ENHANCED PILOT SITUATIONAL AWARENESS THROUGH THE DIGITAL/GRAphICAL PRE-FLIGHT BRIEFING CONCEPT

or “from smoke signals to the digital pre-flight briefing concept”

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THE TELEPRINTER MACHINES IN THE 1920’S SUPPORTED ONLY UPPER CASE LETTERS AND THIS IS THE REASON WHY SOME PILOTS TODAY STILL HAVE TO GO THROUGH NUMBERLESS PAGES OF NOT USER FRIENDLY NOTAM FULL OF ABBREVIATIONS LIKE CLSD RWY 24L TEMPORARY DISPLACED THRESHOLD PAPI GA 3 ETC.

Not only is reading text like this not very user-friendly, it also brings the risk of misinterpretation and can even lead to dangerous situations. Accident reports sometimes identify a failure to review, properly understand and/or recall NOTAM information correctly as a contributing factor, for example in the attempted take off from a closed runway at Taipei by a Boeing 747 in 2000¹. An analysis of investigation reports on aircraft accidents indicates that the format of the briefing documents can make the extraction of key information difficult. A pilot must be able to easily obtain comprehensible information relevant to his flight to help establish the necessary situational awareness. Relevant information will include data about the route to be flown, about the departure, destination and alternate airports and weather information, both observed and forecasted.

The means that gives the pilot this overview and provides situational awareness during the pre-flight briefing is the generic Pre-flight Information Bulletin (PIB) along with separate MET Charts, Forecasts and Reports. A Pre-Flight Information Bulletin (PIB) contains details of current NOTAM for a specified area or along the route. A NOTAM is defined by ICAO as “a notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations”. And it is this “means of telecommunication” that still determines the format of the NOTAM at initial issue. NOTAM have

¹- see http://www.skybrary.aero/index.php/B744_Taipei_Taiwan_2000

PRE-FLIGHT INFORMATION BULLETIN
retained the all-uppercase letters only and abbreviations that were needed for the Teletype machines of the 1920s that could only transmit limited information. However, despite tremendous developments in communications technology in recent decades, only very small advancements have been made in improving the usability and user-friendliness of the NOTAM system. It should also be noted that there is a significant increase in the number of NOTAM issued around the world, which has grown from around 300 000 in 2000 to more than 1.1 million in 2015. This leads to visibly longer and more complex PIB documents for pilots.

Studies recommending improvements are not new, but only since 2010, when the concept of the Digital NOTAM was defined, things have started to progress. No longer does a NOTAM need to be a hard copy text notification. Instead it arrives in a format which can be transformed, analysed and presented to the end user in a form tailored to their specific needs. The availability of Digital NOTAM will enable a complete rethink of the presentation of pre-flight information bulletins. This overdue modernisation can address safety recommendations from accident investigations concerning the need for better NOTAM clarity - in particular annotated graphics in place of text with location described by coordinates or text descriptions. “A picture is worth a thousand words”....
One of the objectives of these real-time simulations was to provide the pilot with improved situational awareness of the status and condition of airports, airspace and the CNS environment. The validation exercise simulated an Airport Briefing Office where pilots performed a pre-flight briefing using the ePIB prototype. The Digital NOTAM included in the prototype was selected automatically based on their flight planned route including departure, arrival and alternate aerodromes and the intended departure time. The ePIB prototype also aimed to improve the pilot situational awareness of the current operating situation beyond NOTAM by integrating MET data. To be able to compare the improvements of the ePIB over the historical alternative, both scenarios were included in the validation exercise.

Examples of relevant information which would not be known pre-flight except through a briefing were included in the validation exercise to see if they were more easily detected using the ePIB process. Such examples included:

- Alerts to erroneous data for the arrival airport (displaced threshold/wrong coordinate decimals)
- A SNOWTAM combined with a closed runway
- Closed taxiways and other relevant events, such as temporary obstacles at the departure airport
- Combined MET and NOTAM information in en-route phase (SIGMET and active military area)

Pilots involved in the validation exercise were invited to review information presented through both the PIB and ePIB method and assess its importance and its consequence for their planned flight. This was done by presenting them with information examples like those above with three minutes to make their assessment for each version - the traditional PIB and the ePIB.

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were conducted with them to elicit their feedback. One of the questions they were asked was if they had detected an information example in both formats, how easy it was to detect it in each one and assess if it was relevant to their intended flight.

The results confirmed the expected benefits of the ePIB. This method resulted in all the information examples being detected whereas this was not the case with the traditional PIB so situational awareness was improved by the ePIB. All participants agreed that the ePIB was the better method of providing information and that the graphical representation of events using colour coding and symbols on an airport map and integration of en-route AIS and MET information was useful. An uncontroversial benefit was the display of the NOTAM in a normal case format.

Of course, this was a prototype, so although it was clear that whilst the ePIB brought many advantages for the pilot, there were still quite a lot of improvements needed including more information on airport maps such as runway and taxiway identification. The need for standardising the graphical presentation of events such as runway closure, navaid unserviceable, airspace reservations, etc. was also identified. A first step in this domain was made by SAE International, which has released a first version of a Recommended Practice (ARP6467) for “Human Factors Minimum Requirements and Recommendations for the Flight Deck Display of Data Linked Notices to Airmen (NOTAM)”. More standardisation efforts are envisaged for the coming years.

The successful completion of this validation, complemented by other validation exercises carried out by SABRE and Honeywell, opens the way for the operational deployment of the ePIB. Soon, pilots will no longer have to read endless lists of NOTAM in upper case, but will be able to consult well-structured integrated AIS and MET information supported by graphical presentations. This will enhance pilots’ situational awareness by helping them detect and easily understand the specific information they need and should greatly reduce misunderstanding and misinterpretation.