Australian Government
Civil Aviation Safety Authority

AIRWORTHINESS BULLETIN

Software Manufacturing -
Development vs Replication

AWB 00-019 **Issue** : 1
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1. Effectivity

General information on aircraft software.

2. Purpose

There has been some confusion as to what the difference is between software replication versus software development. This AWB provides some general guidance on what is considered replication and what is software development.

3. References:

- ARINC Report 667-1, Guidance for the Management of Field Loadable Software.

- RTCA/DO-178B, Software Considerations in Airborne Systems and Equipment Certification.

4. Definition:

Software is a generic term for organised collections of computer data and instructions, often broken into two major categories: system software that provides the basic non-task-specific functions of the computer, and application software which is used by users to accomplish specific tasks. Application software includes, but is not limited to, navigational databases, digital maps, electronic checklists or any information stored in electronic format that is used for the safe operation of an aircraft.

Civil Aviation Regulation (1988) 2 defines an aircraft component (in part) as being "any part or equipment for an aircraft that, when fitted to, or provided in an aircraft may, if it is not sound or functioning correctly, affect the safety of the aircraft, its occupants or its cargo or cause the aircraft to become a danger to person or property."

As software is a critical component of the various parts or equipment fitted to an aircraft that may have an affect on the safety of the aircraft it is considered to be an aircraft component.

5. Background

With the growth of computer systems operating in aircraft today, control of the development, approval and distribution of software (be it an application, a database or documents containing maps, procedures etc) needs to be addressed like any other aircraft component.

The requirement for software updates may come from a variety of causes some of which are:

- update of navigational databases that would include the latest map/approach procedure etc,

- new version of an installed application that provides enhanced functionality or corrects a known issue, or

- customisation of the application to satisfy an operator's unique requirements.

ARINC Report 667-1, Guidance for the Management of Field Loadable Software, provides the guidance an Operator may use as a basis for the development of internal processes.

6.   Replication or Duplication of Approved Software

An Operator may receive a single copy of an item of software which is uniquely identified by part number and is required to be distributed across the Operator's fleet as field loadable software.

This replication is not considered to be manufacture of software. The software has been developed, packaged and approved by the vendors own processes and does not require further approvals by the Operator provided no changes are made.

Suitable processes need to be in place to ensure that:

- the application and version that will be used for the replication is identified;

- the proposed error checking methodology proposed to confirm the integrity of the copies being made is identified;

- the individual copies are uniquely identified to facilitate the distribution and configuration management of the copies; and

- depending on the nature and criticality of the software, security may also need to be addressed.

In summary, Operators intending on replicating approved software delivered by OEM/approved vendors are not manufacturing the software but need to have processes in place to control the replication and distribution.

7. Software Development

There are a number of fundamental aspects that need to be considered with software development. Some of these are:

- the proposed environment the software will operate in, e.g. is it a proprietary operating system, is it commercial off the shelf etc;

- what standards will the software applications/databases etc be developed to;

- the criticality of the software, what are the effects of a failure; and

- what standard will be used for assurance that the software was appropriate and functioned as intended.

As a general statement, software development standards consist of certain terms, concepts, data formats, document styles and techniques agreed upon by software creators. This can be limited to a specific operating system unique to the particular application or to a recognized international standard enabling the software to understand the files and data created by a different software program.

CASA does not specify any particular software development standard but has accepted RTCA/DO-178B, Software Considerations in Airborne Systems and Equipment Certification, for software assurance.

RTCA/DO-178B provides guidance in establishing the criticality of the software and the required assurance level. Early involvement in the assurance process is essential to ensure the necessary certification of the final software.

8. Enquiries

Enquiries with regard to the content of this Airworthiness Bulletin should be made via the direct link e-mail address:

AirworthinessBulletin@casa.gov.au

or in writing, to:

Airworthiness & Engineering Branch
Civil Aviation Safety Authority
GPO Box 2005, Canberra, ACT, 2601