PROCEEDINGS OF SPIE

Open Architecture/Open Business Model Net-Centric Systems and Defense Transformation 2019

Raja Suresh
Editor

16–18 April 2019
Baltimore, Maryland, United States

Sponsored and Published by
SPIE

Volume 11015

Proceedings of SPIE 0277-786X, V. 11015

Open Architecture/Open Business Model Net-Centric Systems and Defense Transformation 2019,
edited by Raja Suresh, Proc. of SPIE Vol. 11015, 1101501 · © 2019 SPIE
CCC code: 0277-786X/19/$18 · doi: 10.1117/12.2536296

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:
Author(s), "Title of Paper," in *Open Architecture/Open Business Model Net-Centric Systems and Defense Transformation 2019*, edited by Raja Suresh, Proceedings of SPIE Vol. 11015 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

ISSN: 0277-786X
ISSN: 1996-756X (electronic)

ISBN: 9781510626959
ISBN: 9781510626966 (electronic)

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445
SPIE.org

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.

SPIE. DIGITAL LIBRARY
SPIEDigitalLibrary.org

Paper Numbering: *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B … 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

Contents

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Conference Committee

Symposium Chairs

Jay Kumler, JENOPTIK Optical Systems, LLC (United States)
Ruth Moser, Air Force Research Laboratory (United States)

Symposium Co-chair

John Pellegrino, Electro-Optical Systems Laboratory, Georgia Institute of Technology (United States)

Conference Chair

Raja Suresh, General Dynamics Mission Systems (United States)

Conference Program Committee

Joseph Borden, Teledyne Benthos (United States)
Vasu D. Chakravarthy, Air Force Research Laboratory (United States)
Darlene Hart, General Dynamics Mission Systems (United States)
Patrick Jungwirth, U.S. Army Research, Development and Engineering Command (United States)
Wilmuth Muller, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)
Jonathan D. Shaver, Air Force Research Laboratory (United States)
Russell Shirey, Air Force Research Laboratory (United States)
Jason R. Stack, Office of Naval Research (United States)

Session Chairs

1 Communications and Networks
Raja Suresh, General Dynamics Mission Systems (United States)
Wilmuth Müller, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

2 Autonomy and Undersea Systems
Raja Suresh, General Dynamics Mission Systems (United States)
Joseph Borden, Teledyne Benthos (United States)

3 Open Architecture Systems
Darlene Hart, General Dynamics Mission Systems (United States)
Russell Shirey, Air Force Research Laboratory (United States)

Introduction

These are the proceedings of the twenty fourth Open Architecture/Open Business Model Net-centric Systems and Defense Transformation conference. The papers presented at the conference strongly reflected the inexorable trend towards open architecture/open business model acquisition patterns to provide the government Better Buying Power (BBP). The conference included the following joint session:

1. Self-organizing Collaborative Unmanned ISR Teams, held jointly with the Unmanned Systems Technology conference.

The conference included invited papers by several luminaries from the United States Department of Defense. A highlight of the conference was the presentation on Mosaic Warfare by Dr. Tim Grayson, Director of the DARPA Strategic Technology Office; the presentation was elevated to a plenary for the entire DCS Symposium.

Looking ahead, we expect Net-centric systems to evolve towards Systems of Systems (SoS) based on an Open Architectures (OA) and Open Business Models (OBM) construct. The emphasis on disaggregated SoS comes from the DoD push in the Third Offset. Such OA/OBM systems seek to mimic the successful PC industry and promise to dramatically reduce the acquisition and life cycle costs of military systems, and tremendously accelerate the rate of technology refresh.

It is gratifying to see the high level of audience interest in this conference. Particularly gratifying is the fact that this conference has resulted in the "spin-off" of several new conferences at SPIE DCS. My sincere thanks to the distinguished invited speakers, authors, attendees, and my associates on the program committee for another successful conference.

Raja Suresh