

Tom Pfitzer

Education

- B.S., Industrial Engineering, *University of Chattanooga*, 1969
- M.E., Industrial Engineering (System Safety), *Texas A & M*, 1970

Other Education or Training

- Army Material Command Intern Graduate (System Safety), 2-year program, 1971
- Multiple Government-Sponsored Management and Safety Courses, 1972 – 1985

Current Position

1990 – Present: APT Research, Inc., Founder and President

Established APT to provide engineering and support services in range safety, tests planning, system engineering, system safety, vehicle testing, risk evaluations, and uncertainty analysis. Provides technical support to multiple customers, such as:

ARROW: Supported Arrow test program in accident investigation, range safety system evaluation, and test planning. Lead analyst for pyrotechnic and flight termination systems (FTS). Developed joint US-Israeli launch safety policy. Senior member on flight readiness reviews. Inspected safety hardware at Israeli launch sites. Consulted with Israeli test range on range safety system design, including raw sensor data processing from multiple sensors and safety criteria. Performed multiple flight safety studies including malfunction and intercept debris hazards.

Range Commanders Council (RCC): Had lead role in initiating and developing common debris standards at US ranges. Conceived/led development of 8-step risk assessment process for probability of impact P(I) predictions, S curves for probability of kill P(k) evaluations, and the logic tree for risk acceptance, which were subsequently adopted by the RCC, and published in RCC STD 321-97 and subsequent editions.

Department of Defense (DoD) Explosives Safety Board (DDESB): Has lead role in developing risk-based standard for DoD in the area of explosives safety. US Representative to NATO panel of “deep experts” assigned to write NATO “Risk Assessment for Explosives” manual. Panel chair at several international safety conventions for risk assessment.

Professional Societies: Active in the System Safety Society (SSS), and International Association for the Advancement of Space Safety (IAASS) member of the Board (Chair, Launch Safety Committee).

Defense Safety Oversight Council (DSOC): Multiple tasks advancing the safety engineering disciplines for the DSOC.

Yuma Proving Ground (YPG): Assisted in the establishment of multi-element system and range safety program.

Related experience at APT:

- Defined risk-based methods used by DoD, National Ranges, Federal Aviation Administration (FAA), and multiple other agencies.
- Frequent instructor in APT courses.
- Developed a Safety and Mission Assurance (S&MA) career ladder and boarding process for the NASA Safety Center.
- Hosted multiple panels on adding discipline to the safety engineering discipline.

Prior Experience

1987 – 1989: Automated Sciences Group, Inc., Program Manager

Conceived, defined and managed two infrared (IR) sensor developments, the Boost phase Optical Sensor System (BOSS), and an IR-based range safety system. Managed range safety support contract, coordinating test program with multiple agencies, and chaired the 100-member safety working group for the Air Force SABIR program. Developed IR-based range safety sensor concept including optics, data processing, and safety criteria. Compiled and published "Lessons Learned in BMD Testing."

1986 – 1987: Sparta, Inc., Director Mission & Threat

Led Sparta team defining the mission of the Missile Defense Agency (MDA) system for Star Wars era systems. Developed MERMaide model to assess outcome of strategic exchanges.

1982 – 1985: Ballistic Missile Defense (BMD) Systems Command, Huntsville, GS-14

Group Lead for Mission Analysis Group in System Engineering Directorate. Contracting Officer's Technical Representative (COTR) for six System Engineering/Analysis contracts.

1977 – 1981: Kwajalein Missile Range (KMR), Range Safety Office, GS-13, Safety Engineer

On-site engineer for installation of new Kwajalein Range Safety System (KRSS). Evaluated support contractors' effort to assure operability of KRSS. Planned and conducted initial KRSS acceptance testing. Participated in initial Flight Safety Officer (FSO) tests. Served as FSO. Reviewed contractor-provided data to insure adequate safety and reliability in KMR test programs. Point of contact for review and evaluation of Discriminating Optical Tracker (DOT) Missile Range Safety Program. Checked the design adequacy and reliability of onboard FTS, which required knowledge and assessment of radio frequency (RF) transmitters, link margins, range safety criteria, protection methods, calculation of P_i , P_c , safety system delay times and reliability, signal coding, receivers, electrical circuitry, safe and arm devices, and pyrotechnic devices. Inspected installation of vehicle-borne FTS designs. Conducted probability and statistical studies to identify flight hazards for KMR programs. Participated in explosion and misfire investigations. As KMR Radiation Protection Officer, coordinated the safety management and promulgation of radiation protection standards associated with RF, Lasers, and ionizing radiation.

1974 – 1977: BMD Range Safety, Huntsville, Safety Engineer

Responsible for review, evaluation, and coordination with range users, probability and statistic studies, reliability analyses, and system engineering. Designed, developed, and tested equipment for underwater search, detection and recovery of small radioactive parts. Responsible for evaluation of RF and Laser radiation levels from all emitters at KMR. Developed computer program to assess RF hazards. Compiled new flight and ground safety criteria, and published first version of the KMR Range Safety Manual.

1971 – 1974: KMR, Ground Safety, Safety Engineer

Responsible for system safety engineering and analyses on vehicle, laser, and RF systems including reliability studies, failure mode effects analysis, and fault tree analyses. Reviewed contractor-provided data to ensure adequate safety in KMR test programs. As Ground Safety Officer for numerous launches, conducted countdown inspections and monitoring. Reviewed/approved all vehicle handling procedures. Assisted vehicle test design and planning. Maintained waivers. Served as KMR Radiation Protection Officer. Statistics Instructor, University of Hawaii.

Professional Awards and Achievements

- 2008 International System Safety Society Professional Development Award.
- 2008 International System Safety Society Presidents Award.

- 2004 International Group Achievement Award from the System Safety Society. Helped lead the group producing the SAFER model.
- 1999 Manager of the Year from the International System Safety Society for merging the use of practices in the safety areas of range safety, systems safety, and explosives safety.
- 1984 Sustained Superior Performance (SSP) Award for developing/documenting "Mission Requirements for future BMD systems."
- 1978 SSP Award for RF & Ionizing Radiation Safety work.

Significant Publications

- "Lessons Learned in BMD Testing," 1988. Currently in 4th printing.
- IAASS space safety text book, chapter on safety at DoD test ranges. Pending publication late 2010.
- Over 20 published papers on system safety and risk management (most are available via the APT homepage).

Professional Societies & Affiliations

System Safety Society (senior member), Society of Risk Assessment (member), IAASS (BOD Member, Chair of Launch Safety Committee), Tennessee Valley BRAC Committee (member).

Unique Qualifications

Mr. Pfitzer's background includes Safety Officer for over 200 launches (sub-orbital), development of multiple new safety and risk-based methods, and currently, a frequent speaker and consultant on matters associated with risk and safety management. On multiple occasions Mr. Pfitzer has been directly involved in the development and execution of risk assessment and communication strategies:

- 1) Prior to the initial DoD launch from the Kodiak Launch Facility, two public hearings were held in Kodiak and Anchorage AK. For these, Mr Pfitzer was the designated "Range Safety Expert." In this capacity, he was responsible for developing the posters explaining how the range safety system provides public protection. Each hearing included six hours of question and answer sessions as the public reviewed the risks and how they are reduced and controlled. All questions were accurately answered on the spot.
- 2) As the expert witness for explosive safety risk at a public hearing in Shannon, Ireland, Mr. Pfitzer's task was to explain the actual risk to the surrounding public of an explosives emulsion mixing plant that APT Research had been hired to assess. Questions, both logical and emotional were answered with an understandable explanation. The validity of the assessment was acceptable by the local governance.
- 3) Mr. Pfitzer has advised acceptance of risk in numerous instances and alternative solutions in many others. The company motto, "Providing Safe Solutions" recognizes the need to provide customers with solutions, not restrictions.
- 4) As the lead technical contractor for the Risk and Lethality Commonality Team (RALCT), Mr. Pfitzer was responsible for developing the semantic framework and risk communication strategy used to build consensus with the RCC's Risk Management standard (RCC321) (1997-2010).
- 5) As the lead technical contractor for the DoD's Risk Based Explosives Safety Criteria Team, Mr. Pfitzer was the principal investigator for the compilation of semantic and consensus building approaches within the DoD. He conceived and first presented the Universal Risk Scales (URS) for both voluntary and involuntary risk. These scales and the data they contain are now in international use to communicate risks.
- 6) In 2001, Mr. Pfitzer co-authored a paper to the International System Safety Society calling for substantial improvements in the methods used to communicate and display risks used in the system safety discipline. These methods have since been incorporated into the ANSI Standard for Best Practices in System Safety, as well as MIL STD 882. They are now used by system safety professionals world-wide.
- 7) As Chair of the Launch Safety Committee of the IAASS (2007-2010), Mr. Pfitzer has chaired several workshops to harmonize international launch safety practices.
- 8) Contributor to and instructor for multiple training programs in safety engineering (1994-2010): software safety, risk management, qra, explosives safety, system safety, range safety.