SISO-STD-001.1-2015

Standard for
Real-time Platform Reference
Federation Object Model

Version 2.0

10 August 2015

Prepared by
Real-time Platform Reference
Federation Object Model
Product Development Group

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Revision History

Version	Section	Date (MM/DD/YYYY)	Description
2.0		08/10/2015	Support for IEEE Std 1278.1™-1998
1.0		08/24/1999	Support for IEEE Std 1278.1™-1995

Participants

SISO-STD-001.1-2015, Standard for Real-time Platform Reference Federation Object Model (RPR FOM 2.0) and SISO-STD-001-2015, Standard for Guidance, Rationale, and Interoperability Modalities for the Real-time Platform Reference Federation Object Model (GRIM 2.0) were together created as a community effort by the Real-time Platform Reference Federation Object Model 2.0 Product Development Group (PDG). The RPR FOM 2.0 development consisted of two separate efforts separated by a period of years. The *initial effort* occurred between 2000 and 2008 and the *final effort* between 2012 and 2015.

RPR FOM 2.0 PDG Initial Effort (2000 - 2008)

The initial RPR FOM 2.0 effort occurred between 2000 and 2008 and included a round of balloting without being approved. The RPR FOM PDG became inactive in 2005, although an additional draft was later produced in 2007, which was followed by another attempt to restart the group in 2008. In 2009 the formal process to dissolve the RPR FOM PDG was approved by the SISO Standards Activity Committee (SAC) and Executive Committee. However, the dissolution never became official due to an administrative technicality.

The hard work of those who participated in the initial effort is greatly appreciated as they produced good drafts that were able to support the balloting process.

Product Development Group Officers

Former Chairpersons: Graham Shanks, Richard Schaffer, Jim Gregg, Jim Kogler
Former Vice-Chair: *vacant*
Former Secretary: Douglas Wood

Drafting Group

Former GRIM Editors: Steve Dix, Mark Rybka, Sean Reilly, Keith Briggs
Former Associate GRIM Editors: Jeff Fisher, Ron Bertin

Former FOM Editors: Graham Shanks, Michael O'Connor
Former Associate FOM Editor: Mark Rybka

Technical Area Director: Paul Lowe

RPR FOM PDG Members

Wayne Belanger
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Keith Briggs
Andy Cox
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Jeff Fischer
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Len Granowetter
Jim Gregg
Carl Ito
Jim Kogler
Reed Little
Robert Lutz
Paul Metzger
Steve Monson
Michael O'Connor
Beth Pettit
Sean Reilly
Ed Roberts
Peter Ryan
Mark Rybka
Jerry Sanders
Randy Saunders
Richard Schaffer
Steve Seidensticker
Graham Shanks
Steven Sheasby
Jack Sheehan
Chris Turrell
Grant Tudor
Jeff Wicks
Earl Williamson
Chris Winters
Douglas Wood

RPR FOM 2.0 PDG Final Effort (2012 - 2015)

The final effort occurred from 2012 to 2013. This effort was initiated by Björn Möller who asked the SAC to reactivate the RPR FOM PDG to complete the effort to produce a SISO Standard for RPR FOM 2.0. The Product Nomination (PN) was updated and approved by the SAC and active work resumed on RPR FOM 2.0 in 2012.

At the time this product was submitted to the SAC for approval, the RPR FOM 2 PDG had the following membership and was assigned the following SAC Technical Area Director:

Product Development Group Officers

Chairperson: Björn Möller
Vice-Chair: Paul E. Murtha, Stephen Chappell
Secretary: Michael Heffernan
Technical Area Director: Thom McLean

Drafting Group

GRIM Editors: Aaron Dubois, Steven Sheasby
FOM Editors: René Verhage, Patrice Le Leydour
DG Recording Secretary: Aaron Dubois

RPR FOM PDG Members

Fredrik Antelius	Roger Jansen*	Lennart Olsson*
Andy Bowers*	Stephen Jones*	Peter Ross
Andy Ceranowicz*	Patrice Le Leydour*	Chris Rouget
Tony Darlington	Farid Mamaghani	Peter Ryan*
Aaron Dubois*	Lance Marrou	Graham Shanks*
Åsa Falkenjack*	Björn Möller*	Steven Sheasby*
Michael Gagliano	Mike Montgomery*	Brett Terry*
Frank Hill*	Robert Murray	Tom van den Berg*
Kyle Isakson*	Shagoto Nandi	René Verhage*

**denotes a Drafting Group member*

NATO Modelling and Simulation Group Task Group 068, NATO Education and Training Network, and Task Group 106, Enhanced CAX Architecture, Design and Methodology – SPHINX also made valuable contributions to the RPR FOM PDG.

The following individuals comprised the ballot group for this product.

Ballot Group

Fredrik Antelius	Frank Hill	Michael O'Connor
Curtis Blais	Kyle Isakson	Lennart Olsson
Andy Bowers	Roger Jansen	Tim Pokorny
Veronica Charlton	Patrice Le Leydour	Félix Rodríguez
Ann Clark	Paul Lowe	Peter Ross
Mark Crnarich	Lance Marrou	Peter Ryan
Uwe Dobrindt	Mark McCall	Graham Shanks
Aaron Dubois	Björn Möller	Steven Sheasby
Michael Gagliano	David Murray	Tom van den Berg
Michael Heffernan	Shagoto Nandi	René Verhage

When the SAC approved this product on 21 July 2015, it had the following membership:

Standards Activity Committee

Jeff Abbott (Chair)
Marcy Stutzman (Vice Chair / Secretary)

Grant Bailey
Curt Blais
Peggy Gravitz
Kevin Gupton
Jean-Louis Igarza
Bob Lutz
Lana McGlynn
Thom McLean
William Oates
Simone Youngblood

When the Executive Committee approved this product on 10 August 2015, it had the following membership:

Executive Committee

Michael O'Connor (Chair)
James Coolahan (Vice Chair)
Jane Bachman (Secretary)

Jeff Abbott
John Daly
John Diem
David Graham
Paul Gustavson
Shel Ocasio
Roy Scrudder
Robert Siegried
Eric Whittington

Introduction

The Real-time Platform Reference Federation Object Model 2.0 (RPR FOM 2.0) defines a hierarchy of object and interaction classes for the High Level Architecture (HLA) that provides the capabilities defined in IEEE Std 1278.1™-1995, IEEE Standard for Distributed Interactive Simulation — Application Protocols, and its supplement, IEEE Std 1278.1a™-1998, IEEE Standard for Distributed Interactive Simulation — Application Protocols. RPR FOM 2.0 is designed to link simulations of discrete physical entities into complex virtual worlds. Its capabilities include representations of:

- Physical entities such as vehicles, lifeforms, cultural features, munitions, and collisions between them.
- Collections of individual entities collected as a single aggregate entity.
- Environmental objects and processes.
- Minefields.
- Communications between entities.
- Emissions generated by entities.
- Underwater acoustics.
- Weapon fire and detonations.
- Logistics, including repair and resupply.

SISO-STD-001-2015, Standard for Guidance, Rationale, and Interoperability Modalities for the Real-time Platform Reference Federation Object Model encapsulates guidance in the use of RPR FOM 2.0. It provides descriptions of FOM classes and datatypes and the relationship between the Distributive Interactive Simulation and the HLA-based RPR FOM, as well as rules for accomplishing specific distributed simulation tasks.

Changes from RPR FOM 1.0 made in RPR FOM 2.0 fall into one of the following categories, depending on the reason for the change:

- Support of IEEE Std 1278.1a™-1998 extensions – this resulted in new object and interaction classes, added attributes and parameters, new complex datatypes and enumerations.
- Representation of Spatial entity information was changed from separate attributes to a single attribute consisting of a variant-record.
- Changes to radio-related object and interaction classes were made due to community comments. The changes were made to support improved performance.
- The ModulationStruct complex datatype was removed because the functionality was moved to the SpreadSpectrumStruct complex datatype.
- Padding fields were added to complex datatypes to comply with the IEEE Std 1516.2™-2010 , IEEE Standard for Modeling and Simulation High Level Architecture – Object Model Template Specification default encoding.
- Updated enumerated datatypes based on SISO-REF-010, Reference for Enumerations for Simulation Interoperability, version 00v20-0.

Appendix A of the GRIM lists all of the new, changed, and deleted structures for RPR FOM 2.0 versus RPR FOM 1.0.

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Annex A: The RPR FOM (Normative)

(Normative)

These FOM Modules, specified according to IEEE Std 1516.2™-2010, constitute the RPR FOM standard.

Module Name	**File Name**
Foundation FOM Module	RPR-Foundation_v2.0.xml
Enumerations FOM Module	RPR-Enumerations_v2.0.xml
Base FOM Module	RPR-Base_v2.0.xml
Physical FOM Module	RPR-Physical_v2.0.xml
Aggregate FOM Module	RPR-Aggregate_v2.0.xml
Synthetic Environment FOM Module	RPR-SE_v2.0.xml
Minefield FOM Module	RPR-Minefield_v2.0.xml
Communication FOM Module	RPR-Communication_v2.0.xml
Distributed Emission Regeneration FOM Module	RPR-DER_v2.0.xml
Underwater Acoustics FOM Module	RPR-UA_v2.0.xml
Warfare FOM Module	RPR-Warfare_v2.0.xml
Logistics FOM Module	RPR-Logistics_v2.0.xml
Simulation Management FOM Module	RPR-SIMAN_v2.0.xml
Switches FOM Module	RPR-Switches_v2.0.xml

These files are normative parts of the specification and can be downloaded from

https://www.sisostds.org/DigitalLibrary.aspx?Command=Core_Download&EntryId=43284

Annex B: The RPR FOM in Additional Formats

(Informative)

For the convenience of users of HLA 1.3, HLA 2000 and the monolithic HLA 2010 formats, the RPR FOM, as specified in Annex A has been converted to these formats. It has also been converted into a hyperlinked PDF format, for easier reading.

Description	File Name
RPR FOM 2.0 in HLA 1.3 FED format	RPR_FOM_v2.0_1.3.fed
RPR FOM 2.0 in HLA 1.3 OMT format	RPR_FOM_v2.0_1.3.omt
RPR FOM 2.0 in HLA 1516-2000 format	RPR_FOM_v2.0_1516-2000.xml
RPR FOM 2.0 in HLA 1516-2010 monolithic format	RPR_FOM_v2.0_1516-2010.xml
RPR FOM 2.0 in PDF format	RPR_FOM_v2.0.pdf

These files are informative part of the specification and can be downloaded from

https://www.sisostds.org/DigitalLibrary.aspx?Command=Core_Download&EntryId=43285