**CURRICULUM VITAE of: Arthur Rex Rivolo**



**SUMMARY:** Current position: President/CEO Roving Sands Fine Arts, Inc.; President/CEO New York Fine Arts Society, Inc.; Chief Technology Officer, Flight Test Aerospace, Inc. Ph.D., Physics; BS Aerospace Engineering. Thirteen years in academia. Seventeen years' experience in DoD Test and Evaluation community as senior advisor to the Office of Secretary of Defense. Twelve years corporate executive. Twenty-eight years of military service (active duty and reserves) with extensive experience in tactical air operations 7,500+ hours total flying time, 1,800+ hours combat operations, in fighter aircraft and rotorcraft, Top Secret/SCI clearance. Extensive technical expertise in all aspects of aircraft and spacecraft design and operation, sensor systems phenomenology, and military operations. Extensive computational skills focused on data analyses and modeling & simulation, over a broad base of hardware and software, spanning 45 years. Special areas of technical expertise include: millimeter-wave astrophysics, ultraviolet molecular spectroscopy, galaxy dynamics, theoretical cosmology, real-time data acquisition and analysis, modeling & simulation, structural dynamics, operations research, and economic dynamics of illegal drug markets.

**EDUCATION:** B.S., Polytechnic University, Aerospace Engineering, 1967
Ph.D., State University of New York—Stony Brook, Physics, 1981
Graduate, Senior Executives in National and International Security, Harvard University, Kennedy School of Government, 2008

**EXPERIENCE:**

1982–present: THE RIVOLO COLLECTION, LLC, **President and CEO**. Peripheral to the technical/scientific pursuits I maintained a growing collection and expertise in fine art focused on the graphic arts from the 16th to the 20th century. I started the collection in 1973. I maintained an active art gallery business since 1982, conducted public lectures in the graphic arts, researched and authored numerous artist biographies for posting on online reference services, and curated several museum exhibitions in the US (Charles B. Wang Center, Stony Brook University) and China (National Water Museum of China, Hangzhou). Over the years, I have donated thousands of works of art on paper to various museums (The Print Club of Albany – Print Museum; University of Wyoming Art Museum; National Museum of Women in the Arts; Cartoon Art Museum of San Francisco, among others)

2023 – present: NEW YORK FINE ARTS SOCIETY, INC., **President and CEO**

2009 – present: FLIGHT TEST AEROSPACE, INC.. **Chief Technology Officer**: Direct basic research developments, assess current and future projects, conduct studies for technology assessments, and oversee current operations.

1992 – 2009: INSTITUTE FOR DEFENSE ANALYSES, Operational Evaluation Division, **Research Staff Member**. Provide technical expertise, analysis, advice and recommendations to the Office of Secretary of Defense (OSD) on a broad spectrum of technical issues relating to test and evaluation of tactical aircraft, spacecraft, sensor systems, weapons, and operations. Assist in the design and evaluation of test plans, oversee testing, and provide independent assessments and analyses for major military acquisitions programs to the Director, Operational Test & Evaluation. Devise and assess modeling and simulation methodologies for validation of major DoD acquisition programs. Conducted extensive operational analyses and constructed operational models of U.S. government counter drug efforts in South America, the Caribbean and the eastern Pacific. Results of this research were instrumental in establishing an interdiction policy and an operational strategy for U.S. Government counter-drug forces from 1995 to 2000. Recipient of IDA's top research award, 2002.

2007 – 2008: **Principal Operations Analyst**, Counter-Improvised Explosive Devices (IED) Operations Integration Center (COIC), Multinational Corps Iraq (MNC-I). Provided weekly operational analyses and forecasts with focus on countering improvised explosive devices directly to LTGEN Raymond Odierno, Commander MNC-I. Prepared and presented weekly analytical briefings to field commanders, performed effectiveness studies of current and proposed tactics, evaluated counter-IED technology in operational field test, created and maintained key databases for statistical analyses.

1989 - 1992: MACOR DIGITAL SYSTEMS, INC., **President and C.E.O.** Founded and developed this small aerospace company. Responsible for overall design, manufacture, and flight testing of hardware and software for a variety of structural / maintenance health monitors for aircraft and surface craft. Conceived, designed and managed the program from inception. Supervised hardware assembly, systems integration and software coding & debugging of extensive computer codes for the company's principal product, the *HYGEA TRACKING SYSTEM*, a structural health and usage monitoring system for rotorcraft for use during normal flight operations. Developed, planned and evaluated future products, and new implementations of existing products.

1985 - 1990: UNIVERSITY OF PENNSYLVANIA, Dept. of Astronomy and Astrophysics, **Assistant Professor**. Chairman of the Graduate Program; Director of Image Processing Laboratory. Developed curricula, supervised students and staff, conducted research and teaching. Research activities: development of image processing techniques using integrated *FORTRAN* and *C* codes with emphasis on the development of 3-D data display/manipulation; development of PC-based imaging workstations for astronomical data analysis; development of algorithms for automated object identification at low signal-to-noise ratios; development of artificial intelligence approaches to data analysis and data archival; conducted basic research in Galactic structure and dynamics using millimeter-wave radiometric data; theoretical cosmology focusing on nonlinear evolution of cosmic structure; ultraviolet spectroscopy of quasars. Teaching: Introduction to Astrophysics, Cosmology (graduate and undergraduate), Galactic Structure (graduate), Dynamics of Space Flight.

1982 - 1985: SPACE TELESCOPE SCIENCE INSTITUTE/Dept. of Academic Affairs. **Postdoctoral Research Fellow**. Conducted basic research in astrophysics, lectured on Hubble Space Telescope and science projects. Research activities included: numerical simulations of velocity perturbations in Friedmann cosmologies using both N-body and hydrodynamic computer codes written explicitly for the projects; analyses of 2.6 millimeter wavelength radiometric survey of the Galactic plane for molecular cloud identification and determination of spatial distributions; development of algorithms for automatic quasar identification from optical and ultraviolet spectra. Functional responsibilities: preparation and presentation of *Hubble Space Telescope* lectures for both technical and non-technical audiences; evaluation of technical proposals for instrument observations with the *Hubble Space Telescope*; evaluation of overall spacecraft systems integration for achievement of scientific goals; preparation of design concepts for a data management facility to archive and access the scientific data.

1977 - 1980: STATE UNIVERSITY OF NEW YORK-STONY BROOK, Laboratory for Planetary Atmospheres Research. **Research Assistant**. Designed and implemented a research program to use the *International Ultraviolet Explorer* (IUE) satellite to conduct ultraviolet observations of the Jovian planets and their

satellites; designed, coded, and extensively used a computer-based data analysis system for the ultraviolet spacecraft data; planned, conducted, and extensively analysed *VOYAGER-2/IRIS* (infrared spectrometer) data for detection of infrared surface features on Jupiter and Saturn.

1975 - 1981: STATE UNIVERSITY OF NEW YORK-STONY BROOK, Quantum Optics Group. **Research Assistant**. Designed and coded computer models of planetary atmospheric infrared emission spectral profiles. Designed, constructed, and utilized nitrogen gas-discharge lasers for laboratory spectroscopy of astrophysics relevant polyatomic molecules.

1976 - 1996: NEW YORK AIR NATIONAL GUARD, **Helicopter Pilot**. Twenty-two years of experience in combat rescue operations flying *HH-3E* and *MH-60G* helicopters with the 102nd Aerospace Rescue Squadron. Served in a variety of tactics related functions; participated and/or organized tactical rescue exercises; developed and implemented crew training programs for assessment of tactical measures and countermeasures to be employed against radar, infrared, and optically guided surface-to-air and air-to-air weapons; supervised junior staff.

1967 - 1973: UNITED STATES AIR FORCE. **Tactical Fighter Pilot**. Six years of experience in tactical fighter operations, including 531 combat missions in South East Asia flying the McDonnell-Douglas F-4E aircraft. Operations conducted include: close air support, interdiction, air escort, forward air control, "wild weasel" (suppression of enemy air defenses), and a wide variety of special operations. Principal player in the *Linebacker* operations during the 1972 effort at Hanoi. Developed and tested new tactics for surface-to-air missile suppression and avoidance; conducted interdiction operations while serving as lead member of strike and hunter-killer teams together with F-105G electronic countermeasures aircraft. Served as: "fast FAC" (4th Tactical Fighter Squadron, Da Nang AB, Viet Nam, 1969-1970); Tactics & Weapons Officer, Instructor Pilot, and Flight Commander (34$^{th}$ Tactical Fighter Squadron, Korat AB, Thailand, 1972-1973); Tactics & Weapons Officer (35th Tactical Fighter Squadron, Kunsan AB, Korea, 1973). Decorations for airmanship: 5 Distinguished Flying Crosses, 28 Air Medals.

**PROFESSIONAL AND MILITARY SCHOOLS:**

Squadron Officer School, Air University, Extension Course Institute, 1971.

Nuclear Emergency Team Operations Course, Kirtland AFB, NM, 1973.

Rotary Wing Qualification Course, US Army Aviation Center, Ft. Rucker, AL, 1977.

USAF Operational Training Course, H-3, Kirtland AFB, NM 1977.

Air Command and Staff College, Air University, Extension Course Institute, 1980.

Air War College, Air University, Maxwell AFB, Montgomery AL, 1988.

Harvard University, Kennedy School of Government, Program for Senior Executives in National and International Security, 2008

**LANGUAGES:** Fluent Italian, good working knowledge of French, some Spanish.

**PUBLICATIONS (Open Literature):**

1. A POSSIBLE SOURCE IN CAMBODIA FOR AUSTRALASIAN TEKTITES, (with: J. B. Hartung), *Meteoritics*, **14**, 1979, 153. 2. OBSERVATIONS OF THE SPECTRUM OF JUPITER FROM 1500 TO 2000 A WITH THE IUE, (with: T. Owen, J. Caldwell, V. Moore, A. L. Lane, C. Sagan, G. Hunt, C. Ponnamperuma), *Astrophys. J.* (Letters), **236** (1980), L39.

2. AN UPPER LIMIT TO THE GLOBAL $SO_2$ ABUNDANCES ON IO, (with: P. S. Butterworth, J. Caldwell, T. Owen, V. Moore, A. L. Lane), *Nature*, 285 (1980), **308**.

3. OBSERVATIONS OF URANUS, NEPTUNE, AND TITAN BY THE IUE, (with: J. Caldwell, T. Owen, V. Moore, G. E. Hunt, P. S. Butterworth), *Astron. J.*, **86** (1980), 298.

4. THE VELOCITY DISPERSION AMONG GALAXIES, (with: A. Yahil), *Astrophys. J.,* **251** (1981), 477.

5. NONLINEAR EVOLUTION OF SUPERCLUSTERS, (with: A. Yahil), *Astrophys. J.,* **274** (1983), 474.

6. NONLINEAR EVOLUTION OF LARGE-SCALE DENSITY STRUCTURE (with: A. Yahil), in *Clusters and Groups of Galaxies*, Proceedings of the meeting held at Trieste, Italy, 13-16 Sep. 1983, (Dordrecht: Reidel Pub. Co.), p.429, 1984.

7. THE MASSACHUSETTS-STONY BROOK GALACTIC PLANE CO SURVEY: DISK AND SPIRAL ARM MOLECULAR CLOUD POPULATIONS, (with: P. M. Solomon, D. B. Sanders), *Astrophys. J.* (Letters), **292** (1985), L19.

8. LIOUVILLE'S THEOREM AND THE VELOCITY FIELD OF GALAXIES, *Nature,* **317** (1985), 788.

9. INFRARED POLAR BRIGHTENINGS ON JUPITER III: SPECTROSCOPY FROM THE VOYAGER-I IRIS EXPERIMENT (with: S. J. Kim, J. Caldwell, R. Wagener, G. S. Orton), *Icarus*, **64** (1986), 233.

10. THE TWO-POINT CORRELATION FUNCTION OF THE LOCAL SUPERCLUSTER, *Astrophys. J.,* **301** (1986), 70.

11. THE MASSACHUSETTS-STONY BROOK GALACTIC PLANE CO SURVEY: STATISTICAL CLUSTERING PROPERTIES OF MOLECULAR CLOUD CORES (with: P. Solomon, D. B. Sanders), *Astrophys. J*. (Letters), **301** (1986), L19.

12. MASSES, LUMINOSITIES, AND DYNAMICS OF GALACTIC MOLECULAR CLOUDS (with: P. M. Solomon, T. J. Mooney, J. W. Barrett, L. J. Sage), in *Star Formation in Galaxies*, C. Persson (ed.), 1986.

13. MASS, LUMINOSITY, AND LINEWIDTH RELATIONS FOR GALACTIC MOLECULAR CLOUDS (with: P. M. Solomon, J. W. Barrett, A. Yahil), *Astrophys. J.,* **319** (1987), 730.

14. MOLECULAR CLOUDS IN THE GALAXY (with: P. M. Solomon) in *The Galaxy*, G. Gilmore and R. Carswell (eds.), (Dordrecht: R. Reidel Pubs.), 1987. Proceedings of the NATO workshop held at Cambridge, UK, Aug. 1986.

15. THE OPTIMAL EXTRACTION OF LOW RESOLUTION IUE SPECTRA (with: A. Kinney), International Ultraviolet Explorer NASA Newsletter, No. **34** (1987), 41.

16. PROPERTIES OF GALACTIC MOLECULAR CLOUDS (with: P. M. Solomon), in *Molecular Clouds in the Milky Way and External Galaxies*, J. Cohen and R. Dickman (Eds.), Proceedings of the workshop held at Amherst, MA, Nov 1987. (Berlin: Springer-Verlag Pub.), 1988.

17. A FACE-ON VIEW OF THE FIRST GALACTIC QUADRANT IN GIANT MOLECULAR CLOUDS (with: P. M. Solomon), *Astrophys. J*., **339** (1989), 919.

18. A STUDY OF THE BALDWIN EFFECT IN THE IUE SPECTRA OF QUASARS (with: A. Kinney), *Astrophys. J.,* **342** (1990), 1.

20. THE EFFICIENCY OF STAR FORMATION IN MOLECULAR CLOUDS (with: P. Solomon), *Astrophys. J.* (Letters), **319**, L17.

**PUBLICATIONS (Limited Distribution):**

1. ANALYSIS OF COUNTERDRUG HISTORICAL DATA IN THE TRANSIT ZONE FOR FY93/94 (co-author), IDA Document *D-1529*, 7 June 1994.

2. OPERATIONAL EVALUATION OF THE T-45 TRAINING SYSTEM (co-author), IDA Paper *P-3006*, 31 October 1994.

3. REVIEW OF THE JOINT COMBAT SEARCH AND RESCUE (JCSAR) FEASIBILITY STUDY (co-author), IDA Document *D-1629*, 23 November 1994.

4. INTERIM ASSESSMENT: SOURCE ZONE INTERDICTION (co-author), IDA Document *D-1651*, 17 March 1995.

5. AN ASSESSMENT OF THE CURRENT STATE AND STRUCTURE OF COMBAT SEARCH AND RESCUE FORCES, IDA Document *D-1715*, 10 August 1995.

6. STRATEGIC SUCCESS AGAINST THE COCAINE MARKET (co-author), IDA Document *D-1803*, January 1996.

7. COUNTERDRUG OPERATIONAL ASSESSMENTS, (co-author), IDA Document *D-1808*, February 1996.

8. UPDATE - STRATIGIC SUCCESS AGAINST THE COCAINE MARKET (co-author), IDA Document *D-1831*, March 1996.

9. AN EMPIRICAL EXAMINATION OF COUNTERDRUG INTERDICTION PROGRAM EFFECTIVENESS, (co-author), IDA Document *D-1837*, May 1996.

10. STRATIGIC SUCCESS AGAINST THE COCAINE MARKET (1995) (co-author), IDA Document *D-1845*, May 1996.

11. CAUSE AND EFFECT IN THE COCAINE MARKET, (co-author), IDA Document *D-1847*, May 1996.

12. ASSESSING INTERDICTION AND THE NATIONAL STRATEGY (co-author), IDA Document *D-1874*, August 1996.

13. ANALYSIS OF THE RESULTS FROM THE OPERATIONAL EVALUATION (OPEVAL) OF THE AN/APG-73 RADAR UPGRADE (PHASE I) TO THE F/A-18C/D AIRCRAFT (co-author), IDA Document *D-1867*, August 1996.

14. VIEWING ROTHR STATISTICAL PERFORMANCE, (co-author), IDA Document *D-1882*, September 1996.

15. THE EFFICACY OF SOURCE ZONE INTERDICTION IN REDUCING COCAINE DEMAND (co-author), IDA Paper *P-3219*, October 1996.

16. JOINT ADVANCED HEALTH AND USAGE MONITORING SYSTEMS (JAHUMS) ADVANCED CONCEPT TECHNOLOGY DEMONSTRATION (ACTD) (co-author), IDA Document *D-1888*, November 1996.

17. DJSOTFI OPERATIONAL FIELD ASSESSMENT (co-author), IDA Document D-2012, May 1997.

18. THE VALIDITY OF ESAMS DERIVED MISS DISTANCES (co-author), IDA Document *D-2229*, November 1998.

19. PILOTS EVALUATION OF THE T-45C "COCKPIT 21" AIRCRAFT (co-author), IDA Document *D-2250*, May 1999.

20. A COMPARISON OF ESAMS AND OPEN-AIR RANGE RESULTS FOR COMMAND GUIDED SAMS (co-author), IDA Document *D-2342*, July 1999.

21. EVALUATION OF THE ROBUSTNESS OF KEY V-22 RELIABILITY AND MAINTAINABILITY CHARACTERISTICS FROM OT-IID (co-author), IDA Document *D-2321*, July 1999.

22. INDEPENDENT VALUATION OF THE F/A-18E/F SUPER HORNET (co-author), IDA Paper *P-3519*, April 2000.

23. INDEPENDENT EVALUATION OF THE MV-22 OSPREY (co-author), IDA Paper *P-3566*, 16 February 2001.

24. OPERATIONAL TEST AND EVALUATION REPORT ON THE JOINT HELMET-MOUNTED CUEING SYSTEM (JHMCS) (co-author), IDA Paper *P-3616*, May 2001.

25. INTERIM REPORT ON INTERAGENCY NATIONAL PERSONNEL RECOVERY ARCHITECTURE (co-author), IDA *P-3779*, 2002.

26. TEST AND EVALUATION CONCEPT FOR THE JOINT COMMON MISSILE SYSTEM (co-author), IDA Document *D-2863*, 2002.

27. VALIDATION OF MISSILE FLY-OUT SIMULATIONS (co-author), IDA paper *P-3697*, 15 Sep 2003.

28. INDEPENDENT REPORT ON THE OPERATIONAL TEST AND EVALUATION OF THE AIM-9X SIDEWINDER MISSILE IN SUPPORT OF THE BEYOND LOW-RATE INITIAL PRODUCTION DECISION (co-author), IDA Paper *P-3883*, 21 Apr 2004.

29. F/A-22 OT&E PHASE 1 OPERATIONAL ASSESSMENT, (co-author), IDA Paper *P-3961*, May 2004.

30. EVALUATION OF THE MV-22 OT-IIF OPERATIONAL ASSESSMENT AND THE STATUS OF READINESS FOR OPERATIONAL EVALUATION PHASE 2 (co-author), IDA Paper *P-3957*, 7 March 2005.

31. ASSESSMENT OF SELECTED WEAPON SYSTEMS PERFORMANCE DURING OPERATION IRAQI FREEDOM - VOLUME VI, FA-18E SUPER HORNET EXPERIENCE IN OPERATION ENDURING FREEDON AND OPERATION IRAQI FREEDOM, (co-author) IDA Paper *P-3917*, Vol. VI, 28 March 2005.

32. IDA D-3236, "INTEGRAL AIR-GROUND OPERATIONS AT THE PLATOON LEVEL: AN OPERATIONAL ASSESSMENT USING RUGGED, LOW-COST, FIXED-WING MANNED AIRCRAFT", 1 Jan 2006. (Rivolo, Holcomb, Chang, Lewis)

33. IDA P-3917, "ASSESSMENT OF SELECTED WEAPON SYSTEMS PERFORMANCE DURING OPERATION IRAQI FREEDOM - VOLUME I - OVERVIEW AND SUMMARY", 13 Nov 2006. (Ball, Bobbitt, Holcomb, Stevens, Marda, Kempinski, Kreis, Lambrecht, Rivolo, Schulman, M. Shaw, S. Shaw, Sunnell Tait, Wells)