

## GLOSSARY

- ACES.** Autocalibrating Extreme Ultraviolet Spectrometers developed by Phillips Laboratory
- ADSID.** Air-Delivered Seismic Detection
- AF.** Air Force
- AFDIS.** AFGWC Dial-In System for weather product support
- AFGWC.** Air Force Global Weather Center, Offutt AFB NE
- AFMC.** Air Force Materiel Command
- AFSPC.** New acronym for Air Force Space Command
- Amor asteroid.** Asteroid having perihelion distance between 1.017 and 1.3 astronomical units (AU).
- aperture.** The diameter of the primary lens or mirror of a telescope; hence, the best single measure of the light-gathering power of a telescope.
- aphelion.** The point in elliptical orbit of a planet, asteroid, or comet that is farthest from the Sun.
- Apollo asteroid.** Asteroid having orbital parameters similar to the Earth's.
- ARPA.** Advanced Research Projects Agency
- Artificial intelligence.** A generic term commonly used to indicate the inclusion in software of some type of automated application of rules, the results of which give the appearance of "intelligence" on the part of the computer. An example would be a computer which uses language rules to carry on a conversation with the human using the computer.
- ASAT.** Anti-Satellite
- ASCM.** Advanced Spaceborne Computer Module
- asteroid.** An object orbiting the Sun that is smaller than a major planet (tens of meters to about 1,000 km diameter), but shows no evidence of an atmosphere or other types of activity associated with comets. Most asteroids are located in a belt between Mars and Jupiter from 2.2 to 3.3 AU from the Sun.
- astronomical unit (AU).** Average distance between the Earth and Sun, equal to about 150 million kilometers.

**Aten asteroid.** Asteroid having semimajor axis less than 1.0 AU and aphelion distance greater than 0.983 AU.

**ATLAS.** Aerospace Traffic Location and Sensing

**ATN.** NOAA's Advanced TIROS-N satellite

**ATSSB.** Advanced Technology Standard Satellite Bus

**Automated assistants.** Any of several software tools which can be programmed to automatically find and/or process information according to rules or guidelines given by a specific user of the resultant information. For example, tell an automated assistant to check all the news service articles for the last two months, and report tomorrow at 0800 with all articles which mentioned both Bosnia and any type of US military forces.

**AWACS.** Airborne Warning and Control System

**AWDS.** Automated Weather Distribution System; Air Force weather communications and data processing/analysis system used in base weather support

**AWN.** Automated Weather Network; Air Force high-speed weather data communications network

**BDA.** Battle Damage Assessment

**BMDO.** Ballistic Missile Defense Office

**bolide.** An asteroid or meteor which explodes in the Earth's atmosphere.

**Bulletin board.** Used in this paper to indicate the on-line (electronic) bulletin boards, where users of the board post notices using modems or network connections such as Internet. Users also read notices and carry out other bulletin board business, such as multiparty on-line conversations where each party types in comments in an ongoing discussion.

**C3BM.** Command, Control, and Communications and Battle Management

**C4I.** Command, Control, Communications, Computers and Intelligence

**C6I.** Command, Control, Communications, Computers and Beyond

**CAD.** Computer Aided Design

**CAT.** Computerized Axial Tomography

**CC&D.** Concealment, Camouflage and Deception

**CCD.** Charge-Coupled Device. A solid-state detector used for low-light imaging.

**chromosphere.** Middle solar atmosphere layer defined to begin at the temperature minimum in the solar atmosphere of 4300 degrees Kelvin, extends approximately 3000 km; region where solar flares are observed.

**CICBM.** Conventional Intercontinental Ballistic Missile

**CINC.** Commander in Chief

**CINCSAT.** Commander in Chief Satellite

**comet.** A volatile-rich body that develops a transient atmosphere as it orbits the Sun. The orbit is usually highly elliptical or even parabolic (average perihelion distance less than 1 AU; average aphelion distance, roughly  $10^4$  AU). When a comet comes near the Sun, some of its material vaporizes, forming a large head of tenuous gas, and often a tail formed by the solar wind.

**COMSEC.** Communications Security

**CONUS.** Continental United States

**Corona.** Very hot, tenuous, outer layer of the solar atmosphere, fully ionized, affected by the solar magnetic field, region from which solar wind is emitted

**Counterforce operations.** those space or trans-atmospheric activities aimed at opposing or defending against threatening force anywhere on the planet or in the region of space. Although counterforce activities are defensive in intent, they do not preclude defense by offensive action. Counterforce activities include the use of information and weather as weapons. They also include defense against non-human threats to the vitality and security of the United States and the people on the planet.

**CRAF.** Civil Reserve Air Fleet

**CSLBM.** Conventional Submarine Launched Ballistic Missile

**CSOC.** Consolidated Space Operations Center

**CSTC.** Consolidated Space Test Center

**D.** Fractal Dimension

**DEW.** Directed Energy Weapons

**DFCB.** Data Fusion Control Bank

**DMSP.** Defense Meteorological Satellite Program

**DNA.** Deoxyribonucleic Acid

**DOS.** Disk Operating System

**DSCS.** Defense Satellite Communications System

**DSP.** Defense Support Program

**ECA.** Earth-Crossing-Asteroid. An asteroid whose orbit crosses the Earth's orbit or will at some time cross the Earth's orbit as it evolves under the influence of perturbations from Jupiter and the other planets.

**eccentricity.** The measure of the degree to which an ellipse is not circular; ratio of the distance between the foci to the major axis.

**ECM.** Electronic Countermeasures

**Electronic performance support system.** A general grouping of software tools to aid productivity. A typical group might include an electronic phone book/rolodex, electronic scheduler/calendar, electronic calculator, project management tool, tutorial(s) on one or more aspects of the job or software, and a database of key information. The objective is to provide the individual with access to the information and tools needed to do the job.

**ELINT.** Electronic Intelligence

**EMI.** Electromagnetic Interference

**EMP.** Electromagnetic Pulse

**EO.** Electro-optical

**EOS.** NASA's future Earth Observing System

**EUV.** Extreme ultraviolet radiation

**Expert system.** Typically a set of rules or a decision tree which aids an individual to make good decisions in an area where that individual is not an expert. Usually, subject matter experts are interviewed by the software developers to determine the steps the expert would use to make a particular decision. Sometimes experts are followed by note-taking observers as the experts go about formulating decisions. This often reveals that the expert was not aware of all the steps and questions used.

**FALCON.** Fission Activated Laser Concepts

**FLOPS.** Floating Point Operations per Second

**FNOC.** Navy's Fleet Numerical Oceanographic Center, Monterey CA

**FPS.** Force Protection Satellites

**Galactic cosmic radiation.** Energetic particles from distant stars and galaxies.

**GEO.** Geosynchronous Earth Orbit

**GEODSSS.** Ground-based Electro-Optical Deep Space Surveillance System

**GOES.** NOAA's Geostationary Operational Environmental Satellite

**GPRC.** Global Precision Response Capability

**GPS.** Global Positioning System

**GSRT.** Global Surveillance Reconnaissance Targeting

**GSV.** Ground Superiority Vehicles

**HF.** High Frequency

**HUMINT.** Human Intelligence

**HVA.** High Value Asset

**HZ.** Hertz

**IBM.** International Business Machines Corporation

**ICAO.** International Civil Aviation Organization

**ICSW.** Intercontinental Strike Weapons

**IFF.** Identification Friend or Foe

**inclination.** Angle or "tilt" of the object's orbit relative to the ecliptic plane, or Earth's orbit plane.

**Information Super Highway.** One of the currently popular expressions used to describe the projected network of computer/electronic connections which are to tie education, industry, government, and personal computers together so that information and questions can freely flow between all those connected on any part of the overall network. It has been popularized by and is being pushed by the current vice-president of the US.

**INS.** Inertial Navigation System

**INSAT.** India's geostationary weather satellite

**interactive.** Implying that the user of the software can exert some control over the software, and not just be a passive page-turner recipient. It also usually implies that part of the software design is aimed at adjusting to the needs of each individual user.

**Internet.** A worldwide computer network that grew out of an originally small network designed by the Department of Defense to allow rapid communication between universities, research laboratories, and military project offices.

**IR.** Infrared

**IRCS.** Infrared Cross Section

**JEM.** Jet Engine Modulation

**JSTARS.** Joint Surveillance, Targeting and Reconnaissance System

**KEP.** Kinetic Energy Penetrators

**KEW.** Kinetic Energy Weapons

**kiloton or Kton.** Energy equivalent to 1,000 tons of TNT (4.3 and  $10^{12}$  Joules).

**KKV.** Kinetic Kill Vehicle

**Lagrangian points.** Points in a two body gravity system of large objects (such as the Sun and Earth) where small objects can orbit the primary body and remain almost stationary relative to the secondary body.

**LANDSAT.** Earth-sensing satellite managed by NASA

**LCS.** Laser Cross Section

**LEO.** Low Earth Orbit

**Libration point.** Point in between two planetary masses where gravitational forces of the two masses are essentially balanced

**LIDAR.** Laser Imaging and Ranging Device

**LightSat.** Light-weight satellite that can be quickly launched.

**Logistics activities.** Broadly encompassing all the activities aimed at providing and sustaining access to space. These include building and maintaining a space operations infrastructure and training the human resources that sustain space logistics, monitoring and reporting from space, and counterforce operations. In the SPACECAST 2020 report logistics activities include space research and development, space system design and procurement, space launch operations, on-orbit maintenance and resupply, tracking, telemetry and spacecraft systems

commanding (TT&C), de-orbit-operations, and education and training for military space operations.

**long-period comets.** Comet with a orbital period around the Sun greater than 20 years. Sometimes this class is divided into intermediate period comets (those with orbital periods between 20 and 200 years) and long-period comets.

**LPI.** Low Probability of Intercept

**LWIR.** Long Wave Infrared

**magnitude.** A number, measured on a logarithmic scale, used to indicate the brightness of an object. Two stars differing by 5 magnitudes differ in brightness by a factor of 100. The brighter the star, the lower the numerical value of the magnitude; very bright objects have negative magnitudes. The star Vega (alpha Lyrae) is defined to be magnitude zero.

**main-belt asteroids.** Asteroids occupying the main asteroid belt between Mars and Jupiter, sometimes limited specifically to the most populous parts of the belt, from 2.2 to 3.3 AU from the Sun.

**MARV.** Maneuverable Reentry Vehicle

**megaton or Mton.** Energy equivalent of one million tons of TNT ( $4.3 \times 10^{16}$  Joules).

**MEO-** Medium Earth Orbit

**meteor.** The light phenomenon produced by an object experiencing frictional heating when entering a planetary atmosphere; also used for the glowing meteor itself. If particularly large, it is described as a fireball.

**meteorite.** A natural object of extraterrestrial origin that survives passage through the atmosphere.

**METEOSAT.** Geostationary weather satellite managed by the European Space Agency

**MIT.** Massachusetts Institute of Technology

**Monitoring and reporting Activities.** Those directed toward observation and orientation to reduce uncertainties, and to provide communications for the purpose of exercising command of military forces. Although omni-spectral surveillance of the planet and of space are important elements of this area of activity, others include using space and the vertical dimension for the command of forces operating in all media, communications, navigation, and for the information collection and fusion that, assisted by computational power, results in intelligence. In the area of monitoring and reporting there are many commonalties between national security needs and systems and the systems serving the needs of business and commerce.

**MRI.** Magnetic Resonance Imaging

**MSI.** Multispectral Imaging

**MSX.** Midcourse Space Experiment

**multimedia.** A term which is commonly used to describe almost any software product which includes multiple types of media, such as color pictures, sound, and video. Multimedia applications are also typically interactive, in that the user can respond to the program and it will in turn adapt to user inputs.

**NASA.** National Aeronautics and Space Administration

**NASP.** National Aerospace Plane

**NEO.** Near-Earth-Object. Objects whose orbits bring them near the Earth. Specifically, Apollo, Amor, and Aten asteroids, and certain comets.

**NIH.** National Institutes of Health

**NMR.** Non-Magnetic Resonance

**NOAA.** National Oceanic and Atmospheric Administration

**NODDS.** Navy's Naval Oceanographic Data Distribution System

**NORAD.** North American Aerospace Defense Command

**Nowcasting.** Forecasting weather, for the next few minutes to a couple of hours using all immediately available weather data

**NRL.** Naval Research Laboratory

**OBC.** On-Board Computer

**Omni-sensorial.** Any of several optical, acoustical, or radio-frequency instruments that using interference phenomena between a reference wave and an experimental wave, or between two parts of an experimental wave to determine wavelengths, wave velocities, distances, and directions.

**on-line.** Generic term to describe communications or information which is transmitted or available through the use of computer modems or networks. If something resides on-line, such as an electronic bulletin board, it may have no existence other than the virtual existence in the computer.

**opposition.** An angle of 180 degrees between a planetary object, the Earth, and the Sun. More simply, these bodies lie on a straight line with Earth in the middle.



**OPSEC.** Operations Security

**OSO.** NASA's Orbiting Solar Observatories in the 1960's and early 1970's.

**OTHB.** Over-the-Horizon Backscatter Radar

**perihelion.** The place in the orbit of an object revolving around the Sun where it is closest to the Sun.

**perturbation.** For a body orbiting the Sun or a planet, the gravitational effect of a third body (e.g., another planet) on its orbit, usually resulting in small changes or periodic fluctuations. [For comets, outgassing near the sun may also act on its orbit.]

**PGM.** Precision Guided Munition

**Photosphere.** Lowest part of Sun's atmosphere where sunspots are seen.

**PME.** Professional Military Education, to include any education or training courses.

**POES.** Polar Orbiting Environmental Satellite, managed by NOAA.

**RBE.** Relative Biological Effectiveness

**RCS.** Radar Cross Section

**reconnaissance.** A mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy.

**reengineering.** Currently popular corporate term used to describe the act of rethinking and restructuring the processes of a company before overhauling the computer systems within that company. The lesson it seeks to teach is that if you don't go through this rethinking process, the result of the computer overhaul may just be the same mistakes and problems as before, but generated one hundred times faster.

**REM.** A unit of ionizing radiation in human tissue, equivalent to one roentgen of x-rays.

**RF.** Radio Frequency

**ROE.** Rules of engagement

**ROSS.** Reusable Operating System Software

**RULLI.** Remote Ultra Low Light Imaging

**RV.** Reentry Vehicle

**S4.** Structural Sensory Signature System

**SAIC.** Science Applications International Corporation

**SAR.** Search and Rescue

**SAS.** Situation Assessment Summary

**SATKA.** Surveillance, Acquisition, Targeting and Attack Assessment

**SBV.** Space Based Visible Experiment

**semimajor axis.** Half the major axis of an ellipse. For a planetary orbit, it represents the body's average distance from the Sun.

**short-period comet.** Comet with an orbital period around the Sun less than 20 years.

**SIGINT.** Signals Intelligence

**SOF.** Special Operations Forces

**SOI.** Space Object Identification

**solar wind plasma.** Ionized gas consisting of protons, electrons, and other heavy, energetic particles ejected from Sun's corona.

**space weather.** Variability of the near-Earth and interplanetary space environment.

**SPATRACS.** Space Traffic Control System

**specific impulse.** Measure of fuel efficiency.

**SSN.** Space Surveillance Network

**SSTAR.** Space Surveillance, Tracking and Autonomous Repositioning

**SSTI.** Space Surveillance, Tracking and Identification

**STEP.** Space Test Experiments Platform

**surveillance.** The systematic observation of aerospace, surface or subsurface areas, places, persons, or things by visual, electronic, photographic or other means.

**SWCL.** Short Wave Chemical Laser

**SWERVE.** Sandia Winged Energetic Reentry Vehicle Experiment

**TAOS.** Technology for Autonomous Operational Survivability

**telecommunications.** Includes any of the component technologies used for electronic communications over a distance typically greater than that covered by a human shout. In the context of this paper it implies two-way communications.

**telepresence.** Using technology to give the appearance of an individual being present at a location other than the actual location of that individual. An example would be a pilot in a sophisticated simulator which was actually controlling a real airplane 500 miles away, and providing to the pilot visual and other sensory feedback as if the pilot were actually in the cockpit looking out the windscreen and feeling the turbulence. As PME 2020 includes extensive mixing of real and artificial locations and people, many of the references to virtual reality or virtual residency will in context include traditional telepresence as an integral part.

**TRIM.** Tactical Reentry Impacting Munition

**TT&C.** Telemetry, Tracking, and Control

**UAV.** Unmanned Aerial Vehicle

**US.** United States

**USAF.** United States Air Force

**USSPACECOM.** United States Space Command

**UV.** Ultra Violet

**VBL.** Vertical Block Line

**VESA.** Video Electronics Standards Association

**VGPO.** Velocity Gate Pull Off

**VHSIC.** Very High Speed Integrated Circuits

**virtual environment.** An environment which is partially or totally based on computer generated sensory inputs.

**virtual learning.** The delivery of educational lessons using any of the technologies included in the expanded virtual reality which is the basis for PME 2020's virtual residency.

**virtual reality.** Immersion of one or more individuals in a virtual environment, with the aim of achieving the illusion that they are in a place, time, or situation different from their actual real-world location and/or time.

**virtual residency.** In the context of PME 2020, this term means the use of virtual reality, telepresence, and other telecommunication and computer technologies to

enable the PME 2020 system to deliver education and training lessons to multiple individuals (usually in geographically-separated locations) simultaneously in a manner giving the appearance and feeling of the individuals being collocated in a traditional seminar. This virtual environment will also allow within it the use of virtual audio-visual tools such as overhead projectors, chalkboards, tape recorders, slide projectors, and multimedia computer programs.

**VLWIR.** Very Long Wave Infrared

**WWII.** World War II

**WDP.** Weapons Delivery Platforms

**WMO.** World Meteorological Organization, managed by the United Nations