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Object-Oriented Technology and Related Techniques
Supplement to DO-178C and DO-278A

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FOREWORD

This document was prepared by RTCA Special Committee 205 (SC-205) and EUROCAE Working Group 71 (WG-71). It was approved by the RTCA Program Management Committee (PMC) on December 13, 2011.

RTCA, Incorporated is a not-for-profit organization formed to advance the art and science of aviation and aviation electronic systems for the benefit of the public. The organization functions as a Federal Advisory Committee and develops consensus-based recommendations on contemporary aviation issues. RTCA's objectives include but are not limited to:

- coalescing aviation system user and provider technical requirements in a manner that helps government and industry meet their mutual objectives and responsibilities;
- analyzing and recommending solutions to the system technical issues that aviation faces as it continues to pursue increased safety, system capacity, and efficiency;
- developing consensus on the application of pertinent technology to fulfill user and provider requirements, including development of minimum operational performance standards for electronic systems and equipment that support aviation; and
- assisting in developing the appropriate technical material upon which positions for the International Civil Aviation Organization and the International Telecommunication Union and other interested international organizations can be based.

The organization's recommendations are often used as the basis for government and private sector decisions as well as the foundation for many Federal Aviation Administration Technical Standard Orders.

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OO.1.0 INTRODUCTION

Object-oriented technology (OOT) has been widely adopted in non-critical software development projects. The use of this technology for critical software applications in avionics has increased, but there are a number of issues that need to be considered to ensure the safety and integrity goals are met. These issues are both directly related to language features and to complications encountered with meeting well-established safety objectives. In fact, there are a number of related techniques that are used with OOT that need to be considered as well. Clarifying each of these issues will ease the application of object-oriented technology and related techniques **(**OOT&RT**)**; therefore, this supplement addresses both object-oriented technology and related techniques.

OO.1.1 Purpose

The purpose of this supplement is to provide guidance for the production of software using OOT&RT for systems and equipment that performs its intended function with a level of confidence in safety that complies with airworthiness requirements. This supplement contains modifications and additions to DO-178C objectives, activities, explanatory text, and software life cycle data that should be addressed when OOT&RT are used as part of the software life cycle.

Compliance with the objectives of DO-178C, Software Considerations in Airborne Systems and Equipment Certification, is the primary means of obtaining approval of software used in civil aviation products. Object-oriented technology is a software development methodology that uses objects and the connections between those objects to express the software design. There are a number of related techniques commonly associated with, but not limited to, object-oriented technology that are considered in this supplement. These related techniques include parametric polymorphism, overloading, type conversion, exception management, dynamic memory management, and virtualization. Since OOT&RT differs from the traditional functional approach to software development, satisfying some of the DO-178C objectives when using OOT&RT may be unclear and/or complicated.

This supplement identifies the additions, modifications, and deletions to DO-178C objectives when object-oriented technology or related techniques are used as part of the software development life cycle and additional guidance is required. This supplement, in conjunction with DO-178C, is intended to provide a common framework for the evaluation and acceptance of OOT&RT based systems.

This supplement provides the following data:

- Objectives for OOT&RT software life cycle processes.
- Descriptions of activities and design considerations for achieving those objectives.
- Descriptions of the evidence that indicate that the objectives have been satisfied.

OO.1.2 Scope

This supplement discusses the use of OOT&RT in the software life cycle for software that is produced in accordance with DO-178C. If the applicant is planning to use OOT or a related technique, then the applicant should comply with the relevant parts of this supplement. The related techniques described in section OO.1.6.2 for which this