International Civil Aviation Organization

Twenty Eighth Meeting of the Communications/ Navigation and Surveillance Sub-group (CNS SG/28) of APANPIRG

Bangkok, Thailand, 01-05 July 2024

Agenda Item 8: Automation

8.2 Other automation related matters

COMPLEXITIES IN PROCURING ATM AUTOMATION SYSTEMS AND SUB-SYSTEMS INCORPORATING COMMERCIAL-OFF-THE-SHELF COMPONENTS

(Presented by Nepal)

SUMMARY

This paper discusses some complexities arising out of the recent trends in the Commercial-Off-The-Shelf industry and its adverse effects in the acquisition and maintenance of modern ATM automation systems and sub-systems by ANSPs like the Civil Aviation Authority of Nepal.

1. INTRODUCTION

1.1 The ever-increasing air traffic trends and the accompanying enhancements in ANSP standards today continue to drive the rapid development of newer generations of air traffic management automation systems (ATM AS), though the automation systems have remained deployed in states with high level of aviation activities for several decades now.

1.2 Current-generation ATM AS heavily employ commercial-off-the-shelf hardware like- servers, workstations, routers, networking gear as well as software like- operating system, device drivers, for achieving their design objectives, unlike earlier generation that often relied on bespoke solutions: both hardware and software.

1.3 Though this trend of employing COTS platforms has enabled reducing product development lead times for the OEMs/vendors, this now unavoidable practice, however, comes with its share of steep challenges, especially for the ANSP user community.

1.4 Nepal, like most States, presently, is not home to activities like design, manufacturing and certification of ATS equipment and facilities including its Communication, Navigation, and Surveillance components, and, as a matter of fact, imports all its needs from OEMs abroad.

1.5 ICAO Doc 4444 (PANS-ATM) mandates that all communications, navigation, surveillance and other safety significant systems and equipment meet the requirements on compliance with human factor principles as well as reliability, availability established by the state's appropriate authority. It also mandates that the above systems and equipment be predictable in terms of failure and degradation by adequate system documentation.

1.6 Clearly, with the above backdrop, ensuring compliance with the safety and security aspects of such safety critical systems becomes difficult for ANSPs.

2. DISCUSSION

2.1 Whereas the deployment of COTS software (and hardware) components in CNS/ATM systems has been going on for decades now, the appreciation of the accompanying complexities by the user community is beginning to dawn as the product development/support cycle has halved from about twelve years in the 1990s to five years currently.

2.2 The COTS industry is typically characterized by rapid development as well as deployment of products over a large user base thereby enabling the lowering of per user costs as compared to bespoke components. But then rapid development also necessitates planned obsolescence with unpleasant downstream effects on users, especially the ANSP community.

2.3 For the ANSP community, the significant levels of financial investment when inducting an ATM automation system, leads to the expectation by management, especially, with non-technical backgrounds, that it has a lifetime comparable to traditional ATM systems, i.e., 10-12 years as in the previous generations of ATM systems. However, the prevailing IT industry practices based on the current product development cycles constricts the life span of such COTS products to often no more than 5 years, typically.

2.4 Besides, this COTS development cycle, in turn, necessitates regular end-of-life (EOL) notifications from the vendors. And, with the EOL, development support (product updates, bug fixes) to the end customer ceases, leaving the systems vulnerable and necessitating an expensive product upgrade, or worse, early replacement!

2.5 As is the case with most ANSPs - government-owned, the procurement methodology applied is that of international competitive bidding by default. Any attempts to extend the lifetime of the system in use by implementing some form of the IT-industry prevailing practice of “Technical refresh,” does not constitute a case of “fair competition,” and isn’t taken kindly by the incumbent vendors’ competitors, in our experience, who cry foul for “loss of possible business.”

2.6 In light of the above, especially for ANSPs with limited revenue, building a viable business case for the acquisition of newer ATM AS systems and components so as to align with the ICAO APAC Seamless ANS Plan is challenging.

2.7 Another challenge that typical ANSPs face with COTS-based ATM systems relates to the issue of safety certification.

2.8 Anticipating the issues of safety certification the EUROCAE document Guidelines For Communication, Navigation, Surveillance, And Air Traffic Management (CNS/ATM) Systems Software Integrity Assurance ED-109 was issued in 2002. Another relevant technical documentation - EUROCAE Document ED-153 exists for reference also.

2.9 The ED-109 guidance, however, as applicable to non-airborne components of the CNS/ATM system, *per se*, is not that of objective “certification” to be carried out by a third party or the regulatory agency, and rather that of “approval” that is expected to be demonstrated by the vendor/OEM by issuance of a signed declaration of conformity.

2.10 As it would be unreasonable to expect the ATM AS OEMs/Vendors to deliver or tailor a fresh products in line with the individual states' requirements, every time an RfP is floated, it is, therefore, a foregone conclusion that ANSPs only get to buy "mature" products sitting in the OEM's stables at any given point of time.

2.11 The acquisition and replacement of ATM automation systems by individual States/ANSP is usually an independent procurement activity requiring little inter-state coordination, except that when testing and implementing features that required cross-border coordination.

2.12 The technical, functional and commercial specifications laid out in such RfPs are usually confidential, often governed by individual states' regulations. However, collaboration between states could go a long way in helping avoid duplication of efforts as well as saving on valuable resources, while ensuring ATM AS compliance with the common or shared safety certification criteria.

2.13 While this paper shares Nepal's experience when procuring components of modern ATM systems in order to comply with the ICAO APAC mandated Seamless-ANS Plan, it is likely that similar issues have been faced by other member states, too.

2.14 With a mandate to "Step up investments in ANS capacity and capabilities and share requirements and best practices in the procurement of ANS systems, " the "Workstream 1," recently formed under the auspices of ICAO APAC ANSP Committee (AAC), seems to be the vehicle of choice to further the cause of not-so-rich ANSPs like CAA Nepal by bringing together the CANSO and the members of ICCAIA, in order to discuss in detail the issues raised in this paper as well as the way forward.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) direct the AAC Workstream 1 to take up the matters raised in this paper for further deliberations;
b) encourage States to share individual experience; and
c) discuss any relevant matter as appropriate.

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