating on non-intersecting tracks, approved for RNP 2 or equipped with GNSS, applied while one aircraft climbs/descends through the level of another aircraft, using any types of communication. (See ICAO Circular 334).

f) 50 NM lateral separation between aircraft operating on intersecting tracks, and approved for RNP 10 (RNAV 10). (See ICAO Circular 334).

g) 30 NM lateral separation between aircraft operating on intersecting tracks, and approved for RNP 4. (See ICAO Circular 334).

h) 15 NM lateral separation between aircraft operating on intersecting tracks, and approved for RNP 2 or equipped with GNSS. (See ICAO Circular 334).

i) It was clarified in PANS-ATM that if any portion of the flight is planned to be conducted under IFR then a "G" (GNSS) in item 10 of the FPL refers to GNSS receivers that comply with the requirements of Annex 10 Volume 1. This is to ensure that operators do not file "G" for GNSS equipment that is not approved for IFR flight.

j) In Trail Procedure (ITP) separation.

2.2 Preparations for some of the changes listed above have been ongoing for up to 10 years.

Implementation Guidance Circulars

2.3 The SASP writes Circulars to guide organizations that are implementing new separation minima. Circular 322 *Guidelines for the Implementation of GNSS Lateral Separation Minima based on VOR Separation Minima* provides guidance for implementing the separation in paragraph 2.1 a) above, Circular 324 *Guidelines for Lateral Separation of Arriving and Departing Aircraft on Published Adjacent Instrument Flight Procedures* provides guidance for implementing the separation in paragraph 2.1 b) and Circular 334 *Guidelines for the Implementation of Lateral Separation Minima* provides guidance for implementing the separation listed in paragraph 2.1 c) – h).

Lateral Separation of RNP Approved Aircraft

2.4 The SASP continues to improve on its previous work on lateral separation of Required Navigation Performance (RNP) approved aircraft. The mathematicians continue to refine the mathematical collision risk models and the assumptions that are fed into the models are also being refined as more data and experience is gathered from operations around the world.

2.5 The Sydney meeting finalized a new 23 NM lateral separation minima that is an amendment to the current 30 NM lateral separation minima in PANS-ATM sections 5.4.1.2.1.6 b). The separation is also made contingent on Required Communication Performance 240 (RCP 240), Required Surveillance Performance 180 (RSP 180) and usage of ADS-C contracts to monitor conformance. The collision risk modeling results indicated that a minima of 18,45 NM would suffice, however, there is a need to take worst case Strategic Lateral Offset Procedures (SLOP) into account and the minima was therefore increased by 4 NM and rounded up to 23 NM. This change therefore requires consequential change to the SLOP provisions in PANS-ATM section 16.5. The intersecting track separation in PANS-ATM 5.4.1.2.7 is also reduced from 30 NM to 23 NM.

2.6 This change will enable the NAT to implement NAT track spacing of half-degree of latitude, which requires a 25 NM lateral separation.

Along Track Speed Estimation

2.7 Work was continued on along track speed estimation, which is the basis for the re-evaluation of longitudinal separation that the SASP has been working on. The work is done using large amounts of ADS-C data collected in the USA, Australia, Canada and Iceland. The data is filtered to find pairs of aircraft on the same identical track.

2.8 The calculation analyses the difference between ATC expected and actual arrival times at waypoints to find the variation between predicted and actual speeds. The group tries to identify the factors that could affect the disparity between predicted and actual progress

times; these include different ATC methods of applying longitudinal separation and manufacturer designed prediction formulas in the flight management systems, which differ between aircraft types.

2.9 Because of the extreme accuracy of GNSS navigation, longitudinal collision risk is highest when aircraft are operating on the same identical track. This is therefore the case that needed to be analyzed in most detail. It is therefore important to understand what are the sources of speed variation in this situation. Aircraft speed error can from an ATC point-of-view be split into three classes:

a) The aircraft technical speed keeping capability; ATC cannot have any influence on this.

b) Pilot actions (such as selecting a different speed); ATC can influence this by using speed control.

c) The effect of wind and temperature: If aircraft are flying the same identical track ATC should be able to ignore the effect of wind and temperature because the aircraft will be experiencing exactly the same weather effect if they are spaced closely enough.

2.10 The analyses of the data came to the conclusion that the closer the aircraft pairs were to the separation minimum, the smaller the difference between ATC expected and actual waypoint progress times and speed variation between aircraft pairs under this condition is small. This conclusion corresponds to the expectation of the ATC experts in the panel because the PANS-ATM clearly requires ATC to apply speed control when aircraft pairs are close to the longitudinal separation minima.

2.11 The results of the data collection and calculations let to a satisfactory conclusion on performance based longitudinal separation minima as described below.

Performance Based Longitudinal Separation

2.12 The OPLINK panel has recently completed its work on the Required Communication Performance (RCP) and Required Surveillance Performance (RSP) concepts. Subject to ICAO approval this will result in an amendment to a number of ICAO documents, including Annex and PANS. Three new manuals will also be published; the Performance Based Communication and Surveillance (PBCS) Manual, the Global Operational Data Link (GOLD) Manual and the Satellite Voice Operations Manual (SVOM).

2.13 It had previously been agreed that the SASP would subsequently align the current 30 NM and 50 NM longitudinal separation minima in PANS-ATM 5.4.2.6.4.3 with the RCP and RSP concepts. Furthermore the panel also completed the development of a new five minute longitudinal separation minima, this is the same minima that has been the subject of an operational trial in the NAT for the last two years. The five minute separation will also be subject to RCP and RSP requirements.

2.14 In order to satisfy the convention used for application of longitudinal separation in the NAT, and to align with the DME/GNSS convention, the separation minima will be applicable where the relative angle between the aircraft tracks is less than 90°. The opposite direction separation was also changed to require ADS-C reports to show that the aircraft had actually passed each other by the appropriate separation minima. There will also be a requirement for post implementation monitoring of defined underlying assumptions in the collision risk modeling.

2.15 The meeting considered many options for placement of the new and revised minima within the PANS-ATM that would properly locate them in accordance with the common performance based requirements. It was determined that it would be best to place the 50

NM, 30 NM and 5-minutes longitudinal separations in a new section within Chapter 5 (section 5.4.2.9) and delete section 5.4.2.6.4 that currently deals with the 30 NM and 50 NM separation.

2.16 As a culmination of all the work on longitudinal separation that has taken place over the last few SASP meetings the PANS-ATM amendment below is proposed. It is hoped that this will be published in the PANS-ATM in 2016. The SASP needs to write an implementation guidance Circular to accompany this separation minima and I have taken an action to write parts of that Circular.

5.4.2.9 PERFORMANCE BASED LONGITUDINAL SEPARATION MINIMA

Note.— Guidance material for implementation and application of the separation in this section is contained in the Performance-based Communication and Surveillance (PBCS) Manual *(Doc 9869), the* Global Operational Data Link (GOLD) Manual *(Doc xxxx), the* Satellite Voice Operations Manual *(SVOM) (Doc xxxx) and the* Guidelines for the Implementation of Performance-based Longitudinal Separation Minima *(Circular xxx).*

5.4.2.9.1 Within designated airspace, or on designated routes, separation minima in accordance with the provisions of this section (5.4.2.6) may be used, subject to regional air navigation agreements.

5.4.2.9.2 For aircraft cruising, climbing or descending on:

a) the same track, or

b) crossing tracks provided that the relative angle between the tracks is less than 90 degrees,

the following separation minima may be used:

Separation minima	*RNP*	*RCP*	*RSP*	*Maximum ADS-C periodic reporting interval*
93 km (50 NM)	10	240	180	27 minutes
	4	240	180	32 minutes
55.5 km (30 NM)	2 or 4	240	180	12 minutes
5 minutes	2 or 4	240	180	14 minutes

Note.— Detailed information on the analysis used to determine these separation minima and monitoring procedures is contained in Guidelines for the Implementation of Performance Based Longitudinal Separation Minima *(Circular xxx).*

5.4.2.9.3 Opposite-direction aircraft on reciprocal tracks may be cleared to climb or descend to or through the levels occupied by another aircraft provided that ADS-C reports show that the aircraft have passed each other by the applicable separation minimum in 5.4.2.9.2.

5.4.2.9.4 The 5 minute separation shall be calculated to a resolution of 1 second. Rounding is not allowed.

5.4.2.9.5 Separation shall be applied so that the distance or time between the calculated positions of the aircraft is never less than the prescribed minimum. This distance or time shall be obtained by one of the following methods:

a) when the aircraft are on the same identical track, the distance or time may be measured between the calculated positions of the aircraft or may be calculated by measuring the distances or times to a common point on the track (see Figures 5-28 and 5-29);

Note.— Same identical tracks are a special case of same track defined in 5.4.2.1.5 a) where the angular difference is zero degrees or reciprocal tracks defined in 5.4.2.1.5 b) where the angular difference is 180 degrees.

b) when the aircraft are on same or reciprocal non-parallel tracks other than in a) above, or on crossing tracks, the distance or time shall be calculated by measuring the distances or times to the common point of intersection of the tracks or projected track (see Figures 5-30 to 5-32); and

c) when the aircraft are on parallel tracks whose protection areas overlap, the distance or time shall be measured along the track of one of the aircraft as in a) above using its calculated position and the point abeam the calculated position of the other aircraft (see Figure 5-33).

Note.— In all cases presented in Figures 5-28 to 5-33, "d" and "t" is calculated by subtracting the distance or time of the closer aircraft from the common point from the distance or time of the more distant aircraft from the common point, except in Figure 5-32 where the two distances or times are added and the order of the aircraft is not important in the calculation.

5.4.2.9.6 The communication system provided to enable the application of the separation minima in 5.4.2.6.2 shall allow a controller, within 4 minutes, to intervene and resolve a potential conflict by contacting an aircraft using the normal means of communication. An alternative means shall be available to allow the controller to intervene and resolve the conflict within a total time of 10 1/2 minutes, should the normal means of communication fail.

5.4.2.9.7 When an ADS-C periodic or waypoint change event report is not received within 3 minutes of the time it should have been sent, the report is considered overdue and the controller shall take action to obtain the report as quickly as possible, normally by ADS-C or CPDLC. If a report is not received within 6 minutes of the time the original report should have been sent, and there is a possibility of loss of separation with other aircraft, the controller shall take action to resolve any potential conflict(s) as soon as possible. The communication means provided shall be such that the conflict is resolved within a further 7 1/2 minutes.

5.4.2.9.8 When information is received indicating ground or aircraft equipment failure or deterioration below the communication, navigation and surveillance performance requirements, ATC shall then, as required, apply alternative separation minima.

(Figures 5-28 to 5-33 are amended to reflect also the time-based separation).

ADS-C Climb and Descent Procedure (CDP)

2.17 The SASP finalized the work on a new longitudinal separation minima labeled ADS-C Climb and Descent Procedure (CDP). The aim of the separation is to utilize current advanced aircraft equipage (CPDLC and ADS-C) to enable aircraft to climb/descent through the level of other aircraft with reduced longitudinal separation.

2.18 The FAA conducted an operational trial of the ADS-C CDP in the Oakland oceanic CTA between February 2011 and February 2013. Limited information was collected during the trial because the procedure was not programmed into the FDPS and manual application of this separation is cumbersome. The FAA therefore conducted a fast time simulation with an objective to evaluate the ADS-C CDP in terms of the potential application, aircraft speed variability, time for the procedure to complete and longitudinal spacing.

2.19 Considering the limited scope of the operational trial and fast time simulation and therefore small amount of available data, the SASP concluded that the separation should be published in the PANS-ATM with a requirement that implementers log every time the separation is used the distance between aircraft pairs when at the same flight level. This will require specific automation. The agreed monitoring requirement is as follows:

ATS authority is to conduct the following performance monitoring in order to allow the application of the separation:
1. the minimal longitudinal separation distances (D) between aircraft when at the same flight level;
2. the number of events where more than 12 NM longitudinal distance is not maintained during the ADS-C CDP;
3. the probability of P(D<12NM) < 3.0·E−5 must be demonstrated (number of events with less than 12 NM/total number of times the procedure has been applied); and
4. If the probability is exceeded, safety mitigations must be established to reduce likelihood of re-occurrence.

2.20 The SASP noted that including such a requirement represented a new approach to SASP working methods and some concern was raised as to whether such measures would make consideration for use of the standard too onerous for implementers. It was explained that such monitoring is necessary for near term implementations but the requirement could be relaxed when sufficient data verifying safe application had been gathered.

2.21 The SASP finalized the PANS-ATM amendment proposal, impact statement and supporting ICAO Circular. Subject to ICAO approval it is anticipated that the new minima will be published in the PANS-ATM in November 2016. The proposed PANS-ATM amendment is as follows:

5.4.2.8 LONGITUDINAL SEPARATION MINIMA BASED ON DISTANCE USING ADS-C CLIMB/DESCEND PROCEDURE (CDP)

5.4.2.8.1 Aircraft on the same track may be cleared to climb or descend through the level of another aircraft provided:

a) the longitudinal distance between the aircraft is determined by the ground automation system from simultaneous ADS-C demand reports which contain position accuracy of 0.25 NM or better (Figure of Merit 6 or higher);

Note: refer to 5.4.2.6.4.1 for distance calculations

b) the longitudinal distance between the aircraft, as determined in a) above, is not less than:

1) 27.8 km (15 NM) when the preceding aircraft is at the same speed or faster than the following aircraft; or

2) 46.3 km (25 NM) when the following aircraft is not more than either 18.5 km/h (10 kt) or Mach 0.02 faster than the preceding aircraft;

c) the altitude difference between aircraft is not greater than 600 m (2000 ft);

d) the clearance is issued with a restriction that ensures vertical separation is re-established within 15 minutes from the first demand report request; and

e) direct controller-pilot communications (either voice or controller pilot data link communications) is maintained.

5.4.2.8.2 Application of the ADS-C CDP requires *ongoing monitoring as described in the En Route Monitoring Agency Manual and the ADS-C CDP Circular XXX.*

Separation of arriving and departing aircraft

2.22 The departure/arrival separation minima specified in PANS-ATM section 5.7.1 does not take into account aircraft flying area navigation departure and arrival procedures. A proposal to expand the separation to include such aircraft was provided to the ANC some time ago but further clarifications were requested from the ANC and the matter was also referred to the ATM OPS panel. A number of comments were received from the ATM OPSP and those were considered by the SASP.

2.23 The SASP had originally drafted a proposal that also tried to cater for opposite directions RNAV arrivals and departures in a similar manner as is currently done for conventional procedures in PANS-ATM section 5.7.1. This however proved to be complicated and difficult to explain in a clear and concise manner in a typical PANS-ATM style short text. After putting a lot of effort into considering the various options the group in the end came to the conclusion to simplify the proposal and only cater for the cases where the departing aircraft remains at all times clear of the arrival protection area of the published RNAV/RNP arrival procedure being flown. The idea of catering for "opposite direction" departures was therefore abandoned. The proposed simplified PANS-ATM amendment is shown below:

. . . . . .

5.7.1.3 If an arriving aircraft is following an RNAV or RNP instrument flight procedure, a departing aircraft may take off on to a departure path that is clear of the arrival protection area of the arriving aircraft provided (see Figure 5-38 X1);

a) the take-off takes place before the arriving aircraft crosses a designated waypoint on the instrument flight procedure, the location of such waypoint to be determined by the appropriate ATS authority; and

b) the departing aircraft remains clear of the arrival protection area until another form of separation is established.

Note: The arrival protection area is defined as the shaded area in Figure 5-38 X1.

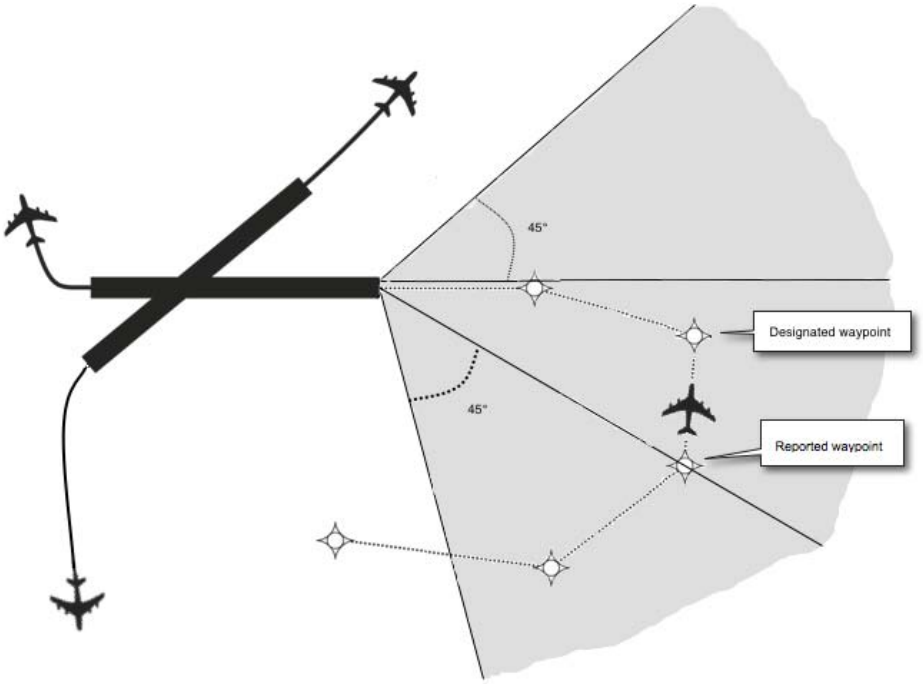


Figure 5-38 X1

Waypoint Transition (turn) Guidance Material

2.24 At the Amman conference in 2011 the following IFATCA policy was set:

Tables, which show the maximum dimensions of fly-by transitions, should be published in ICAO PANS-ATM.

2.25 Since then I have been working on this subject within the SASP and the effect of RNAV fly-by, fixed radius and fly-over turns on separation has been extensively discussed over the course of a few meetings.

2.26 It has been confirmed by data collection that variations in performance of different Flight Management Systems (FMSs) and Flight Management Computers (FMCs) can have significant effect on the flight track flown by an aircraft during fly-by turns. It has been noted that the issue of actual separation between aircraft during the turns would be of particular interest in the case of closely spaced routes such as parallel departures and arrival routes in the terminal airspace and parallel routes in the en-route environment. It must be kept in mind that defined separation minima in the PANS-ATM applies to aircraft nominal tracks and that in the case of fly-by turns the nominal track can be quite varied.

2.27 In order to quantify the effect the SASP agreed to perform a number of collision risk calculations on fly-by and fixed radius turns. The group decided against modeling fly-over turns because of the known disparate behavior of such turns. The conclusion of the collision risk work seems to indicate that fixed ground track turns (RF and FRT) accurately represent the aircrafts nominal track and could therefore be applied with tight separation standards but that the behavior of fly-by turns was too spread out to be

directly applicable to separation without detailed local definitions on speed control etc. Therefor it is recommended to use fixed radius turns for closely spaced routes or otherwise increase the route spacing if fly-by turns are used to ensure that nominal separation is maintained.

2.28 The SASP has agreed in principle that the best way forward is to include in the PANS-ATM guidance material on aircraft turn performance so that all ATM stakeholders could have a common understanding of the influences on the lateral path the aircraft will fly during a waypoint transition. The group considered that the PANS-ATM was the best-suited document for this purpose since most personnel connected with ATM have good access to this document. It has however been very difficult to come to an agreement on the scope of this material and agreement could not be reached before the deadline set for the 2016 PANS-ATM update. The material will therefore likely be included in the 2018 PANS-ATM update.

Parallel Approach Operations

2.29 Over a period of time the SASP has been working towards rewriting ICAO Doc 9643 (Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways) and PANS-ATM section 6.7 (Operations on Parallel or Near-Parallel Runways). The aim is to update the material with approach procedures based on modern technology, e.g. GNSS Landing system (GLS) and RNP and RNAV procedures and new surveillance technologies. Extensive safety studies have been done on these new technologies and it has been determined that they are suitable for use in parallel approach operations.

2.30 The PANS-ATM and Doc 9643 amendment material has now been completed and the aim is to have it published in November 2016. The material is extensive and is therefore not reproduced in this working paper.

3600 Parallel Approach Spacing

2.31 The USA has done a safety assessment that concluded that runway spacing as low as 3600 feet could be used in Simultaneous Independent Parallel Instrument Approach (SIPIA) operations based on a 4,8 second update rate Airport Surveillance Radar (ASR-9) with a Standard Terminal Automation Replacement System (STARS) Final Monitor Aid (FMA) providing a display Aspect Ratio (AR) of 4:1 and visual and aural alerts for the controller to warn of deviating aircraft. This is in contrast to the 2,5 second update rate that is specified in the PANS-ATM today. The USA proposed an amendment to the PANS-ATM and Doc 9643 to make such a standard globally applicable.

2.32 A detailed discussion about this proposal however concluded that the proposal was too focused on a radar system and final approach monitoring display that were quite specific to operations within the United States and that the specifications needed to be more generic if they were to be included in the PANS-ATM. Members were also concerned about the controller intervention capability in case of aircraft deviating into the Non-Transgression Zone (NTZ) when the surveillance update rate was reduced from 2,5 seconds to 4,8 seconds.

Rotorcraft RNP 0.3 Separation

2.33 The development of rotorcraft RNP 0.3 separation was added to the SASP work program. It was pointed out that the Performance-based Navigation (PBN) Manual now contains a rotorcraft PBN specification of RNP 0.3 for rotorcraft en route, terminal (arrival and departure) and the initial/intermediate/missed approach segments of a rotorcraft instrument approach to an airport, heliport/helipad, point-in-space or offshore environment.

2.34 It was highlighted that the RNP 0.3 specification is considered important to provide service for low level rotorcraft routes in mountainous, metropolitan obstacle-rich environments, remote and high-density airspace but that separation standards suitable for rotorcraft operations were missing.

2.35 Operational requirement descriptions were developed to enable the mathematicians to start the required collision risk modeling.

Space based ADS-B

2.36 NavCanada plans to implement space-based ADS-B through the use of 66 Iridium NEXT satellites equipped with receivers capable of receiving signals from 1090 megahertz (MHz) Mode S extended squitter transponders. The satellite launches are planned to occur throughout the 2015 to 2017 timeframe with the full constellation expected to be operational by 2018.

2.37 The SASP started its initial work on space based ADS-B by considering the modifications to longitudinal collision risk models that would be needed. The biggest change will be the reduced position reporting time intervals but the communication element also needs to be considered.

2.38 Detailed discussion took place on various aspects of the model being proposed in particular with regards to surveillance and communication response times and how these are calculated, and the range of possible communication mediums that could be used to satisfy the modelling assumptions such as CPDLC, HF and SATCOM voice. Detailed specifications of the space based ADS-B surveillance element are still pending. Single points of failure must also be considered such as GNSS for navigation and surveillance and Iridium satellites for surveillance and data link/Satcom communication.

Global Guidance for En-Route Monitoring Agencies (EMA)

2.39 Over the last few meetings the SASP has been developing global guidance material for organizations supporting introduction and maintenance of horizontal-plane separation minima relying on performance based navigation and enhanced communications and surveillance. Production of such guidance material follows from the decision at a previous SASP meeting to pursue development of global guidance based on the combined experience of en-route monitoring agencies in the North Atlantic and Asia/Pacific regions. The SASP is proposing that the document be named "*Manual on Monitoring the Application of Performance-Based Horizontal Separation Minima*".

2.40 Development of the material is now almost complete and the intention is to have the manual published in 2015.

Gross Navigation Errors

2.41 Taking into account the rapidly changing applications of reduced separations based on Performance-Based Navigation (PBN), Performance-Based Communication (PBC) and Performance-Based Surveillance (PBS) standards, the SASP has over the last few meetings been dealing with the question if there should be a globally applicable definition of a Gross Navigation Error (GNE). One of the issues is whether it was practical to determine a standardized GNE value and definition as opposed to the current situation where these are regionally defined. Is it being proposed within that SASP that 2*RNP be used as a reference value for a GNE.

2.42 The SASP continued to discuss this but again no conclusion was reached because the issue is not as simple as it might seem at first. I once again pointed out that air traffic controllers would likely be the reporters of GNEs but it is often not clear to controllers

what RNP value is selected in the aircraft. In a mixed mode environment the point of reference for the controller would normally be the separation minimum being applied to each aircraft. This discussion will probably be continued at future meetings.

Remotely Piloted Aircraft Systems

2.43 The secretary presented a working paper on behalf of the Remotely Piloted Aircraft Systems Panel (RPASP) seeking guidance from the SASP in order to proceed with the assessment of the Target Level of Safety which they are claiming must be assigned to the Detect & Avoid (DAA) system of Remotely Piloted Aircraft Systems (RPAS) in order to integrate these new aircraft into non-segregated civilian airspace. The RPASP are claiming that any integration process will likely require significant contribution of SASP expertise and that this would necessitate generation of a formal job card to enter it onto the SASP work programme.

2.44 An RPASP representative was to be made available to the SASP as a subject matter expert to assist with the initial analysis of the Performance and Safety Case Considerations in the document "*MIDCAS Performance and Safety Case Considerations*" provided to the SASP by the RPASP but unfortunately this person could not attend the meeting.

2.45 The SASP had significant concerns regarding the document and it is not really clear to anybody within the SASP what the RPASP is asking for. The document failed to state clearly the problem that it is attempting to solve and departs from established practices for determining acceptable levels of risk for the introduction of new, or changes to existing, separation procedures. The document fails to describe underlying assumptions concerning airspace structure and traffic, navigation, surveillance and communication performance and any relationship to the air traffic control system.

2.46 Integrating RPAS aircraft into non-segregated controlled airspace is about Communications, Navigation and Surveillance and air traffic control procedures. From my perspective regarding SASP work there are two possibilities:

a) Prove that RPAS aircraft can satisfy the CNS requirements for application of all or some of the current separation standards; or

b) Create new separation standards for integrating RPAS aircraft into non-segregated controlled airspace.

2.47 For the SASP to be able to do either of the above the CNS performance of RPAS needs to be clear. Unless current ICAO rules are changed DAA would not be a factor in collision risk calculations in the same manner as ACAS and VFR is not included.

3. Conclusion

3.1 The following are the main issues that were progressed by SASP during the year 2014:

a) Work was completed on a 23 NM performance based lateral separation standard.

b) Work was completed on 30 NM, 50 NM and 5 minute performance based longitudinal separation standards.

c) Work was finished on the ADS-C Climb Descent Procedure.

d) Work was finished on separation of departing and arriving RNP/RNAV aircraft.

e) Work was continued on waypoint transition (turn) guidance material.

f) Work was finished on amendments to ICAO Doc 9643 (Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways) and PANS-ATM section 6.7 (Operations on Parallel or Near-Parallel Runways).

g) Work was started on separation standards for space-based ADS-B.

h) Work was mostly completed on Global Guidance for En-Route Monitoring Agencies (EMA).

3.2 The next SASP WG meeting will be held in Montreal at ICAO headquarters 4 - 15 May 2015 and the next meeting thereafter will be in Oklahoma City USA in November 2015.

3.3 Many thanks to my employer, ISAVIA, who gave me the time from work to attend the SASP WG meetings and also paid the airfare to both meetings.

4. Recommendation

4.1 That this paper be accepted.

- END –

INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

54th ANNUAL CONFERENCE – Sofia, 20th to 24th April 2015

Agenda Item: 4.1.11 **IFATCA 15**
WP No. 81

Report on the 2nd ICAO High Level Safety Conference

Presented by EVPT

Summary

This paper reports on the 2nd ICAO High Level Safety Conference that was held during February 2015 in Montreal.

1. Introduction

1.1. The second ICAO High Level Safety Conference (HLSC) was held in Montreal from 2-5 February 2015. IFATCA was represented by Patrik Peters (President), assisted by Duncan Auld (EVPT) and Ruth Stilwell (ANC Rep).

1.2. The High Level Safety Conference is an ICAO meeting of all Member States who are generally represented by their Director General of Civil Aviation (DGCA), along with UN Observers, and International Organisations such as ourselves.

1.3. A High Level Safety Conference is a forum where current and expected future safety issues are raised and delegates from the States "build consensus, obtain commitments and formulate recommendations deemed necessary for the effective and efficient progress of key aviation safety activities" [1]

2. Discussion

2.1. The last HLSC was held in 2010 and as is typical in aviation; in one way everything is the same, and in another way everything has changed. This conference had high expectations placed upon it. The unfortunate loss of life due to several aircraft accidents in 2014 created much public demand, and political pressure particularly to 'resolve' the issues with global flight tracking of aircraft and flights over conflict areas. The increased use of social media has an unprecedented influence over governments and there was some concern that this political pressure would result in 'knee-jerk' reactions and outcomes that were not ideal from the aviation perspective.

2.2. Flight Tracking

2.2.1. Following the tragic disappearance of MH370, ICAO established two groups to address the public concerns related to aircraft tracking; an Ad-Hoc Working Group to develop a concept of operations for a long term solution, and the Aircraft Tracking Task Force (ATTF) to investigate possible solutions utilising existing technologies for the short to medium term.

2.2.2. We had some concerns that in the current political environment the delegates would push for increased aircraft tracking using existing communications and surveillance

[1] ICAO HLSC Website http://www.icao.int/Meetings/HLSC2015/Pages/default.aspx accessed 23 Feb 2015

infrastructure primarily used for air traffic control purposes. In this event it would be possible that the reliability of that infrastructure could be degraded due to increased demand on the systems. As this is a very sensitive topic, we did not want to be seen as 'the guys that don't want to find crashed aeroplanes' we closely monitored the discussions and were ready to intervene and make our point if required to do so – but only if required; sometimes it is better to say nothing at all.

2.2.3. In the end, the conference endorsed the development of performance based requirements for the aircraft operator on aircraft tracking, this is ideal as it does not tie the requirement to any specific technology. Member Associations should be aware of tracking initiatives in their vicinity and be vigilant to ensure these do not negatively impact on communications or surveillance infrastructure that is primarily used for air traffic control purposes.

2.2.4. The conference agreed on the following conclusions regarding global flight tracking:

> ***CONCLUSION 1/2***
> *Global flight tracking*
>
> *a) Recent events, such as the accident to Flight AF447 and the disappearance of Flight MH370, have shown that there is a need for provisions requiring operators to determine the position of an aircraft at any time in any location;*
>
> *b) States, air navigation authorities and the industry should begin voluntary implementation of global tracking using available technologies as a matter of urgency;*
>
> *…*[2]

2.3. Risks to Civil Aviation in Conflict Zones

2.3.1. In response to the tragic downing on MH17 last year, there has been a significant shift in traffic patterns in some regions to avoid conflict zones. There is still some doubt as to where the best information to make these risk assessments is to come from. The global aviation community has been working together with intelligence agencies to develop a reliable system to provide information to base this risk assessment on. ICAO will host a repository that will gather various sources of relevant information such as NOTAM, AIC, AIP SUP, etc. and provide access to these to qualified parties.

2.3.2. The conference agreed on the following conclusions regarding flight near conflict zones:

> *…*
> *Conflict zones*
>
> *c) The tragic loss of Flight MH17 highlights the necessity to provide accurate and timely information to States and airlines regarding risks to civil aviation arising from conflict zones as a matter of urgency;*
>
> *d) There is an urgent need to utilize and enhance existing mechanisms for the purpose of sharing critical information related to airspace use restrictions that are associated with conflict zones and to ensure robust risk assessments.*
>
> *…*[3]

2.4. Protection of Safety Information and Associated Sources

2.4.1. Aviation safety relies heavily on a 'lessons learned' philosophy requiring the reporting of incidents and recording of data and/or information to discover the causes of incidents or accidents. A healthy reporting culture cannot exist without a feeling of trust in the

[2] HLSC/15-WP/102 "Summary of Discussions, Conclusions and Recommendations for Theme 1: Reviewing the Current Situation". Paragraph 2.1
[3] Ibid.

system that the safety information held will not be used for reasons other than incident investigation, and that the reporters of incidents will be protected from adverse action.

2.4.2. While a reasonably healthy 'just culture' exists in some regions, in other areas there concept is almost non-existent. This problem is raised time and time again yet we have made little progress in many areas. It is difficult for some employers to understand why it is needed, and therefore it must be supported at the regulatory and legislative levels to remain resistant to public pressure during times of crisis.

2.4.3. During the 38th General Assembly in 2013, IFATCA expressed concern regarding legal action on aviation professionals that was against the interest of the reporting culture. During this HLSC we once again advocated the safety culture issue, supporting papers endorsing effective reporting systems that include protections for not only the data, but the sources of the data as well.

"The International Federation of Air Traffic Controllers' Associations, supports working paper 4 from the Secretariat, working paper 25 from the USA and Brazil, working paper 38 from the EU and working paper 93 from the Dominican Republic.

The proper protection of safety information and its sources is critical to creating effective safety reporting systems. Many states have made great progress in this area and we have seen measurable improvements in safety as a result.

Unfortunately, we are far from global implementation of adequate protections to ensure that safety issues can be reported without risk. We must continue to move forward as a global community to promote the collection of safety information. Without adequate mechanisms to protect both the sources and the information, effective progress toward this goal is not possible.

We commend ICAO, the Safety Management Panel, and the SIP Task Force for taking on this issue and for the development of standards for the protection of safety information and its sources. We stress that continued commitment and diligence by the entire aviation community is necessary to ensure these standards are implemented and effective."

2.4.4. During the presentation of the report, it was realised that there was an omission in the final conference recommendations. The conclusions had identified the need to protect both the safety information itself and the sources of that information, which was in line with the discussion the day before. However, the report failed to mention the protection of sources, from our point of view this was a significant issue. In coordination with IFALPA they presented a joint intervention on our behalf highlighting this important issue to the conference, and it was accepted as an editorial amendment.

2.4.5. The conference agreed on the following significant outcomes:

CONCLUSION 2/2

a) Accident investigation authorities gather and generate records during the course of investigations instituted with the objective of determining causes and/or contributing factors of aviation accidents or incidents to prevent their recurrence. Safeguarding accident investigation authorities' continued access to essential information during the course of an investigation relies on States' ability to implement appropriate protection for accident and incident records;

b) Proactive mechanisms designed to manage aviation safety rely on the collection, analysis and exchange of safety information for the timely identification and

subsequent mitigation of risks and hazards that may result in an accident or an incident. The success of this proactive approach to manage aviation safety depends on the appropriate protection of safety information and related sources to encourage meaningful reporting;

c) The protection of certain accident and incident records, other information collected for the purposes of maintaining or improving safety and its related sources is an enabler for safety improvement and should be introduced at the legislation level;

d) Multidisciplinary groups of experts have contributed towards the development of proposals to enhance ICAO provisions on the protection of certain accident and incident records and other information collected for the purposes of maintaining or improving safety and its related sources; and

e) Progress in ICAO's work to enhance the protection of certain accident and incident records and information collected for the purpose of maintaining or improving safety in addition to assistance to States in implementing these new protective frameworks is critical for the improvement of aviation safety;

f) Consistency and maturity on the proposals as well as clearly defining the types of information and sources to be protected is fundamental for the development and efficient implementation of new or enhanced provisions.

3. RECOMMENDATION 2/2

3.1 The Conference agreed on the following recommendations:

a) That ICAO ensure meaningful progress towards the adoption of new and enhanced provisions on the protection of safety management information as well as accident and incident records, while ensuring maturity, consistency and clarity on the proposals;

b) That States undertake the necessary legal adjustments to efficiently implement new and enhanced protective frameworks to facilitate safety management and accident investigation activities; and

c) That ICAO support States in implementing new and enhanced provisions through a strategy comprised of supporting guidance material, tools and seminars tailored to the needs of each region aiming at building trust, cooperation and a common understanding among aviation safety professionals, accident investigation authorities, regulators, law enforcement officers and the judiciary in the context of an open reporting culture.[4]

2.5. **Unmanned Aerial Vehicles**

2.5.1. IATA presented a paper highlighting the issues faced with unregulated remotely piloted aircraft in the vicinity of aerodromes. This problem is increasing with the availability of cheap 'drones' in stores and on the internet. Generally, the persons purchasing these aircraft have little or no knowledge on aviation rules and procedures.

2.5.2. The paper clearly presented the problems and requested that the conference delegates:

- refer to the ICAO guidance when developing or amending RPAS regulations;
- establish a formal means to educate users on regulation relating to the RPAS

[4] HLSC/15-WP/104 "Summary of Discussions, Conclusions and Recommendations for Theme 2: Future Approach to Manage Aviation Safety". Paragraph 2

operations;
- establish proper enforced legal and/or administrative sanctions for using RPAS in an unsafe or dangerous manner, especially near airports or commercial aircraft; and
- request ICAO address the issue of non-regulated RPAS use in the vicinity of airports and aircraft.

2.5.3. Considering the impact of these operations on air traffic control, we considered it appropriate to support the paper and its recommendations. A lengthy intervention was not required and we kept it short and to the point.

"The International Federation of Air Traffic Controllers' Associations shares the concerns of IATA with regard to the operation of RPAS particularly in the vicinity of aerodromes and support the conclusions of IATA in working paper 98. We look forward to working with ICAO and participating in the RPAS Symposium to further this work."

2.5.4. The outcome of that discussion was the following:

RECOMMENDATION 2/1
a) Strategies for managing aviation safety
…

4) ICAO should expedite the development of provisions to be used by States to regulate RPAS operations within their airspace and to educate users regarding the risks associated with their operations.
…[5]

2.5.5. We will continue to work with Industry through the ICAO process to address the ongoing concerns with UAS.

3. Conclusions

3.1. The Federation was well represented and advocated several positions that are important to the membership. These high level meetings may appear to achieve little from the perspective of an operational controller, but they play the significant role in achieving commitment from the States to work towards certain outcomes. We will continue to address these important areas through all avenues at our disposal.

4. Recommendation

It is recommended that;

4.1. This paper is accepted as information material.

- END -

[5] HLSC/15-WP/103 "Summary of Discussions, Conclusions and Recommendations for Theme 2: Future Approach to Manage Aviation Safety". Paragraph 3

INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

54th ANNUAL CONFERENCE – Sofia, 20th to 24th April 2015

Agenda Item: B.5.1 **IFATCA 15**
WP No. 82

Screen Design Process

Presented by TOC and PLC

Summary

The development of new ATS systems allows the introduction of new technologies. Colour displays and automated warnings are but some of them, as well as the layout of Controller Working Positions. If not carefully assessed and tuned they bear their own risks. This paper is discussing the various aspects of the screen design process, points out risks associated with immature introduction and looks at possible solutions to avoid unwanted effects.

1. Introduction

1.1. Modern ATM systems have vast capabilities compared to those previously in use. The growing demand for increased system capacity are leading to the introduction of new automation. This automation can overcome human cognitive limits or support the controller, but can at the same time lead to additional complexity in the ATC task management.

1.2. Generally, Controller Working Positions (CWP) have developed via an incremental and non-uniform process. With components supplied by different vendors, the equipment interfaces are often dissimilar and not integrated. Though technical compatibility must be ensured, there are often inconsistencies in the Human-Machine Interface (HMI).

1.3. Although many studies on screen design optimization have been performed over the year, and a clear 'cockpit design philosophy' exists, a standard regarding HMIs specifically for Air Traffic Services is still lacking.

1.4. MA's report mixed results on the outcome of the implementation of new support tools or ATC systems. This paper gives an overview of the existing guideline material and the main aspects to be taken into account in a Screen Design Process.

2. Discussion

2.1. The modification of the Controller Working Position (CWP) has become one of the most visible and critical activities in the upgrade of the ATM system. Successful introduction of such an upgrade involves the integration of operational, technical and human factors expertise.

2.1.1. There often is a gap between the manufacturers (engineers) and the front-end users (air traffic controllers). Although an iterative approach (spiral model[1]) is preferable, human factors are often considered too late in the design of new systems. These late considerations often lead to adjusting the model to provide the desired outcome or so-called 'reverse engineering', with negative consequences on the basic design. An agile design model, in which front-end users are looped in every phase of the process, helps getting a better understanding of how the realized vision would operate in a real world concept and lowers the chances of surprises arising down the road[2]. The main pitfall is the assumption that since humans are so flexible and adaptable, it's easier to let them adapt themselves to the machine than vice versa. It is therefore important to continue to urge the need for controllers to be involved in the design process.

2.1.2. At the IFATCA conference in Kathmandu 2012 a paper was presented on "Determining Operations Readiness of Automated ATM Systems". This paper describes several cases in which controllers have been involved in the development of the system and compares those with cases in which ATCOs worked with already developed systems. In those cases where operational staff had been included in the development process, system changes were better accepted by the concerned ATCOs and (partial) redesigns were not deemed necessary. The following policy was adopted at the Conference:

Operational controllers shall be involved in the design, development and implementation of new ATM systems. Their role should include:
-Establish user requirements
-To participate in the risk assessment process
-To validate the system
-To provide feedback in the further development of the system

IFATCA Wp 87 – Resolution B12 – Kathmandu 2012

This policy connects to earlier adopted policy, which states:

Automation must improve and enhance the data exchange for controllers. Automated systems must be fail-safe and provide accurate and incorruptible data. These systems mu be built with an integrity factor to review and crosscheck the information being received.

The Human Factors aspects of Automation must be fully considered when developing automated systems.

Automation must assist and support ATCOs in the execution of their duties.

IFATCA Technical and Professional Manual 2014, page 4.2.1.15

2.1.3. Although IFATCA has several general policies on requirements for design standards for automated systems, there is no uniformity or consistency in system design. Over the years, several researches have been done on the human factors in system design, colour use etc. But, in contrast to the design of cockpits, common principles for alerts and the display of operational information specifically for Air Traffic Services are still lacking.

[1] For more information see IFATCA WP NO. 87 "Determining Operations Readiness of Automated ATM Systems"
[2] "Understanding Agile Design and why it's important" - Luke Clum, June 2013

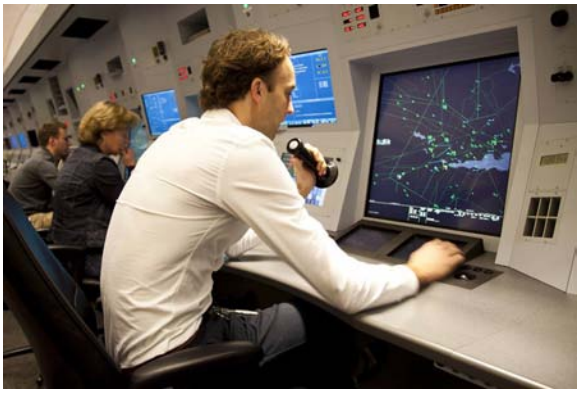
2.1.4. Nowadays cockpits present similar interfaces and equipment and functionalities are highly standardized. The introduction of a fly-by-wire cockpit had adhered to a set of design rules and guidelines for cockpit design. These design rules include for example that the cockpit should simplify the pilot's task by enhancing situational and system awareness, with automation assisting the aircrew by achieving tactical tasks that it can perform better than a human operator. The automated systems are designed to complement the aircrew, and are not intended to challenge their role and responsibility. Furthermore the process used for system design includes human factor considerations that help minimize the potential for pilot error.

Cockpit of a Boeing 777

Cockpit of an airbus A320

2.1.5. There are no official standards and requirements available for the design of ATC systems. The chosen design is often ANSP specific. There is a high diversity in interfaces and different protocols are used in the design. Standards, design and procedures used are non-standard which could counteract interoperability. Several ANSPs are changing their facilities in different times and in different ways.

Bodø Oceanic ACC Norway, May 2014



Amsterdam ACC, July 2014

2.1.6. It seems there is a lack of interest amongst ATM system developers' industry to develop such standards. As one ANSP explains, in this way the supplier will offer his own "standard". Any changes an ANSP would like to have implemented is usually available at additional charge. Not only is this pointing towards an economic interest against any standardisation, it could also be disadvantageous for ANSPs who don't have the expertise and ability to set requirements for the supplier.

2.1.7. Some stakeholders developed their own guidelines or standards for system design. In December 2002 the Eurocontrol Core Requirements for ATM Working Positions (CoRe) Project was finalized. This project was created to identify and mitigate problems within the Controller Working Position Development Process. The Style Guide that was produced provides a style philosophy, which provides a general direction from which style details emerge and takes into account the general human requirements arising from this philosophy.

2.1.8. The FAA produced the Human Factors Design Standard (HFDS) for Acquisition of Commercial Off-The-Shelf Subsystems, Non-Developmental Items, and Developmental Systems in May 2003. This report converts a previous guidelines document into standards that assist in e.g. the design, development and evaluation of FAA systems and equipment. It provides comprehensive guidance on 15 different areas, including alarms, computer-human interface, workstation and workplace design.

2.1.9. The so-called “Common Controller Cockpit” is a standardised working position for ATCOs, which is part of the Virtual Centre Model. This Virtual Centre Model is an idea within the European Air Navigation Service industry, in which a group of air traffic service units, operating from different locations, use fully standardised methods of operation, information, procedures, technical means and equipment. In a Common Controller Cockpit the controller’s workstation, the architecture, its functionalities and the related procedures will be fully standardised in order to permit common working processes. This could facilitate the establishment of cross-border service provision.

2.1.10. A standardization among system design and ATC applicable guidelines would allow system developers to reuse the lessons learned from the past and could reduce the chance of human error. Furthermore it would increase the flexibility and benefit in the interoperability of the overall ATC system. Possible cultural differences should always be taken into account when developing such standardizations.

2.2. Over the years, scores of generic guidelines have been created. Although not all of these guidelines are particularly ATC related, but as they are applicable on all displays in various functions, they are valid for ATC as well.

2.2.1. General design requirements can be divided in four different areas of concern. Simplicity, Consistency, Safety, and Usability should be taken into account.

2.2.2. Simplicity; A system design should be as simple as possible. Equipment designed with simplicity in mind is generally more reliable and easier to maintain and operate. Simple design usually has less potential for human error and could decrease the amount of training needed to operate on a system. Since users rely on the system’s information, it is important that the validity of the data, the way the data is processed and the limitations of the system are well understood.

2.2.3. Consistency; Consistent system design adheres to the same principles with minimum variation. Although integrated displays are always preferable when a variety of data is needed to be displayed, there are certain factors that make this impossible. In these cases, the displays used should be as consistent as possible; the extent of inconsistency should be minimised. This means that the same layout and style should be used as much as possible, e.g. support screens that have the same background as main screens. Furthermore identical interfaces should have identical functions, colour

schemes and layout of the screens should be similar and terminology should be standardised so that there's no difference in the names assigned to a function or feature.
Consistency for instance leads to a faster information processing; studies have shown that the length of time it takes a user to mentally process the comments on a screen nearly doubles when the position of the screen elements is varied[3].

2.2.4. Safety; As in every system design process, a new designed ATC system should be verified, validated and certified. An important part is that a safety check is not only done on the technical side of the system (is the system stable enough to work on?) but also on the Human Factor side. Is the new design workable, how does the new layout affect the ATCO and is capacity proportional or increased without safety issues? This should be done for normal, degraded and emergency situations.

The previously adopted IFATCA policy on this subject can still be considered as valid.

When designing and introducing new ATM-equipment the vulnerability and possible abuse of this equipment should be considered, and precautionary measures should be taken.

IFATCA Technical and Professional Manual 2014, page 4.2.1.17

MAs should encourage their State's Regulatory Authority to play a role in the development and certification/commissioning and oversight during the life cycle of air traffic control equipment.

IFATCA Technical and Professional Manual 2014, page 4.2.1.18

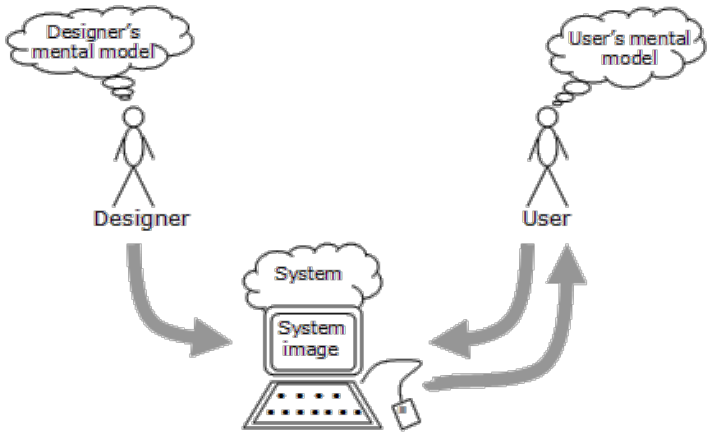
2.2.4.1. A system should not only be stable and well designed, but should also be as little error prone as possible; the possible amount of errors made by the user should be minimised. In the Baseline Exemplary Guide, published by the CoRe Project, the responsible interface style is mentioned. This is an interface that encourages the user to give considerations to inputs, which might have an operational significance, before they are made. In the case that an action leads to a change of information to another party, or when severe system changes are made (e.g. entering a back-up mode), an UNDO-function might not be sufficient.

2.2.5. Usability; the usability of a system is determined by the ease of use for the ATCO. A so-called User-Centred Perspective Design can achieve the best usability. A design with a User-Centred Perspective is similar to the previously mentioned cockpit design strategy; it focuses on the needs and requirements of the end user throughout the design, acquisition or development process. The process also continues after the system is delivered in order to further optimise the design and user satisfaction.

2.2.5.1. Human beings learn how to deal with certain situations and systems by using so-called mental models[4]. This knowledge tells them how to use the system (what to do next?) and what to do with unfamiliar systems (how does it work?). This involves both conscious and unconscious processes, whereupon people draw conclusions of how to work a system and why a system acts the way it does. If the mental model of the designer (what do I want to achieve?) differs from the mental model of the user (what

[3] Teitelbaum&Granda (1983)
[4] "*The mind constructs 'small-scale models' of reality that it uses to reason, to anticipate events and to underlie explanation"* – Kenneth Craik, The Nature of Exploration, 1943

do I want the system to do?), a discrepancy arises. This could cause misunderstanding and rejection, followed by possible safety issues.



2.2.5.2. There are several factors contributing to the usability of screens and systems. In psychology several so-called “core cognitive aspects” can be marked. These cognitive aspects are a set of mental abilities and processes, which define the way people process information. Three of these aspects (Attention, Perception&Recognition and Memory&Working memory) have an influence on screen design.

2.2.6. Although most information on an ATC screen is critical, some warnings and alerts need direct focus and attention. These warnings can be made noticeable in either aural or visual way. The extent to which certain warnings are displayed should be well thought of. Well-designed warnings and alerts on a screen definitely contribute to safety, however if nuisance alerts and false warnings occur too frequently, this could lead to a neglect, which would cause a direct safety issue. The parameters for such warning systems should be set in such a way that the risk of nuisance alerts is minimised. Studies have shown that nuisance alerts are extremely distractive to the primary task of an ATCO, since it always has to be determined immediately whether the alert is necessary, important, and/or helpful. After this determination there is also a “resumption lag”; the time it takes for an ATCO to resume the normal task flow[5].

2.2.6.1. Aural warnings can immediately raise awareness of a possible problem. Additionally it enables the environment to contribute to problem solution. On the downside aural warnings contribute to higher noise levels in the operations environment. They could cause annoyance from the “disturbance” from other working positions. Aural warnings should therefore be used selectively and should be appropriately designed and prioritised. An aural STCA warning can be very distinctive, but therefore also a trigger for colleagues to check if something is done about a potentially unsafe situation. If such a priority would also be given to routine alerts like e.g. estimate discrepancies, this would become an unwelcome distraction.

2.2.6.2. Visual warnings are feasible in various ways. In cockpit design, the so-called quiet/dark philosophy is used. This design philosophy states that information is not displayed until something goes wrong. This way an abnormal situation will be instantly noted. This concept can also be used in ATC. The colour of a label (or part of it), the writing (size,

[5] Altmann&Trafton, 2002

font, bold), or the symbol for the respective flight(s) could be changed (e.g. the target symbol changes, a symbol is added to the label, the label is framed). Among visual warnings, the extent to which they are implemented can also differ and should be well considered, depending on the importance of the alert.

2.2.6.3. Some ATC systems have multiple warning renditions built-in to warn the ATCO of a possibly unwanted or unsafe situation. Apart from the essential Conflict Alert tools, systems might also display warnings such as Callsign Confusion warnings, Hand-Off warnings and restricted areas warnings. Improvident implementations of such systems could cause an increase of workload for a controller since it might be difficult to determine the nature of the warning.

2.2.6.4. On the other hand, well-designed warnings contribute to safety. The implementation of so-called PSL-warnings (Pilot Selected Level-warnings[6]) for example reduced the possibility of level busts. In case of a discrepancy between the PSL and the cleared flight level according to the system, the Pilot Selected Level is shown in red next to the cleared flight level entered by the controller.

PSL warning, Amsterdam ACC, January 2015

2.2.6.5. Salient colours are often used to capture attention to information, which needs to be attended to immediately, such as warnings. Generally used colour codes (red for alert and yellow/orange for caution), exclusively used for this purpose prevents confusion and possible neglect.

2.2.7. The Perception and Recognition aspect is about how information is acquired and processed. Adjusting obvious design implications such as legibility, structure and filtering can best optimise this aspect.

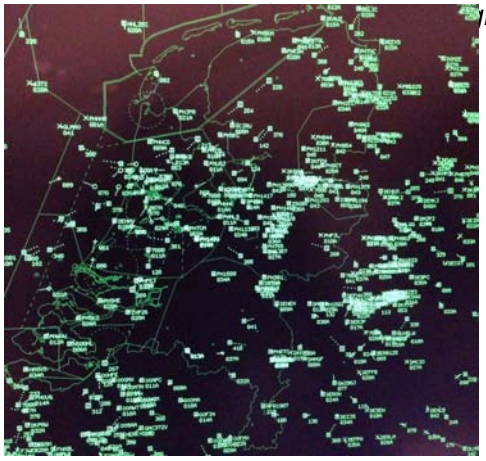
2.2.7.1. Studies have shown that the characteristics of display formats affect how well users can extract information from displays. Variety (is the information categorized or mixed) and numeric size (the amount of information displayed) for example, contribute to the complexity of a display.
When defining complexity, two different parts have to be taken into account; information complexity and cognitive complexity. Information complexity described the complexity

[6] The Pilot Selected Level is downlinked from the aircraft's mode S and then compared to the cleared flight level input by the controller. If a discrepancy is found, a warning is shown. This is not uplinked to the aircraft.

from the perspective of the system. Graphics and text are discussed. Cognitive complexity focuses on the observer, the user of a system. Since ATC involves many cognitive tasks (such as resolving conflicts and monitoring situations), it's important to measure the cognitive complexity. Automation is supposed to reduce workload so the cognitive complexity should be lowered.

2.2.7.2. Screens should be designed in a way that minimises eye movement. The information on a screen should be presented in a simple and well-organised manner. To integrate as much information on a screen as possible, the concept of toggling could be considered. Toggling makes a user able to turn certain information displays on or off so ATCOs can get the right information when this is needed.
The way information is displayed and the amount of information shown also contributes to the conspicuousness. The information displayed should be prioritized so that the most and critical information is displayed all the time. Showing information which is non-critical could create an information overload for the controller.

2.2.7.3. Not only showing non-critical information, when this is information which isn't directly needed for the task, can cause an overload for the controller. Also information that can't be filtered can hinder. When controllers are only working in a certain altitude range, it might be useful to filter out traffic above or below their own sector to prevent screen clutter. With traffic at all altitudes being displayed on a radar screen, it could become difficult to keep track of the applicable traffic.



ht Information without height filters.
Radar screen of Amsterdam Flight information without height filters.

2.2.7.4. When legibility is taken into consideration, several aspects should be taken into account. At the Amman Conference in 2010, a review on the Policy on Alpha-Numeric Call Signs was presented. The following policy was accepted:

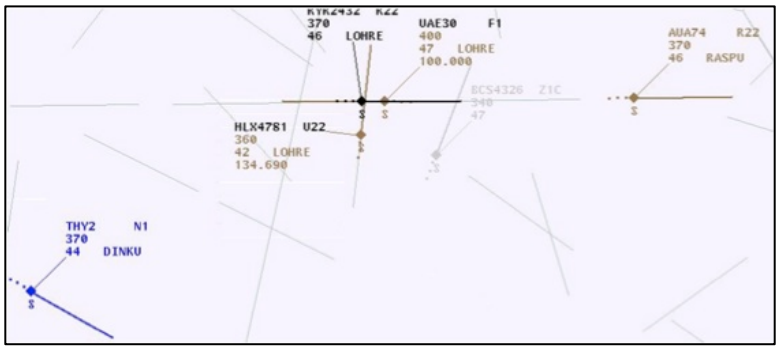
> **"A universally applicable system for the use of alpha-numeric call signs should be developed. This system should consider at least the following requirements;**
> **….**
> **- alpha numeric call signs shall not comprise of the letters B, I, O, S and Z in the flight identification because of the potential visual confusion with 8, 1, 0, 5 and 2."**

Since the use of such potentially confusing characters can increase workload and error potential, the use should still be highly discouraged.

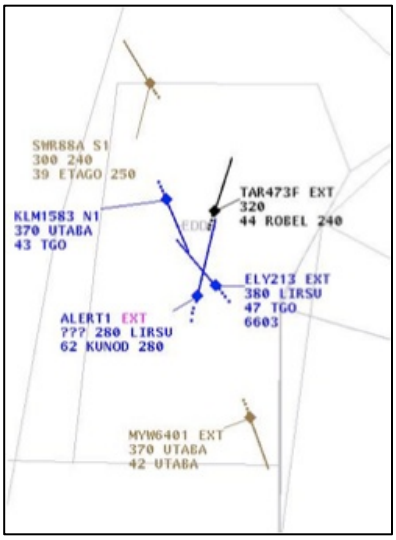
2.2.7.5. Legibility can be further increased by the use of techniques such as anti-aliasing, a technique in which the “boundaries” between two different colours are smoothened so graphics become less granular. Although ATC screens contain mostly typography, fonts and symbols can ease the readability.

Regular (left) and aliasing (right) comparison

2.2.8. Colour use does not only attract attention when correctly used, it also has an impact on the recognition. Although it seems like dark background is still most often used in ATC, the German Karlsruhe centre introduced a new system with a white background in 2010. The training sessions for the new system (VAFORIT) showed that ATCOs did not accept the new design. Attempts to change the colours showed that each change to one colour affected another as well as the whole design.
After the introduction of VAFORIT the colour scheme was seen as a contributory factor to several incidents and was in need of improvement. The Institute for Labour Sciences (IAD) of Darmstadt University got called in for assistance. For the first time a scientific analysis was done, which was developed into a concept, taking into account the existing hardware. A major aspect found was that the colour distances needed to be equidistant from each other (see diagram and explanation below). This conceptual approach was well taken by the ATCOs, who saw the benefits.

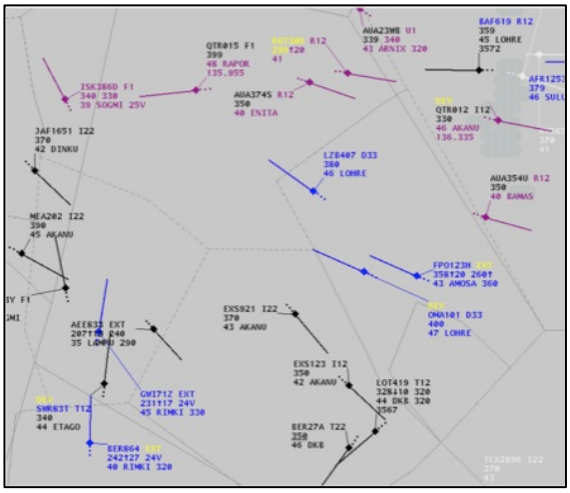


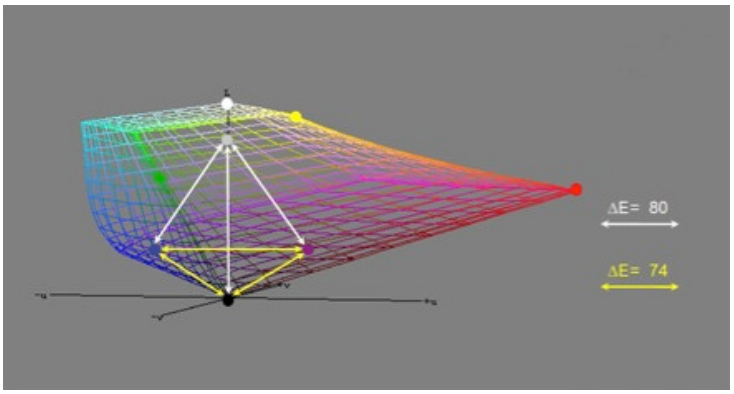
*1) Original colour scheme VAFORIT; black: on frequency;
brown: on next frequency;
black/brown: send status;
blue: expected traffic;
brown tended to get lost from view*



*2) Colour scheme after first change;
after a first change yellow was changed t pink as a warning colour; the background colour was turned to clear white.*

3) Latest colour schema after IAD study; yellow is now a first step warning colour, also for system warnings; "raspberry" colour replaced the former brown; the background is now light grey.

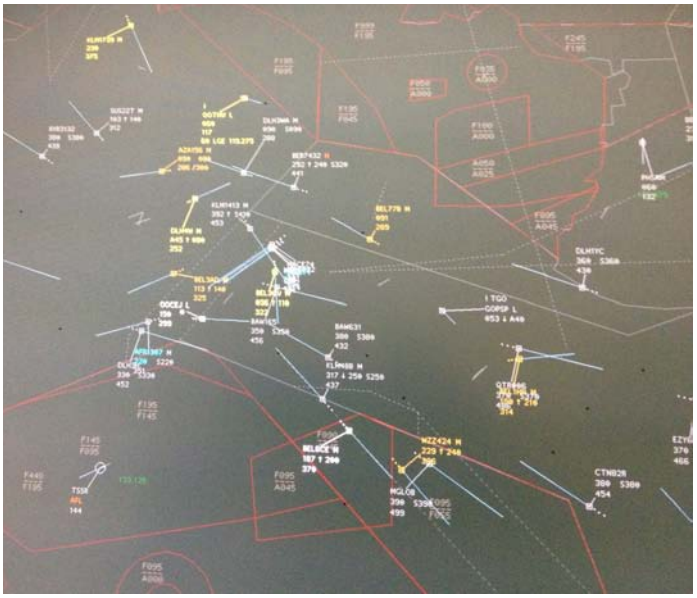




4) Examples for colour distances
the diagram is showing distances between individual colours; it was proven that the distances should ideally be equidistant in the grid; e.g. the clear white at the very top was too distant from the other colours

2.2.9. The colour use can also affect the memory aspect. A human being cannot remember everything, the brain uses processes such as filtering in order to organise all information. Instead of remembering every single piece of information, the brain creates links and "folders" of information, which can be traced when it gets a new stimulus. This subconscious process make that it is easier for human beings to recognize than to recall certain information. Since the immediate memory capacity of a human being is limited, the use of strips or label inputs are necessary to keep track of the clearances given or information provided.

2.2.10. Several centres use colour codes or symbols to get a clear image of the stage a flight is in. Although this can be a perfect mnemonic and information source, it could also cause overload for controllers in heavy traffic situations. An example of a selection of the used colours from the Belgian ACC department:
White – ACFT is currently on the frequency
Yellow – ACFT is coordinated to enter the sector
Brown – 'Redundant' traffic, ACFT is transferred to the next sector
Green – ACFT should be entering the sector but is not yet under control
Blue – ACFT is selected/highlighted
Red – Conflicting ACFT
Grey – Information label, ACFT won't necessarily be entering the sector.



In this case all the colours used make it difficult for the controller to keep track of the traffic. Furthermore the grey 'information' labels are often overlooked due to all the other colours. However, there are also situations reported in which colour differentiation is preferable and an actual outcome of a safety assessment. A differentiation in colour use for inbound and outbound traffic for example (used in Zurich Approach for instance; outbounds are coloured cyan, while inbounds are coloured green) gives an immediate overview of the traffic streams. If used correctly and sensibly, colour usage can be an asset.

2.2.12 There is no standardisation in colour usage. This might be difficult to achieve, as colour perception, meanings and preferences vary by culture and ethnicity[7]. Finding a colour setting that suits every culture all over the world could prove very challenging.
It could be achievable to develop a colour vision standard for Air Traffic Control based on previously published generic guidelines. Although according to Swiss psychologist Carl Jung "Millions of years of knowledge are stored in the genetic building plan of our brain. Throughout human life the individual refines this building through experience and learning". However, it is clear from all the information obtained that people cross-culturally attach meanings to colours, which transcend cultural boundaries.[8]
This would ensure that colour distances as a standard will match the respective priorities, e.g. purple must not be too close to red in order to keep it distinguishable.

2.3. Most ACCS, APPs and TWRs have had their own experience with the HMIs in use and especially new HMIs to be introduced with the latest system technology. Often units are taking different approaches, even within the same ANSP. Taking advantage of lessons learnt would seem to be the most natural step, but for various reasons, e.g. tradition, this only happens rarely. The economic pressure stemming from the SES might be a chance to improve this point.

2.4. As a general rule it can be summarised, that the HMI needs to be looked at in an iterative approach. This includes the operations room, the controller workstation, the HMI, layout

[7] Colour: Cross Cultural Marketing Perspectives as to what governs our response to it, Sable / Akcay 2010
[8] Culture and Color: http://alslectures.webs.com/cultureandcolor.htm

and colour scheme, lighting and the prevailing hardware. Every part needs to be seen as a cog in the machine. Each detail being changed has an influence on the whole, and as such needs to be regarded as a complete system.
Other lessons learnt from previous experiences:

- Screen technology has to be considered when designing colours
- In order to ensure the same colours on every screen, these might need to be calibrated
- Screens need to be monitored with respect to aging problems
- Colour distances need to be considered
- Reflections have to be eliminated as far as possible
- Support screens require the same background as the main screen
- Colour code and colour scheme have to be the same on all screens
- Control room lighting and the environment, screen background, colours are interdependent

Experiences made in one unit - esp. within the same ANSP – should be made available and used in all other units with the unavoidable limitations.

3. Conclusions

3.1. Successful introduction of any upgrade or renewal in the ATM system involves the integration of operational, technical and human factors expertise. Operational controllers shall be involved in the design, development and implementation of new ATM systems.

3.2. Although many studies on screen design optimization have been performed over the year, and a clear ‘cockpit design philosophy’ exists, a standard regarding HMIs specifically for Air Traffic Services is still lacking.

3.3. A User-Centred approach in which Safety, Consistency and Usability are taken into account is deemed necessary for a successful introduction of new ATM systems.

3.4. Visual and Aural warnings can contribute to safety, if correctly implemented; nuisance alerts can cause neglect and distraction.

3.5. Filtering, toggling, optimized readability and simplicity contribute to an optimized usability.

3.6. The need to memorize information should be minimized, however additional tools to support the controller should not cause an increase of workload.

3.7. All participants in the development and maintenance of an ATM system and it’s HMI need to be aware that a iterative approach is the best way to achieve the desired result.

4. Draft Recommendation

4.1. It is recommended:

To task the EB to develop principles for alerts and the display of operational information.

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INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

54th ANNUAL CONFERENCE - Sofia, 20th to 24th April 2015

Agenda Item: B.5.2 **IFATCA 13**
WP No. 83

Flight Planning Impacts on the ATM System

Presented by TOC

Summary

Inaccuracies during initial flight planning or insufficient communication regarding changes to existing flight plans can lead to undesirable effects on the ATM system. This paper discusses the most common issues currently experienced with flight planning.

1. Introduction

1.1 In order to facilitate the safe and efficient flow of air traffic, accurate flight planning is essential. The flight plan contains crucial information about the crew's intentions and the aircraft's capabilities, and an accurate representation of those informs the ATM system in general and the controller in particular about current and future traffic demands, restrictions and abilities.

1.2 The variation in capabilities between ATS units, demands between different sectors or airspaces and individual capabilities of aircraft, leads to a high diversity and complexity when it comes to correctly completing and filing a flight plan. It is not unusual for flight plans to be incompletely or incorrectly filed.

1.3 As there are large differences in local requirements to flight plans worldwide and even from flight to flight, and in the capabilities of ATS units for the exchange of flight data, we will be looking mostly at the basic means with which we can ensure accurate filing of flight plans.

2. Discussion

2.1 The flight planning process

2.1.1 Flight plans must be filed for all flights crossing international borders and for most other flights that are operated commercially[1]. ICAO provides a model flight plan form and extensive regulations for the completion of a flight plan in DOC 4444[2]. All flight plans filed shall be submitted using a form based on the model in Appendix 2, provided by the ATS unit. Flight plans shall be completed using the international and national standards and restrictions as defined by ICAO and the local Aeronautical Information Publications.

2.1.2 After the flight plan is submitted the ATS unit which received it will check it for inaccuracies or inconsistencies. The operator or crew shall be informed of the plan's acceptance or rejection. After acceptance the receiving ATS unit will forward the flight plan to all other ATS units concerned. Any changes to the flight plan shall be communicated to the relevant ATS unit(s).

2.1.3 ANSPs have varying capabilities with regards to flight plan conformance checking. Automated systems may have the capability to compare filed flight plans with local flight planning regulations, and reject or propose amendments accordingly.

2.1.4 Advanced systems can compare information provided in flight plans with aircraft equipage and performance databases and alert either the operator, ATCO or Flight Data Officer to potential discrepancies, allowing early intervention to correct potential errors.

2.1.5 In many cases, conformance checking is limited to manual assessment by flight data or briefing staff, which relies heavily on human resourcing and appropriate training to ensure flight planning accuracy.

2.2 Common flight planning issues and consequences

2.2.1 A common and recurring issue is the difference between flight planned speed and flown speed. Airlines generally plan a generic speed for a fleet type, however it is common for flight crew to vary the speed in flight without informing ATC due to operational circumstances. Variances in flight planned and actual speed can have the following effects on the ATM system:

- Incorrect forward calculation of estimates – particularly in Oceanic and remote airspace
- Instability in calculation of arrival sequences, particularly with automated sequencing software that draws speed information from what has been filed rather than derives it from surveillance data.

A pending change to ICAO Annex 2 proposes pilots will be required to report a variation of speed by more than 10 knots to ATC, rather than the 5% of speed it is now. This would of course go great lengths to reducing the impact of this issue.

2.2.2 Incorrect planning of RVSM or Negative RVSM status remains an issue in non-exclusive airspace. Planning RVSM approval when not approved can lead to loss of separation, or conversely, planning negative RVSM when approved can lead to an aircraft being assigned reduced priority for level assignment, or sub-optimal levels.

2.2.3 A late aircraft change often leads to incorrect registration data in the flight plan. CPDLC connections are contingent on correlation with the flight planned registration, and registration and other data in a logon request from the aircraft. Incorrect flight plan registration data can lead to prolonged periods of no communication in remote and oceanic airspace.

2.2.4 Incorrect data can pose serious risks if an incident occurs during flight as fire brigades and search and rescue operations rely on information from the flight plan to make decisions during a crisis situation.

2.2.5 When the flight plan form is not correctly filled in and the flight plan consequently rejected, dispatchers sometimes work around this by omitting parts of equipage, in order to get the flight plan accepted. This may lead to expectations in the cockpit differing to expectations on the ground.

2.2.6 Sometimes, no flight plan is filed at all or it's not communicated to adjacent units. Consequences may include, but are not limited to:

- Loss of separation.
- Increased controller workload.
- Incorrect boundary estimates.
- Inaccurate coordination between ATS units.

2.2.7 In other cases, a flight plan has been filed, but the dissemination is inadequate or inaccurate, or there is a system error which prevents the flight details from being presented to ATC.

2.2.8 In both of the above events, controller and flight deck workload are significantly increased because of the need to file a flight plan while airborne. This is a common occurrence in airspaces where systems are outdated or the threshold for filing a flight plan is relatively high (i.e. only on paper at a flight information office).

2.2.9 If the rejection of a flight plan is not communicated to the flight crew, controller workload may be significantly increased due to inquiries from the crew. Sometimes the issue can be resolved easily with a minor change made by local troubleshooters. Other times controllers may need to create a flight plan using the information provided by pilots. This can be a large drain on frequency time and mental resources.

2.2.10 Even if a briefing officer is present to take care of the flight plan, there is a lot of pressure to file the plan quickly in these cases. This leads to a higher error rate because of less thorough checking of the entered data.

2.2.11 A contributing factor to flight plans not being filed can be the barrier of entry to the flight planning systems. In some areas, flight plans can only be submitted by paper. A flight plan processing unit that is available online or via phone lines could assist in preventing lack of correct planning.

2.2.12 Robust and reliable links along which to send flight plan data are not always present between ANSPs. System limitation, political conflict or inadequate resources may all contribute to the failure of data being passed correctly.

2.3 Flight planning through third parties

2.3.1 Corporate aviation and charter operators often makes use of third parties to file their flight plans. These companies provide pilots with applications that allow them to submit their flight plans easily. For example, in Europe, the user is only required to enter the departure and arrival aerodrome. The application then sources several possible compliant routes from the Integrated Flight Plan System (IFPS), which it presents to the user. They then pick the desired route and submit it directly via AFTN. Acceptance or rejection is usually instantaneous.

2.3.2 Problems arise when the flight plan is not immediately accepted or rejected by IFPS. The user may be under the impression that the flight plan has been filed but it may get rejected later after review by the receiving unit(s). Because the flight plan was submitted through a third party which operates their office only during office hours, sometimes the originator cannot be reached to communicate a rejection. This may result in pilots being

confronted with rejections in flight while they were working under the assumption that their flight plan had been accepted.

2.3.3 Training of dispatchers sometimes lags behind the addition of new routes or new definitions of airspace. This of course causes problems while filing plans as the filer is not fully aware of the requirements, restrictions or possibilities of a given route.

2.3.4 In some regions dispatchers are not up-to-date on the norms required for the correct filing of flight plans. This results in issues such as, but not limited to:

- Incorrect routing.
- Incorrect equipage.
- Incorrect information on RVSM capabilities.
- Shortcuts to simplify filing resulting in inaccuracies.

2.4 Flight planning and safety net alerts

2.4.1 Flight planning inaccuracy can lead to the alerting service of ATS units being compromised, because it is contingent on several key points included in flight plans. The filing and processing of flight plans should therefore be a high priority to the responsible parties. Whether they be dispatchers, air crews, operators, flight planning offices or ANSPs.

2.4.2 In some regions, ANSPs are moving towards (or have already implemented) automated conflict detection. In such cases the system is legally and operationally responsible for detection of conflicts, not the controller. Correct information is even more crucial in these systems because if the information is incorrect, so is the system's conclusion on conflict. This will be an important factor in the future as systems and tools that support controllers will rely more and more on accurate data to provide support.

2.4.3 In Europe flight plans are used to calculate airspace and aerodrome capacity and delays. That means that in order to expedite their flights, dispatchers often delete a flight plan and refile using a different route and/or level. The flight deck may not be aware of these last minute changes, and would then have different expectations of the flight profile than ATC. This can lead to unexpected turns or flights entering military airspace without proper coordination.

2.4.3 Airlines have also been known to make last minute route changes for security reasons. This can and has led to unexpected situations where controllers were confronted with aircraft flying different routes than expected.

2.4.4 Sometimes a new flight plan does not actually avoid a restriction further down the line, but it takes a given amount of time for flow control to award a flight a CTOT. It is therefore possible that the new flight plan slips through the cracks and generates a slot violation, leading to congestion.

2.5 Complexity of flight planning regulations

2.5.1 Especially for flights that cross several jurisdictions, flight planning can become very complex, due to differing flight planning requirements. Sometimes multiple documents need to be referenced in order to file a conforming flight plan.

2.5.2 For example, in Australia, different regions allow for different flight planning options[3]. The manuals for these options can be confusing and difficult to read. The case of Australia is not an exception, as most regions have different demands as to the content of the flight plan. This is often a problem for incidental flights, where the flight planner does not have a routine knowledge of the airspaces involved.

2.6 Distribution of flight plans and changes among ANSPs

2.6.1 All ANSPs should receive border crossing flight plans from their neighbours. Changes to routing, level and speed are also supposed to be communicated according to ICAO regulations and applicable LoAs.

2.6.2 If messages are passed inaccurately, or not at all, adjacent units may find themselves with unexpected situations. Some providers reject messages from neighbours outright due to a high error rate in the messages sent, increasing system backlog and requiring manual checking and correction.

2.6.3 There are cases of ANSP suspending certain services regarding flight plans that pilots may not be aware of. For example, some ANSPs do not forward flight plans that concern flights departing from aerodromes outside their FIR. This can sometimes mean that the user assumes a correct filing, but relevant ATS units have not received the data.

2.7 Notable incident where flight planning was a contributing factor

2.7.1 On May 9th 2012 a Sukhoi Superjet 100 crashed into Mount Salak in Indonesia whilst on a demonstration flight[4]. While there were many contributing factors to this accident, there were a number of issues regarding the planning of the flight.

2.7.2 The initial route planned by the ground handling operator was rejected by the briefing office at Halim Airport, due to the route interfering with traffic for Soekarno-Hatta International Airport. The briefing office suggested a new route which was accepted by ground handling staff, however the route passed on to the flight crew was incomplete. The captain would later make another amendment to the planned route.

2.7.3 Halim Tower overheard the briefing office staff mention that the first demonstration flight used a nearby military training area, the assumption was then made that the next flight would head there.

2.7.4 Due to the aircraft type not being available in the system, the aircraft type was incorrectly entered as a Sukhoi 30 military jet. When Halim Tower coordinated with Jakarta Approach, the tower controller mentioned that the flight was heading to a training area. This coordination, in conjunction with the incorrect information entered into the flight data system, led the approach controller to believe that the flight was performed using a military aircraft. It was only after surveillance and radio contact were lost that Approach realised it was a passenger jet.

2.7.5 The above illustrates a case in which many assumptions were made and shortcuts were taken regarding the planning of the flight and the correct entering of data into ATM systems. While not a direct cause of the flight crashing, a more accurate representation of intended flight path and type of flight may have raised questions during an earlier phase of the flight.

2.8 The future of flight plan data

2.8.1 ICAO is working on a replacement to the current ICAO flight plan. The working title for this project is Flight and Flow – Information for a Collaborative Environment (FF-ICE).

2.8.2 One of FF-ICE's grounding principles is the sharing of information regarding the flight between flight deck, service providers and operators in order to increase safety and (perhaps even more so) efficiency.

2.8.3 Accuracy will become easier to achieve if information is continuously and consistently shared. On the other hand, systems will become ever more reliant on accurate data as their complexity and sophistication increases. Accurate information will only increase in importance in the future.

2.9 Methods of filing and automated conformance checking

2.9.1 There are a number of ways in which flight plans are submitted to ANSPs, these include but are not limited to:

- Direct from operators into AFTN.
- Via purpose-built websites or applications.
- At a briefing office, either via phone lines, fax or physically at the office using a paper form.
- On a dedicated frequency.
- On the frequency through a controller engaged in separating traffic.

2.9.2 The methods by which operators can submit flight plans directly to AFTN vary slightly from state to state. However, in general, these direct submissions are automatically checked for conformance and accepted or rejected without human intervention.

2.9.3 Some ANSPs have created purpose built websites that allow for direct submission of the flight plan. This allows the ANSP to check the flight plan for conformance and submit it to AFTN for further dissemination. If the website is well designed, errors can be prevented before they even occur.

2.9.4 Applications by third parties can be useful if careful agreements are set out with regards to responsibility for conformance checking. In this manner, errors in submitted flight plans can be prevented or corrected before submission to the ATM system.

2.9.5 Submissions that are reviewed and/or accepted by human officers are more error prone than the above as they rely on human resourcing and adequate training. On top of that, errors are more likely in high workload situations. It is therefore the opinion of TOC that it is preferable to submit flight plans through electronic means if practicable.

3. Conclusions

3.1 Incorrect and late filing, or total absence of flight plans have a significant detrimental effect on controller workload. ANSPs, regulators, operators and all other relevant stakeholders should make every effort to ensure flight plans are accurate and up-to-date in order to keep safety concerns to a minimum.

3.2 Accurate flight plans are critical for any future developments in ATC and ATM. Appropriate training is essential to guarantee dispatchers and briefing officers are current on the requirements and finer details of the flight plan.

3.3 Data and intentions must be accurate in order to provide safe and efficient ATS.

3.4 It should be as easy as possible to submit a complete and accurate flight plan for every flight. TOC believes that electronic means of submission are the way forward because they reduce workload for dispatchers, briefing officers and ATCOs. As we reduce this workload, we also reduce the likelihood of errors occurring in flight plans or the ATM system as a whole.

3.5 Responsibility for conformance checking, flight plan amendment or other troubleshooting should not lie with controllers for reasons of workload management. Electronic filing and automated conformance checking, including feedback on errors made by the submitter, would prevent this from happening.

4. Recommendation

It is recommended that IFATCA policy is:

4.1 Electronic filing and automated conformance checking of flight plans are preferable.

It is recommended that IFATCA policy is:

4.2 Interaction with flight plans should be minimised for controllers engaged in separating aircraft.

References

[1] ICAO Annex 2 Rules of the Air
[2] ICAO Doc 4444 PANS-ATM
[3] Off Air Routes Planning Manual: http://www.airservicesaustralia.com/flight-briefing/off-air-route-flight-planning-options/flight-planning-regional-options, Airservices Australia, version 22, August 2014
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-END-

INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

54th ANNUAL CONFERENCE – Sofia, 20th to 24th April 2015

Agenda Item: B.5.3 **IFATCA 15**
WP No. 84

Introduction to GNSS Landing Systems

Presented by TOC

Summary

GNSS has great precission but not enough for approach purposes. Augmentation systems can get over this limitation. Ground Based Augmentation System (GBAS) and Satellite Based Augmentation System (SBAS) are described in the jointly with their advantages and limitations.

1. Introduction

1.1 The aviation community has been used to the ILS[1] for many years as a reliable system to perform the final approach phase of the flight. But ILS is relatively expensive to deploy and maintain, especially due to the need of regular calibration flights.

1.2 The first Global Navigation Satellite System (GNSS), was the American Global Positioning System (GPS) which has been fully operational for more than 20 years and is widely used for en-route purposes. But the features of GNSS as first designed are not suitable for the approach phase of flight.

1.2 Augmentation systems have been designed to improve the features of GNSS making the system able to support approach and landing operations. First CAT I operations have been already developed and implemented and future developments try to achieve CAT III operations.

2. Discussion

2.1 ILS has prevailed as the standard for the final phase of flight over more technically advanced systems such as MLS[2]. The availability of GNSS has made it possible to think on its use as a substitute of ILS with several advantages, though the primary incentive would be cost savings; no ground infrastructure would be needed making a

[1] Instrument Landing System
[2] Microwave Landing System

GLS[3] able to serve any runway at any place, at least from a theoretical point of view. This reduced requirement of ground based infrastructure greatly reduces the cost of maintenance compared to one ILS system, and even more so for airports with multiple ILS installations.

2.2 GNSS alone is not suitable to the final approach phase of flight. Its precision, though impressive for en-route navigation, is not enough for a landing system. Another issue is that unlike ground based systems, GNSS errors can change over a period of hours due to satellite movements and the effects of the ionosphere.

2.3 The Integrity problem is also to be considered: "Health" status for every satellite are part of the message received from GNSS constellations. In the GPS case the full navigation message takes 12.5 minutes to transmit and is updated twice a day. The notification of a failed satellite would take too long compared to CAT III system which allows only 2 seconds from when a system goes out of tolerance until the spare transmitter is on the air.

2.4 Augmentation systems are designed to compensate the errors mentioned in 2.2, thus increasing the precision, and monitor the system to improve its integrity. Annex 10 defines three augmentation systems: Aircraft-Based Augmentation System (ABAS), Satellite-Based Augmentation System (SBAS) and Ground-Based Augmentation System (GBAS).

2.5 Description of GBAS

2.5.1 The idea behind GBAS is to measure the small but significant deviations in the calculation of a position using the GNSS satellite signals, calculate corrections and send them to the aircraft.

2.5.2 A GBAS Ground Facility typically has three or four GNSS antennas, situated at positions with perfectly determined coordinates. The position calculated for these antennas by the use of GNSS is sent to a central processing system which compares them with the known real positions and determines a correction factor in case any difference is found.
Corrections are sent to the aircraft via VHF Data Broadcast (VDB) in the 108.025 – 117.975 MHz band. Another function of the GBAS Ground Facility is to monitor general satellite performance thus preventing the aircraft to use a faulty satellite. Finally, GBAS also broadcast precision approach pathpoints data.

Reference GBAS antenna in Zurich, Switzerland

[3] GNSS Landing System

2.5.3 According to the Annex 10 up to 256 types of messages may be broadcasted by the GBAS Ground Facility broadcast to transmit the information described in 2.5.2. At present only three different types are specified while the rest are reserved or not yet defined.

- The message type 1 (MT1) sends up pseudo-range corrections for up to 18 individual satellites. Two MT1 can be linked making possible to broadcast corrections for up to 36 satellites. For precision approaches the aircraft GBAS receiver only uses satellites for which corrections are available, meaning that no correction broadcasted for a satellite in line of sight is equivalent to a "do not use this satellite" message thus improving the integrity of the system.

- The message type 2 (MT2) contains information related to the Ground Facility station such as the coordinates of the reference point to which all corrections refer. It also include the maximum distance at which the corrections may be used, data for tropospheric correction and local magnetic variation.

-

- The message type 4 (MT4) contains the Final Approach Segment (FAS) data. Included are the airport identification, runway designator, landing threshold point coordinates, threshold crossing height, flight path alignment point and glide path angle. All the approaches served by the GBAS facility must be broadcasted at least once every ten seconds. The system admits up to 48 different approaches.

VHF antennas of the Zurich GBAS

2.5.4 At present GBAS approaches are ILS-like approaches defined by a straight line linking a final allignment point (FAP) with the landing threshold point. It is envisaged the capability to perform curved approaches, called Terminal Area Path (TAP) by the FAA. Some flight tests have been performed but there are no SARPs in the Annex 10 yet nor an autopilot capable of performing the automatic procedure which shall be a requirement considering the complexity of this kind of procedure.

2.5.5 GBAS avionics standards have been developed to mimic ILS to simplify the integration of GBAS with existing avionics and reduce aircrew training requirements. The industry has even developed a multi mode receiver (MMR) comprising several receivers (VOR, ILS, GNSS) in one box.

A pilot barely finds any difference between an ILS and GBAS approaches

2.5.6 Although the CAT I/II/III terminology is commonly used, a new concept called GAST (GBAS Approach Service Type) is intended for future SARPS designation. Using this terminology GAST-C is the equivalent to CAT I while GAST-D is the equivalent to CAT III.

2.6 Benefits and issues of GBAS

2.6.1 ILS signal can be disturbed due to the presence of objects in determined areas defined as critical and sensitive by ICAO in the Annex 10. The creation of such areas produces an operational impact due to departing aircraft holding relatively far from the runway to avoid interference. GBAS does not use antenna patterns to compose the navigation signal so the site constraints are related to signal blockage and multipath effects reducing the operational impact.

2.6.2 GBAS is intended to permit the use of guided curved approaches. This feature can be useful to create procedures to avoid aircraft flying over specific areas due to noise reasons or even to avoid obstacles. It could also allow for more efficient use of airspace in areas with multiple airports close by.

2.6.3 The information provided by GBAS may be used to support PBN in the terminal area.

2.6.4 A single GBAS can broadcast up to 48 approaches to different runways in different airports in the vicinity (approximately a 23 nautical miles radius). In the same way GBAS can define different glide angles for the same runway allowing different paths for each kind of aircraft.

2.6.5 GBAS can also be quickly configured to support a new threshold in case it must be displaced while ILS needs to be physically moved to comply with a new position.

2.6.6 GBAS can provide guidance during a missed approach.

2.6.7 The estimated cost of a GBAS facility is approximatively twice the cost of a single ILS but the ILS defines only one approach while a GBAS can define up to 48 approaches to different runways. The maintenance costs is estimated as half of that of an ILS.

2.6.8 Probably the most important issue affecting GBAS and GNSS in general is space weather. The effect of disturbances in the ionosphere on the satellite signals can lead to positioning errors and even the interrumption of service. These undesirable efects are more prominent in low latitudes. In July 2011 a Honeywell SLS -4000 SmartPath GBAS station was adquired and installed in Rio de Janeiro Airport (SBGL) to evaluate the behavior of a station that operates normally in mid-latitudes airports like Bremen (Germany), Newark (USA), Málaga (Spain) or Sydney (Australia). The station demonstrated sensitivity to ionospheric caused disturbance which affected service availability.

2.6.9 Future multi-constellation multi-frecuency GNSS receivers are expected to mitigate the ionospheric issues but solar storms may produce sudden peaks of activity in the ionosphere causing disturbances to the GNSS system. An example is the series of solar storms in late October 2013 that degraded GPS performance. An eventual intense solar flare reaching the Earth could potentially degrade GNSS performance leading GBAS to be out of service. An aircraft could find all GBAS equipped airports in its range unable to provide such an instrumental approach service.

2.7 Current situation and future evolution

2.7.1 According to the ICAO Global Air Navigation Plan (GANP) GBAS CAT I operations belong to Block 0 meaning that they are currently in place in some place of the world. GBAS CAT II/III belong to Block 1 meaning that this kind of operations should be implemented by 2018. The GANP recognizes that until there are GBAS CAT II/III standards, GLS cannot be considered a candidate to replace ILS. A draft SARPs amendment for GBAS to support CAT II/III approaches is completed and currently undergoing validation by States and industry.

2.7.2 As of 2012 approximately 40 GBAS stations around the world were supporting testing and CAT I operations and the system has grown to be already operational in several airports. While promising the concept shows that it still needs some development. In Sydney for example the ionosphere disturbances have made the system unusable sometimes. In Frankfurt a whole series of NOTAM were issued describing limitations to the system.

NOTAM in force on Jan 13, 2015

1A6652/14 VALID: 02-DEC-14 1149 - UFN
GBAS (GLS) **LIMITED** AS FOLLOWS:
GLS 07L
NOT USABLE
GLS 07R
REDUCED COVERAGE: 16 NM WITHIN -26 DEG NORTH AND +35 DEG SOUTH FROM LTP, **MINIMUM** INTERCEPT ALTITUDE 3900 FT MSL
GLS 07C
REDUCED COVERAGE: 16 NM WITHIN -26 DEG NORTH AND +35 DEG SOUTH FROM LTP, **MINIMUM** INTERCEPT ALTITUDE 3900 FT MSL
GLS 25R
REDUCED COVERAGE: MAXIMUM INTERCEPT ALTITUDE 8000 FT MSL
GLS 25C
REDUCED COVERAGE: 19.8 NM FROM LTP
1A6477/14 VALID: 22-NOV-14 0223 - UFN
GLS Z **RWY 07L:**
DUE TO LOW SIGNAL STRENGTH THE FLW CHANGES TO **APCH** PROC OCCUR:
GLS **APCH** PROC **RWY 07L** TEMPO **SUSPENDED.**
REF AIP **AD** 2 EDDF 4-7-1 EFF 21 AUG 2014.

NOTAM with limitations to GBAS operations in Frankfurt

2.7.3 While GBAS is intended to be the new standard approach and landing system, it may be a long time until the aircraft fleets are equipped thus making the ILS irreplaceable for many years. As an example only the A380 and B748 planes in the Lufthansa fleet are equipped, this is a 10% of its fleet. On the other hand some airlines are already prepared: Airberlin fleet of B737 for example is fully equipped. The German provider DFS estimates that fleet equipment will make possible to switch off some of their ILS by 2030.

2.7.4 The next step in GBAS evolution will be to extend the system to take advantage of multiple frequencies and multiple constellations. Use of multiple frequencies will allow more robust monitoring and detection of errors caused by ionospheric anomalies. Use of multiple constellations will enable higher availability of robust geometries that are required to support CAT II/III operations and mitigate common mode errors.

2.7.5 GAST-C and GAST-D (see 2.5.6) are currently being developed jointly with other two approach services for Approach with Vertical Guidance (APV). The total number of Approach Service Types intended to be developed is six:

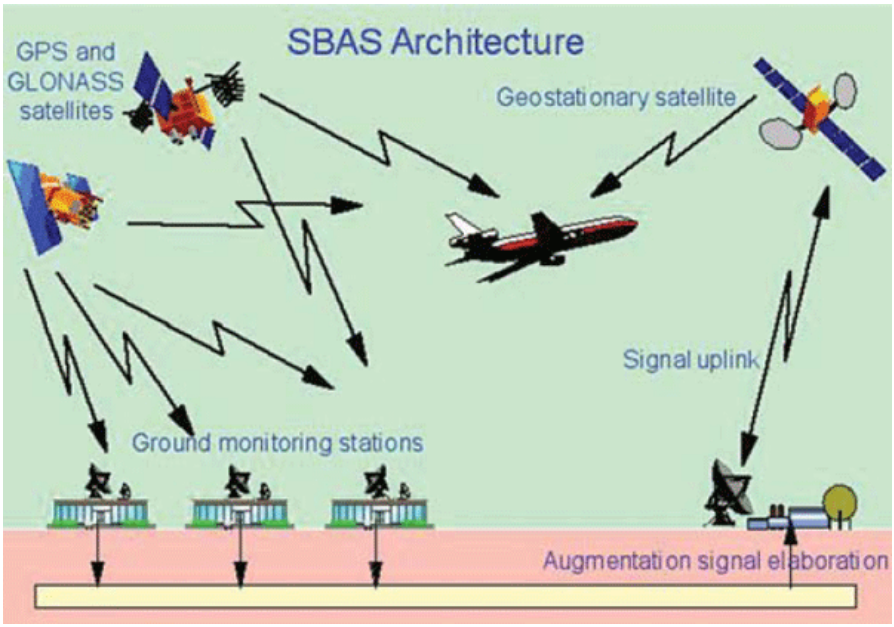
- GAST-A: for operations to APV I performance
- GAST-B: for operations to APV II performance
- GAST-C: for operations to CAT I performance level
- GAST-D: for operations to CAT III performance
- GAST-E (TBD): either CAT II performance or L5/E5 CAT III
- GAST-F (TBD): planned for multi-constellation, multi-frequency CAT III performance level

2.7.6 In October 2014 simulations were run in EUROCONTROL premises in Bretigny, France. According to the preliminary results the runway capacity of an airport using a GBAS system is incremented due to the reduction of protection areas as expected (see 2.6.1) even in cases were GBAS coexist with ILS. On the negative, an increment in the controllers workload was noted due to the need to accomodate planes using two different approach systems thus making the tower controller constantly check the equipment of the landing planes to know if they needed the protection areas to be cleared of intruders or not.

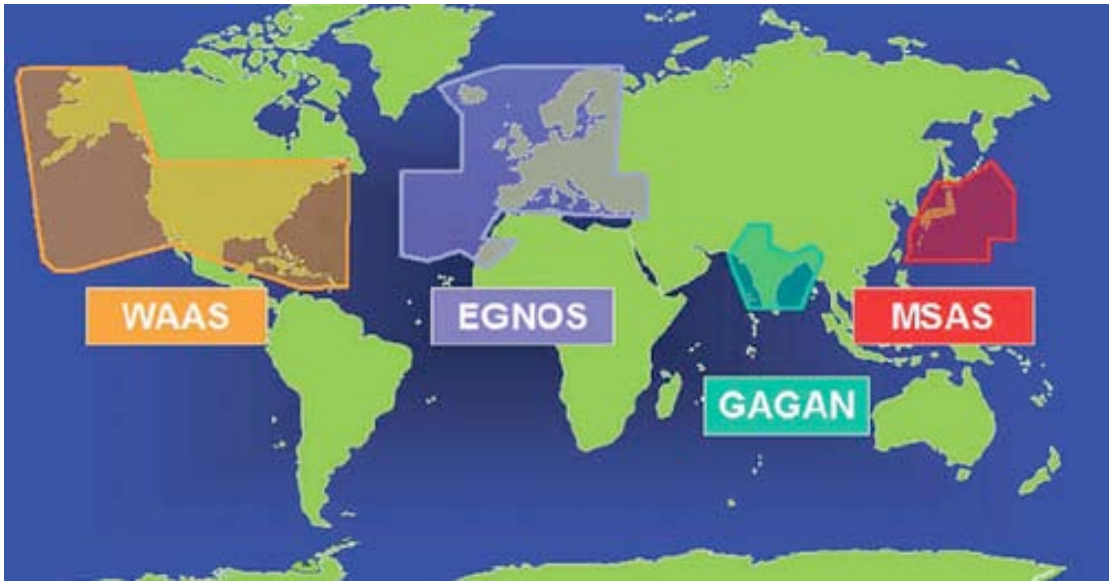
2.8 The SBAS alternative

2.8.1 SBAS works in a similar way to GBAS but on a regional basis. Instead of a single ground station there is a net of reference ground stations which monitor the GNSS signals in a similar way to GBAS. Corrections are sent to the aircraft through geostationary satellites jointly with integrity information broadcasted as a “do not use” message when a faulty satellite is detected or a “not monitored” for satellites not visible to any monitoring station.2.8.2 The information sent by the SBAS satellites is broadcasted using the GNSS frequencies. The satellites include not only the possibility to relay SBAS information, but a GNSS payload so they are themselves GNSS satellites thus improving the availability of the GNSS.

2.8.3 Unlike GBAS the SBAS do not need any infrastructure in the airports served by the system.



2.8.4 There are several SBAS already in use. The American system, WAAS, uses 38 reference stations in the USA, Canada and Mexico; the European EGNOS has 39 stations while the Japanese MSAS needs only 4 and the Indian GAGAN uses 15. It is expected that the Russian system SDCM reaches operational status in 2015.



2.8.5 WAAS was the first operational SBAS. It was expected that 250 ft would be the lowest decision height meaning that it would not be used for precision approaches but experience demonstrated that this assumption was conservative. The FAA claims that a service equivalent to ILS CAT I can be provided.

2.8.6 Being GNSS based, SBAS is as vulnerable as GBAS to ionospheric interference or even more because it is more satellite dependant. Thus, the drawbacks related to space weather affecting GBAS exists for SBAS.

2.9 Changes for ATCOs

2.9.1 A GNSS-based approach is very similar to an ILS one making the switch to this new kind of procedure very easy to controllers. New phraseology has been developed. Chapter 12 of ICAO Doc 4444 reflects this:

- The new types of approach are recognized being they named “GBAS Approach and SBAS Approach”.

- The usual references to Localizer and Glide Path used for ILS approach have an equivalent in GBAS and SBAS approaches. The term used is Approach Course.

2.10 The following policy may be related to this subject:

2.10.1 **ATS 3.14 MIXED MODE OPERATIONS**

Mixed mode operations are defined as ATM Operations that require different procedures due to variances in airspace users’ characteristics and/or ATM design within the same area of controller responsibility.

Efforts should be undertaken to reduce existing Mixed Mode Operations by creating intrinsically safe solutions.

Introductions of new Mixed Mode Operations should be avoided by creating intrinsically safe solutions.

When safety of a Mixed Mode Operation cannot be completely managed at an intrinsic level, assessment must take place that the change in the ATM system does not increase controller workload to an unacceptable level.

2.10.2 Implementing a new system like GLS while having still in place the previous one, ILS, leads to the need of Mixed Mode Operations. The policy on the subject is considered by the TOC as valid and solid.

2.10.3 While there is no GLS policy in the Technical and Professional Manual there is a policy on advanded approach procedures that was found as outdated by the TOC. The revision of this old policy is intended for the next year working program.

3 Conclusions

3.1 GNSS has excellent features for en-route navigation but neither its precision nor its integrity are enough for precision approach purposes thus augmentation systems are required for that phase of flight.

3.2 GBAS is based on measuring the GNSS satellites signal in determined places to calculate corrections and send them to the aircraft in the vicinity of the GBAS facility thus improving both precision and integrity.

3.3 At present GBAS approaches are limited to ILS-like CAT I. In a future CAT III is expected and even guidance on the ground as well as curved approaches.

3.4 Other benefits of GBAS include less restrictions due to protection of the signal, more flexible configuration and reduced maintenance cost than than ILS and possibility to use up to 48 approaches to different runways, even at multiple airports within the

range of a single facility. Drawbacks are mainly related to the effect of disturbances in the ionosphere specially in low-latitudes.

3.5 Preliminary tests confirm that the use of GBAS approaches increases the runway capacity due to the reduction of protection areas being the drawback an increase in the tower controller workload due to the need to accomodate the situation to traffic performing GLS and ILS approaches, thus leading to a mixed-mode operation. The GBAS stations already in use have shown promising results but also some limitations.

3.6 Due to fleets not being equipped yet ILS may still be in place in airports also equipped with GBAS even until 2030 and beyond.

3.7 A similar augmentation system is SBAS. It uses a network of regional ground stations to calculate corrections and broadcast them to aircraft via geostationary satellites.

3.8 Several SBAS are in use to provide augmentation in large areas: WAAS in North America, EGNOS in Europe, MSAS in Japan, etc.

3.9 SBAS may allow a service equivalent to ILS CAT I with no need of any facility in the vicinities of the aerodrome served.

3.10 IFATCA Policy concerning advanced approach systems is outdated and is intended for revision.

4 Recommendations

It is recommended that:

This paper is accepted as information material.

5 References

ICAO Doc 9750 – AN/963 Global Air Navigation Plan

ICAO Doc 9849 – AN/457 Global Navigation Satellite System (GNSS) Manual.

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INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

54th ANNUAL CONFERENCE – Sofia, 20th-24th April 2015

Agenda Item: B.5.4* **IFATCA 15**
WP No. 85

SWIM technical and legal issues

Presented by TOC

Summary

System-Wide Information Management (SWIM) is the programme to create a network where Flight Data Objects will be shared through all the actors who participate in the business and operations of a flight. This is intended to augment the awareness of ATCOs as to create efficiency in airspace and time management. In this working paper, a description of the principles will be given together with some technical and legal issues considerations.

1. Introduction

*"**Information.** The ATM community will depend extensively on the provision of timely, relevant, accurate, accredited and quality-assured information to collaborate and make informed decisions. Sharing information on a system-wide basis will allow the ATM community to conduct its business and operations in a safe and efficient manner."* (ICAO Doc 9854 AN/458)

2. Discussion

2.1. SWIM concept

2.1.1. Information is the pillar of any ATM activity, and getting accurate and timely information to all of the air traffic players is essential to performance. The flow of information in today's ATM is limited. A primary issue is that there are often numerous systems gathering and processing data independently, and the transfer of data between these systems is often problematic. The Flight Plan, which is considered as the most important set of data about a flight, is itself often provided in different manners from region to region according to different regional rules. Users often must monitor and interact with a multitude of displays in an inefficient manner. Another issue is the distribution of data. There is no single access point through which to get ATM data; users must maintain several layers of infrastructure.

2.1.2. Except for those security cases (military, state, patrol…) where information is lacking for purpose, an accurate and system-wide information sharing is the next step for a more efficient management of time and space. The ICAO Global ATM Operational Concept has a larger set of data requirements than those that can be supported by the existing flight plan system. These include a secure architecture with trusted information sharing system-wide programme, providing early intent

data, management by trajectory, collaborative decision making and high automation support. This concept is known as System-Wide Information Management or SWIM.

2.1.3. The Four Dimensional (4-D) Trajectory is a concept of ICAO Global ATM Operational, starting from the early business development stage up to post-operations activities. To support activities linked to ATM planning, collaborative decision making (CDM) and tactical operations, the trajectory will be shared by the ATM according to the SWIM protocols with stakeholders and continuously refined based on the latest and most accurate data.

2.1.4. The SWIM concept is intended to create a network in which every information related to a flight is shared through all the ATM system components. These data will not be only about the aircraft and its movement (ETD, slot allocation, take off time, speed, requested flight level, ETA…) but will integrate all the information surrounding the flight like weather, special use of airspace, company restrictions.

2.1.5. Eurocontrol originally presented SWIM to the FAA in 1997 in order to set the basis for the creation of a worldwide ATM information network. In 2005, ICAO adopted this concept to promote the integration of all the ATM related information within its Global ATM Operational Concept.

2.1.6. The concept changes the definition on how information is managed across the whole ATM system. It should enable direct ATM business benefits to be generated by ensuring the provision of commonly understood quality information delivered to the right user at the right time. This should improve ATM real-time collaborative decision making process and situational awareness across all ATM stakeholders sharing the same information. SWIM will interact with the Collaborative Decision Making (CDM) in order to share the decisional process through government agencies, air navigation service providers, airspace users, ground operations companies and others.

2.1.7. SWIM has a transversal nature, which goes from ATM systems to data domains, business trajectory phases and stakeholders. It is easy to recognise that global interoperability through standardisation is essential so that this concept could become a driver for new and updated standards. Standardization is a way to create harmonization. SWIM is a change in information sharing in order to enable the concept of “net-centric ATM operation”.

2.1.8. SWIM should support future Airspace Management programmes with flexible and secure information management architecture for sharing data with commercial off-the-shelf hardware/software. The way this is to be implemented is given by informatics technology through Service Oriented Architectures (SOA)[1].

2.2. **Benefits**

[1] Software design and software architecture design pattern based on distinct pieces of software providing application functionality as services to other applications. This is known as service-orientation. It is independent of any vendor, product or technology (Wikipedia).

2.2.1. There are still many holes in the world's ATM information network. The current ATM system is highly fragmented. The Data-Link capability of aircraft and ground station is limited and not fully exploited. The lack of surveillance provided in some areas (e.g. over the oceans) limits the information management that is necessary for a reliable network over those remote areas. SWIM is intended to be the base for the evolution of the information management carried through both the existing ground-based system and the satellite-based system of air traffic management expected to be developed for remote and oceanic areas surveillance.

2.2.2. The SWIM programme should improve safety through an increased shared situational awareness. More decision makers and users (pilots, controllers, dispatchers…) will have access to the same information supporting the system proactivity. Situational awareness should then be increased by giving the possibility to every user to get all the required information of a flight; even those that are not available today (e.g. fuel quantity for ATCOs).

2.2.3. An example of benefit is the efficient use of airspace reached through a better air traffic management around weather. SWIM core services will enable systems to request and receive information when needed/requested or based on automatic transmission, and publish information and services as appropriate. This would allow airspace users and controllers to access the most current information that may be affecting their area of responsibility in a more efficient manner. SWIM could improve decision-making and streamline information sharing for improved planning and execution.

2.2.4. SWIM should reduce infrastructure costs by creating unique interfaces between systems. SWIM-compliant interfaces will be necessarily standardized. This should introduce initial investments costs to upgrade present hardware but should reduce future data interface development costs.

2.2.5. Data resources redundancy will not be needed anymore. SWIM is, in fact, been intended as a sort of "cloud" where data are always reachable from any of the several servers around the globe.
Both FAA's NextGen and European SESAR (Single European Sky ATM Research) programmes include SWIM in their development steps.

2.2.6. The SWIM process can be applied for Dynamic Slot Trading. Thanks to the possibility to share the appropriate latest and updated information, it will be possible to provide User Driven Prioritization Process (UDPP)[2], which is designed to allow airspace users to have input into the allocation of delay in capacity, constrained situations.

2.3. **ICAO**

2.3.1. ICAO has integrated the SWIM concept as one of the pillars through which the Aviation System Block Upgrades (ASBU) process has to be developed. ASBU is the ICAO "step-by-step" programme to reach a globally harmonized ATM network. It includes four Performance Improvement Areas (PIA), which include different blocks of interest. The second Performance Improvement Area is called "Globally Interoperable Systems and Data - System Wide Information Management" and is divided into several area of interest to be developed as follows:

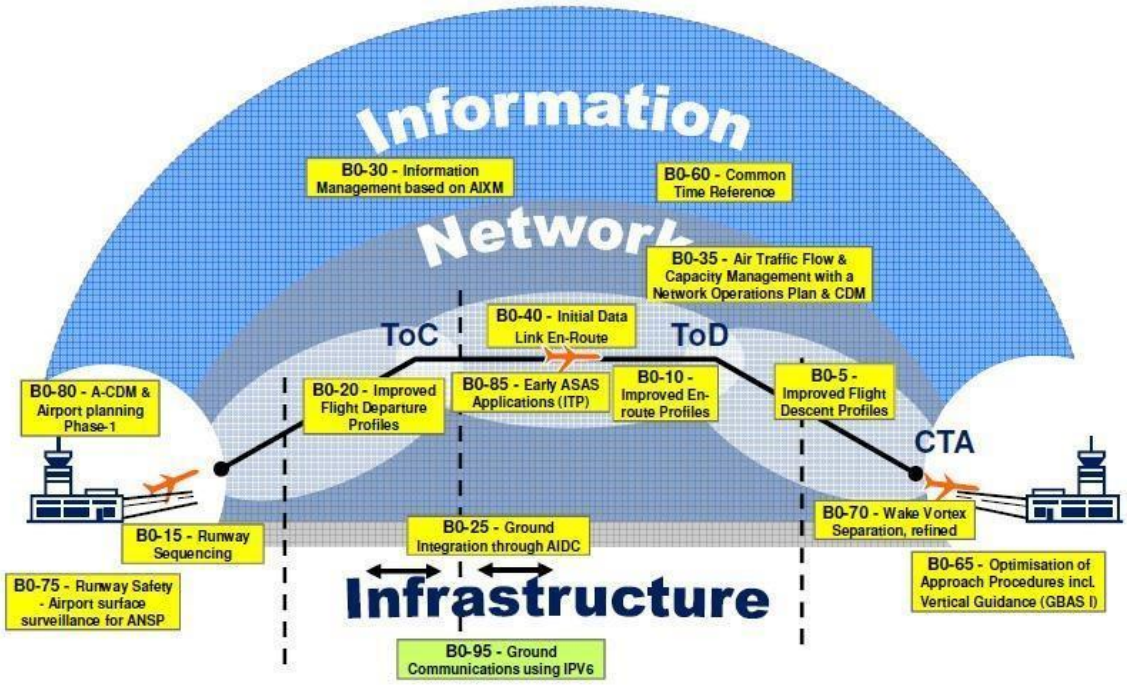
- Module N° B*0-DATM*: Service Improvement through Digital Aeronautical Information Management
- Module N° B1-*DATM*: Service Improvement through Integration of all Digital ATM Information

[2] See IFATCA Technical and Professional Manual 2014 § ATS 3.36 Resolution B1 - WP 86 – Bali 2013 and its relative policy.

- Module N° *B*1-*SWIM*: Performance Improvement through the application of System-Wide Information Management (SWIM)
- Module N° B*2*-*SWIM*: Enabling Airborne Participation in collaborative ATM through SWIM
- Module N° B*0*-*AMET*: Meteorological information supporting enhanced operational efficiency and safety
- Module N° B*1*-*AMET*: Enhanced Operational Decisions through Integrated Meteorological Information (Planning and Near-term Service)
- Module N° B*3*-*AMET*: Enhanced Operational Decisions through Integrated Meteorological Information (Near-term and Immediate Service)
- Module N° B0-*FICE*: Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration
- Module N° B1-*FICE*: Increased Interoperability, Efficiency and Capacity though FF-ICE, STEP 1 application before Departure
- Module N° B*2*-*FICE*: Improved Coordination through multi-centre Ground-Ground Integration (FF-ICE, Step 1 and Flight Object, SWIM)
- Module N° B*3*-*FICE*: Improved Operational Performance through the introduction of Full FF-ICE

2.3.2. To give an example, the module B2-31 allows the aircraft to be fully connected as an information node in SWIM, enabling full participation in collaborative ATM processes with access to voluminous dynamic data including meteorology. This will start with non-safety critical exchanges supported by commercial data links.

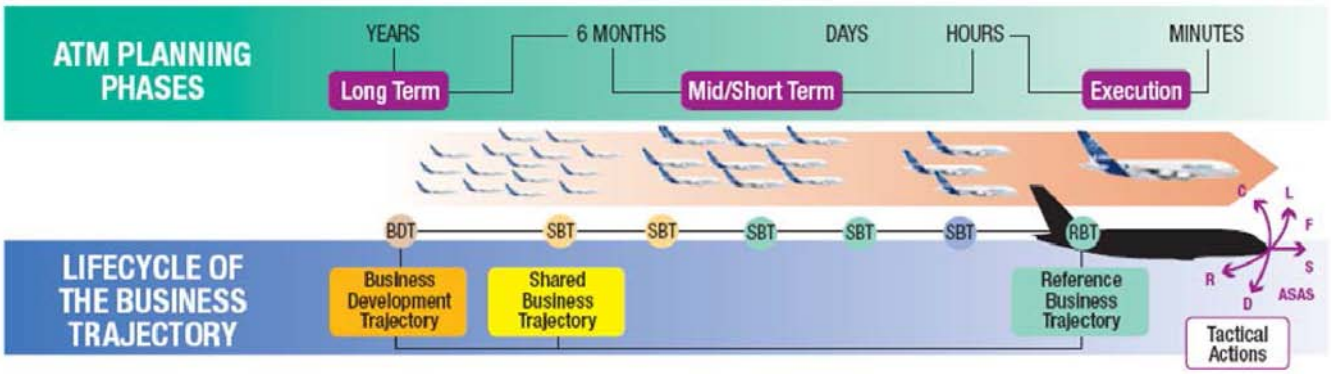
2.3.3. The module B2-25 “Improved Coordination through multi-centre Ground-Ground Integration: (SWIM + Other components)” is about the implementation of SWIM services (applications and infrastructure) to create the aviation intranet based on standard data models, and internet-based protocols to maximize interoperability.
The first steps of SWIM deployment are to be carried by 2023.



2.4. **An IT infrastructure**

2.4.1. The Network Centric Operations Industry Consortium (NCOIC), a partnership of stakeholders that includes, among others, Airbus, Boeing, EADS, Lockheed Martin and Thales, has defined the pattern for the correct dissemination of the so-called Flight Data Object (FDO).

2.4.2. This pattern describes system-wide information management dedicated to FDO dissemination, where the ATM network is considered as a series of nodes (including the aircraft and the airspace users), providing or consuming information. The data object scope extends to all information of potential interest to ATM including trajectories, surveillance data and aeronautical information of all types.



2.4.3. SWIM implementation is starting from the ATS Message Handling System (AMHS), which is already developed in more than 120 countries around the world. It is the standard for aeronautical

ground-ground communications (e.g. NOTAM, Flight Plans or Meteorological Data) and is based on the ICAO Doc 9880.

2.4.4. The next step is the creation of a net-centric[3] environment, derived from Information Technology (IT) and based on secure and unambiguous set of information data, in order to overcome the existing deficiencies and obtain a 4-D trajectory-based harmonized ATM system.

2.4.5. 4-D trajectory based ATM systems have a number of data-related requirements. These include:

- a secure architecture with trusted sharing of information system-wide;
- early provision of intent data;
- collaborative decision making support;
- high automation support requiring machine readability and unambiguous definition of information items.

2.4.6. Both the SESAR and the NextGen efforts are aligned on key objectives with regard to the management of flight information:

- Information must be shared securely on a system-wide basis;
- Pertinent information will be available when and where it is required;
- Information may be personalized, filtered, and accessed, as needed;
- The system will include all tenets of cybersecurity to include confidentiality, integrity, availability and protection of data, networks and control systems, continuity of operations and secure interoperable communications;
- Authentication for user access;
- Initial quality of the information will be the responsibility of the originator; subsequent handling will not compromise its quality;
- Information sharing can be adjusted to mitigate any proprietary concerns;
- Information management will use globally harmonized information attributes.

2.4.7. SWIM Implementation Alternatives Basically there are two ways to introduce SWIM and achieve its objectives:

- Establish a dedicated centralized flight data processing system that is supposed to act as a server;
- Connect individual flight data processing systems into a wide array network.

2.4.8. The second approach seems more likely to be implemented as it makes use of existing systems and provides more reliability and robustness (a failure of a central server generally has a greater impact on a network than a failure of several elements in a peer-to-peer network).

2.4.9. The way to create a network of server and nodes has not been decided yet but this is an item about which there has been a lot of interest since the Air France flight 447 accident of June 1st 2009. After that event, the aeronautical community started wondering if the technology related to data communication from aircraft to ground station was to be updated.

2.4.10. Aircraft flying over remote areas (oceans, poles, territory without ground-based surveillance…) have the possibility to send their own data only through voice or via the Aircraft Communications Addressing and Reporting System (ACARS), which is based on the transmission protocol technology of

[3] The way to participate as a part of a continuously-evolving, complex community of people, devices, information and services interconnected by a communications network to achieve optimal benefit of resources and better synchronization of events and their consequences (source: http://en.wikipedia.org/wiki/Net-centric).

the century-old telex. ACARS is useful and reliable but has a great disadvantage on limited data transfer rate and its messages are not costless. The recent Malaysia Flight 370 disaster, where the flight did not use the primary ACARS, popped up again to the media the need to have some sort of communication box on-board that is always connected as an internet node.

2.4.11. Foreseeable technology on Air/Ground connectivity is exploring Nanonatellite technology[4], actual satellites[5] or high altitude solar powered drones[6] to create an ATM data network, where everything will be connected according to the SWIM principles.

2.5. **Technical and operational issues**

2.5.1. Since SWIM can be used for Flight Information Service data sharing (ground/air, ground/ground and air/air) the accuracy and reliability of the information spread is fundamental.

2.5.2. Automation will move several "housekeeping tasks" from human to machines. In those cases where software will carry information which should be used for ATM purposes, it is mandatory that data are the latest available, always updated and checked by automated and SWIM-certificated systems. The responsibility on data accuracy will be upon the system administrator. ATCOs should be kept responsible only for those cases where the controller is tasked of data inputting.

2.5.3. The airframe would receive great benefit from the SWIM deployment. Aircraft/aircraft and ground/aircraft data sharing should increase the situational awareness of both ground staff and aircrew. SWIM is intended, among other topics, to share flight plans set of data in the most accurate and reliable manner, dropping the software difference issues that Air Traffic Flow Management is experiencing today. The Flight Information Service (FIS) can be provided in an automated manner giving latest updated information about weather, airspace restriction, flight status and others.
Once again accuracy of information is mandatory to gain the highest benefit from the system.

2.5.4. The SWIM process, its technology and the philosophy that lies behind it could be very complicated. ATCOs should not be responsible for infrastructure design but should participate in Human-Machine Interface (HMI) definition to permit the creation of a user-driven design.
After any step of the SWIM programme is deployed, the whole process should become transparent to ATCOs.

2.5.5. SWIM would permit the sharing of a large number of information. The amount of data could overwhelm the capability to manage the information itself. It is then mandatory that ATCOs should receive only required information to be displayed and available at any particular time.

2.5.6. The SWIM programme is intended to be achieved with a step-by-step path. It is mandatory that the number of changes will not exceed the normal human capability to cope with the provided amount of changes and that the training process is carried accordingly. Any Human Factors (HF) and Human Performance (HP) aspect has to be applied together with the required safety assessment.

[4] Skybox Imaging.
[5] Aireon.
[6] Google/Titan Aerospace and Facebook/Ascenta projects.

2.6. **Legal issues**

2.6.1. Those operators who should be in charge of data transmission and dissemination could be retained responsible for its accuracy. The SWIM system is Information Technology (IT) based, meaning with it that any operation is carried through an input/output process and data intervention at different levels of administration (Admin, Superuser, Limited Account, Read-Only…).

2.6.2. In SWIM system, there will be user who will have no "write" possibility over the information (read-only) while other will be accounted of managing information as to change the data itself.
ATCOs are supposed to be in charge of managing some of the information at the highest levels.
SWIM access permission should then be developed through a clear governance policy that is transparent at all stages.

2.6.3. In this case, the responsibility beneath data intervention has to be clearly defined because any wrong setting could lead to a ripple effect on the flight data profile. It is even truth that, whenever the possibility to intervene on the data is kept, a wrong input error can be mitigated by a second input to obtain the right output. It is then mandatory to have redundancy and accessibility at different and pre-determined levels.

2.6.4. Certain operator category should have the capability to over-ride the system by issuing arbitrary input. An example is the necessity to modify the Controlled Time of Arrival (CTA) over a designated fix to recalculate sequence in the Arrival Manager (AMAN). This can be necessary whenever it is needed to give to special flights, prioritization over other traffic.

2.6.5. Even if SWIM process should be as more transparent as possible to ATCOs, some security-affected data could reach controllers' awareness and management. Controllers should be qualified by the regulator on sensitive data treatment/management according to local laws. Sensitive information should be shared through a data protection protocol. ATCOs should not be considered in charge of managing privacy affected data unless this is required for the sole purpose of providing air traffic services. Each user roles and accountability need to be clear and unambiguous.

2.6.6. Wherever automation will support or completely own usual ATCOs' tasks, clear and unambiguous regulatory framework must be set. Responsibility and liability have to be set upon machine or human without overlaps.

2.6.7. Even contemplating high redundancy, it could not be enough in case of mass-disaster (weather, war, hacking). SWIM deployment should include recovery protocols and system degradation management.

3. Conclusions

3.1. SWIM is an infrastructure of data sharing, based on existing IT and developed according to the Service Oriented Architecture principle. It will be the network behind any future development in the aviation field.

3.2. SWIM is recognized as an effective tool to create efficiency in airspace management and to increase operators' awareness. It will help the establishment of CDM procedures.

3.3. SWIM processes is transparent for ATCOs unless data inputting task is mandatory (e.g. flight profile update).

3.4. ATCOs should receive only required information to be displayed and available at any particular time.

3.5. ATCOs should not be accounted on managing privacy-affected data unless this is required for the sole purpose of providing air traffic services.

3.6. SWIM deployment should follow a step-by-step path in order to permit an easy integration into ATCOs' activities.

4. Recommendations

4.1. It is recommended that:

This paper is accepted as information paper.

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