FLIGHT SIMULATION GROUP · ROYAL AERONAUTICAL SOCIETY

Simulation and Training - Recent World News

September 2019   *Editor: Ian Strachan FRAeS*

RAeS Flight Crew Training Conference

The annual Flight Crew Training conference was held in September at RAeS headquarters in London. Speakers came from Belgium, Canada, China, Denmark, Germany, Greece, India, UK and USA. The audience not only included training professionals and simulation experts, but also some pilots who are currently in training. The latter were both male and female and their views and reactions to their training were generally positive.

The conference was opened by RAeS President Professor Jonathan Cooper and chaired by Peter Barrett FRAeS, Secretary of the Society's Flight Crew Training Group. Presenters and panel members were from the Bristow Group, British Airways, CAE, Cathay Pacific, EASA, EU Aircrew Training Policy Group, European Cockpit Association, ICAO, IATA, L3 Harris Commercial, Lufthansa, Olympic Air, RAeS Human Factors Group; UK CAA, and the US FAA. Other subjects included a historical survey of aviation development and training; modern competency-based training; training for command; training for instructors and examiners; helicopter training; and drones. This was a comprehensive agenda with a lot of information and discussion packed into the two days.

ITEC - Stockholm 2019, London 2020

The May 2019 European International Training Equipment Conference and exhibition (ITEC) in Stockholm was attended by about 2100 people. However, this is a low number compared to the equivalent annual event in the USA at which attendance is between 15,000 and 20,000. One difference is that after the US I/ITSEC event stabilised its location in Orlando, attendance went up. In contrast, ITEC has been to no less than 15 different locations over the years - Amsterdam, Birmingham, Brussels, Cologne, the Hague, Lausanne, Lille, London, Luxembourg, Maastricht, Prague, Rome, Rotterdam, Stockholm, Stuttgart. A survey on the Stockholm event by the European Training and Simulation Association (ETSA), showed that the size of ITEC may have become less than the "critical mass" for an international exhibition of this nature, and 67% of responders to the survey assessed the exhibition as not as good as in previous years with several key companies no longer attending.

A preference was expressed for the event to be held in London, and this will happen next year at the Excel exhibition centre near London City Airport from 28 to 30 April 2020. This will be preceded by the usual seminar of the International Simulation Interoperability Standards Organization (SISO) on 27 April, maybe at RAeS HQ.

Finally, it has been announced that from 2020, the event will be known as "IT²EC" (note the extra "2") standing for the International Training Technology Exhibition & Conference.

RAeS Flight Simulation Group Conference - The Future Reality of Flight Simulation

The annual spring Flight Simulation Group conference was held at the Royal Aeronautical Society HQ in central London in June. About 100 delegates attended from 15 countries including 7 European nations, Australia, Canada, Nigeria, Russia, Singapore, UAE, and the USA.

Organisations represented included Airbus, BAE Systems and Boeing; the UK CAA and US FAA; simulator manufacturers CAE, Collins, Leonardo, Quadrant, Saab, ST Electronics, Thales, and TRU; organisations such as NASA, NLR in the Netherlands and TsAGI from Russia; several airlines and Air Forces.

Speakers included Jeff Schroeder, Chief Technical Advisor to the US FAA and a regular attender at RAeS Simulation conferences; and from Airbus, Boeing, Collins Aerospace, Evidence-based Training Foundation, Geoinformation Institute Zürich, Imagine 4D, International Development of Technology, Karachi Institute of Technology, Leonardo Helicopter, NLR Netherlands, Quadrant, TRU Simulation, TXT e-Solutions, VR Aerotraining.
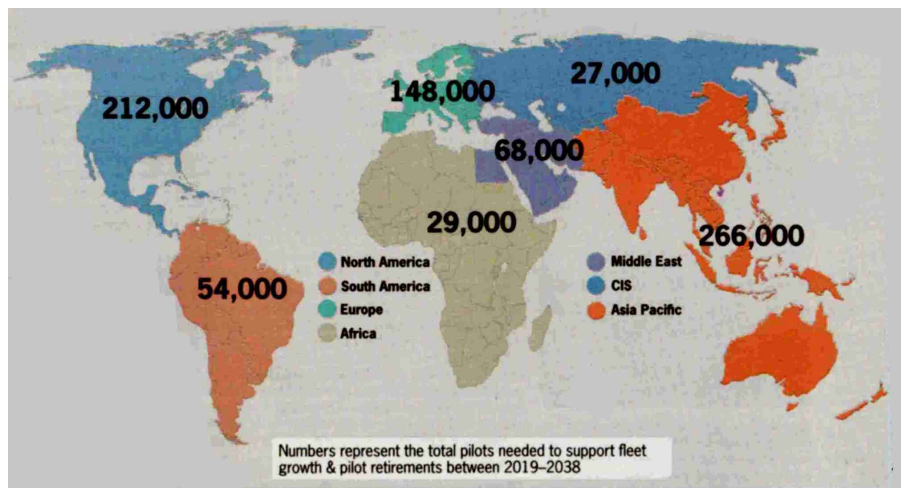
Future World Commercial Pilot Requirement

The table and map below gives the latest Boeing 20-year forecast for future Commercial pilots. The critical question is - can the world pilot training system produce over 40,000 new airline pilots each year?

The USA has a particular problem because it has more restrictive rules than the rest of the world on the minimum flight hours required for co-pilots of airlines based in the USA. After the 2009 Colgan accident, the minimum flight hours for copilots were increased from 250 to 1500 after pressure from legislators in Congress. There are some dispensations from the 1500 hour figure for ex-military pilots and graduates of FAA-approved courses, but there is already a problem in the supply of new pilots for US airlines.

In contrast, in many other parts of the world the Multi-crew Pilot Licence (MPL) can be used rather than the traditional CPL system. In MPL training, pilots not only fly training aircraft but also experience a substantial amount of simulation from simple training devices up to Full Flight Simulators with high-fidelity motion and visual systems. An MPL graduate is therefore familiar with the multi-crew environment that will be experienced as an airline copilot.

Commercial pilot demand 2019-38 Source: Boeing Pilot Outlook	
Region	Pilots
Asia Pacific	266,000
N America	212,000
Europe	148,000
Middle East	68,000
S America	54,000
Africa	29,000
Russia	27,000
Total	804,000
per year	40,200
per month	3,350

Numbers represent the total pilots needed to support fleet growth & pilot retirements between 2019–2038

The largest area of expansion is the Asia Pacific region, and looking at aircraft rather than pilots, the airline fleet in that region is forecast to increase from 7,700 to about 13,000 aircraft in 2037, with a large increase in China. In Europe, the current fleet of about 4,900 commercial aircraft is forecast to increase to nearly 9000 in 2037.

Contents

World Simulation and Training Events

October 15-16 - MilSim CEE
Venue: Best Western International, Husova, Brno, Czech Republic
Organiser: Clarion Events   www.milsim-cee.com

October 28-30 - Bahrain International Defence Exhibition & Conference (BIDEC)
Venue: Bahrain International Exhibition and Conference Centre
Organiser: Clarion Events   https://clarionevents.com   &   www.bahraindefence.com

October 29-30 - European Airline Training Symposium (EATS)
Venue: Estrel Hotel, Berlin, Germany
Organiser: Halldale Group   www.halldale.com   &   www.eats-event.com

November 12-13 - RAeS Flight Simulation Group Conference
Venue: Royal Aeronautical Society, 4 Hamilton Place, London W1J 7BQ, UK
Organiser: RAeS Flight Simulation Group www.raes-fsg.org.uk

November 18-20 - Defence and Security Equipment International (DSEI) Asia
Venue: Makuhari Messe, Chiba city, SE of Tokyo, Japan.
Organiser: Clarion Events   https://clarionevents.com &   enquiries@dsei.co.uk

December 2-6 - I/ITSEC 2019
Interservice/Industry Training, Simulation & Education Conference and exhibition
Venue: Orange County Conference Centre, Orlando, Florida.
Organiser: NTSA   www.trainingsystems.org

Countries and Regions mentioned in this newsletter *(Use the search function to find individual items)*
Afghanistan, Argentina, Australia, Austria, Bahrain, Bangladesh, Belgium, Brazil, Canada, Chile, China, Colombia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, India, Israel, Italy, Japan, Kenya, Latvia, Lithuania, Malaysia, Morocco, Netherlands, Norway, Panama, Poland, Phillippines, Portugal, Qatar, Russia, Saudi Arabia, Singapore, Spain, Sweden, Switzerland, Thailand, Turkey, UAE, UK, Ukraine, USA, Vietnam. (47 Nations)

This Newsletter has about 11,400 words, of which 5914 are on aviation systems, Land systems have 1315 words and Maritime 807. Simulation systems have 1018 and corporate changes 602. Within air systems, Civil Fixed-wing has 2968, Military Fixed-wing 1507, followed by military rotary wing 605, civil rotary 136 . A detailed table is at the end of the whole document.

AVIATION SYSTEMS *- training systems for aircraft and the aviation environment*

CIVIL FIXED-WING AIRCRAFT
For rotary wing systems (helicopters and propeller-driven tilt engine / tilt wings), see later

Alsim - www.alsim.com

Belgium. Alsim of Le Loroux Bottereau, East of Nantes, France, is to deliver an AL42 FSTD for the Diamond DA42 aircraft to the EuroPilot Center (EPC) in Antwerp. It has the Alsim High Definition Visual System (HDVS) and 3-axis force feedback. This will be used for CPL IR/ME and PPL training in a new Integrated Airline Career Program in which it will fill the gap between single-engine instrument training and multi-engine conversion to the DA42.
Canada. Alsim is to supply a Level 2 AL250 training device to the Calgary Aviation College (CFC) in Alberta. The AL250 is used for single & multi engine piston (SEP/MEP), Instrument Rating and CPL training. CFC uses the Cessna 172 for single engine training and the Piper PA-34 Seneca for twin training.
USA. Alsim is to deliver an AL250 training device to the University of Dubuque, Iowa, west of Chicago (www.dbq.edu). This is for the University's Ed Babka Aviation Learning Center for Flight Operations and Aviation Management programs, accredited by the Aviation Accreditation Board International (AABI - www.aabi.aero), headquartered in Opelika, Alabama. It will have Alsim's own avionics system, ALSIM GPS and be used in the university's Cessna 172S, Piper PA-28R and PA44 aircraft for Private Pilot (PPL), Instrument Rating (IR), Commercial Pilot (CPL), and Flight Instructor ratings.

ANA Group - www.ana.co.jp/group/en

Japan. All Nippon Airlines Group, headquartered in Tokyo, has opened a new training centre, ANA Blue Base (ABB), near Haneda Airport, Tokyo. ABB will serve as a training hub for pilots, flight attendants and maintenance staff. Simulators will use mixed reality and virtual reality and there is a motion mock-up for flight attendants and firefighting training. There will also be cabin door training and a pool for training water landings. The facility will also familiarize staff with ANA's Japanese-style hospitality known as "Omotenashi" including a Japanese tea room.

APS - http://aviation-performance-solutions.com **& CAE** - www.cae.com

Canada and USA. Aviation Performance Solutions LLC (APS) of Mesa, east of Phoenix, Arizona, USA, and CAE, headquartered in Montreal, Canada, have announced an online course for loss of control in-flight (LOC-I) for business jet pilots. The CAE-APS e-Learning course is based on Revision 2 of the US Federal Aviation Administration (FAA) Airplane Upset Recovery Training Aid (AURTA). The Air Line Pilots Association's (ALPA) Human Factors and Training Group and the ALPA Training Council is supporting "enhanced academic requirements on the approach to stall, full stall and abnormal flight conditions". The CAE-APS e-Learning course uses animations, video, graphics and other techniques to cover swept-wing aerodynamics, aircraft control fundamentals, high-altitude effects, and upset recovery techniques for stall, nose-high, nose-low and high-bank angles.

Avion Group – www.aviongroup.aero

UK. Avion Group, headquartered at Nieuw-Vennep, SW of Amsterdam Schiphol Airport, Netherlands, is to provide their Phantom design of Level D Full Flight Simulator for the Airbus A320 to IAGO Flight Training of Crawley, just South of London Gatwick airport (www.iagoft.com).

AvSoft - www.avsoft.com

USA. AvSoft International of Denver, Colorado, USA, has added Pratt & Whitney engine information to its A330-200 Aircraft Systems Course. The course now covers both the Pratt & Whitney PW4000 and Rolls Royce Trent 700 engine types. The course has 27 modules with 46 hours of instruction, and is designed for a type rating. The course can be delivered through Avsoft's Learning Management System (AvLMS), or a third party LMS, also though the Avsoft Portable Classroom app for iPad and Android tablet users on- and off-line.

Baltic AA - www.baatraining.com

Baltic AA (BAA) Training Aviation Academy of Vilnius, Lithuania, is to add several Full Flight Simulators in Europe and Asia in a 60-million Euro programme.

China. BAA Training China is a Joint Venture with Henan Civil Aviation Development and Investment Company (HNCA). This will have six full flight simulators, starting with Airbus A320 and Boeing 737NG.

Italy. BAA Training in Rome is to add full flight simulators for Airbus A320neo and Boeing 737NG.

Lithuania. BAA is to add an Airbus A320neo and Boeing737NG Full Flight Simulator at its Vilnius academy.

Vietnam. BAA is to open an aviation training centre in Ho Chi Minh City. The 3,000 square metre facility is 18km from the airport and can house four full flight simulators. It will start in early 2010 with an Airbus A320ceo full flight simulator (FFS) and a Flame V9000 Commander Fire Fighting Trainer.

Britannica - www.britannica-ks.com

Russia. Britannica Knowledge Systems (BKS) headquartered in Chicago, USA, is to supply its Fox Training Management System   to Pobeda Airlines, a subsidiary of Aeroflot headquartered in Moscow (https://en.wikipedia.org/wiki/Pobeda_(airline)). This will manage pilot qualifications, training, compliance, courseware delivery, online testing and performance evaluation. Instructors will also use the Fox Grading app on mobile devices.

CAE - www.cae.com

Chile. CAE, headquartered in Montreal, Canada, is to train pilots and cabin crew of LATAM Airlines Group, headquartered in Santiago, at CAE training centres in South America. LATAM operates 317 aircraft including the Airbus A320neo, 321 and 350, and Boeing 787.

Colombia. CAE has opened a training centre in Bogota, Colombia, for pilots of Avianca Airlines and other airlines in the region. It has three Airbus A320 full-flight simulators (FFS), an ATR 72 FFS, and a Boeing B787 FFS, plus flight training devices (FTDs) for Airbus, ATR and Boeing aircraft. An Airbus A330 FFS and another Airbus A320 FFS will be added later this year.

Denmark, Norway & Sweden. At the Paris Air Show in June, CAE announced further pilot and cabin crew training for airline SAS. Pilot training on the Airbus A320, A330, A340 and Boeing 737 will use full-flight simulators (FFS) at CAE centres at Copenhagen, Oslo and Stockholm and Airbus A350 FFS at CAE London Gatwick and Madrid. SAS cabin crew will continue to train at CAE centres in Copenhagen, Oslo and Stockholm. In addition, CAE will deploy an Airbus A320Neo FFS to their Oslo training centre in late 2020.

India. CAE is to open a training centre in Gurugram, National Capital Region.

Italy, Spain & UK. At the Paris Air Show, CAE announced that Airbus A330 and Boeing 787 pilots of Air Europa will train at CAE centres in Madrid, Rome and Gatwick. In addition, CAE operates Air Europa's training centre in Palma de Mallorca, Spain, and is to provide the airline with future A330 pilots.

Norway. Ab initio Norwegian pilots at CAE Oslo may be financed through the Norwegian State Educational Loan Fund. This is provided by Lånekassen (https://lanekassen.no), a government-owned financial institution that provides student loans. CAE Oslo has six full-flight simulators (FFS) including two Boeing 737NGs, King Air B200 andB250, DHC Dash 8, and a Sikorsky S92, plus a Boeing 737NG flight training device (FTD), and a cabin crew trainer.

Philippines. CAE has a five-year agreement with AirAsia to train A320 pilots. Training will take place at CAE's Philippine Academy for Aviation Training (PAAT) at Clark freeport, NW of Manila. The CAE Rise system will give simulator training data to instructors and training managers, including assessments of pilots as they train.

Thailand. CAE is to open a training centre in Bangkok, to support AirAsia training,

USA. CAE is to train over 700 new pilots for Southwest Airlines over the next 10 years at the CAE training academy in Phoenix, Arizona. This is part of Southwest Airlines Destination 225 programme.

ECA - www.ecagroup.com

Thailand. ECA Group, headquartered in Toulon, France, has delivered three maintenance training device licences to Suranaree University of Technology, NE of Bangkok. These will be used to train engineers on the Airbus A320 and other aircraft, using ECA Group's A320 Maintenance Training Device (MTD).

Elite Simulation - www.flyelite.com

USA. Elite Simulation Solutions, headquartered in Dubendorf, Zurich, Switzerland, has supplied an iGATE King Air B200 advanced aviation training device (AATD) to Mountain Aviation, headquartered at Rocky Mountain Metropolitan Airport, Broomfield, Colorado (http://mountainaviation.com). This will be used for instrument and emergency procedures training.

Entrol - www.entrol.es

Ukraine. Entrenadores Olarte, S.L (Entrol) of Madrid, Spain, is to supply an en-1000 FNPT II training device to Aviation Group Ukraine (AGU) in Kiev. AGU is an alliance between three airlines based in the Ukraine. The device is reconfigurable between SEP and MEP, equipped with GTN 650 and has an interchangeable cockpit between analogue and glass. For AGU, see https://centreforaviation.com/data/profiles/airline-groups/ukrainian-aviation-group

Fidelity FS - www.f2si.net

USA. Fidelity Flight Simulation Inc (F2Si) of Pittsburgh, Pennsylvania, USA, has delivered three examples of modular aviation training equipment (MATE) for the Diamond DA40 training aircraft to Granite School District in Utah. These are classed as advanced aviation training devices (AATD) and are part of the Granite Technical Institute (GTI) Aviation Department's simulation lab. Hardware includes the G1000 Primary Flight Display (PFD), multi-function display (MFD), autopilot panel, and audio.

Flame Aviation - www.flame-aviation.com

Morocco. Flame Aviation of Wassenaar, NE of The Hague, Netherlands, is to provide a V9000 Commander Cabin Fire + Smoke Trainer for Royal Air Maroc. It will be installed at new training facilities in Casablanca and include an observation area that allows training to be followed. It will have an automatic fire extinguisher refilling station and a trainee performance monitoring system.   It includes a rage of scenarios, including lithium-ion battery fires.

FlightLogger - https://flightlogger.net

Estonia. FlightLogger of Aarhus, Denmark, is to supply its flight training software to AS Pakker Avio (http://pakkeravio.ee) at Tartu Airport, SE of Tallinn. Pakker operates Cessna, Piper aircraft and Robinson helicopters, together with two simulators. FlightLogger enables instructors, students and staff to access manuals and training files.

Latvia. FlightLogger of Aarhus, Denmark, has supplied software to airBaltic Pilot Academy in Riga. FlightLogger software covers training schedules, roster changes, instructors, students and aircraft.

Germany. FlightLogger is to supply its flight training software to TL Aviation (www.tlaviation.de) at Mönchengladbach airport, west of Düsseldorf.

Netherlands. FlightLogger is to supply its flight training software to the Mission Aviation Training Centre (http://missionatc.nl) at Teuge, north of Arnhem.

FlightSafety - www.flightsafety.com

Brazil, France and USA. FlightSafety International (FSI), headquartered at La Guardia Airport, New York, USA, has obtained US FAA approval for an Embraer E-Jets E2 training program. It has also been approved by the National Civil Aviation Agency of Brazil. Training will be offered at FlightSafety's Le Bourget Learning Center in Paris using a FSI

Embraer E190-300 E2 full flight simulator. FSI is the authorized training provider for the majority of Embraer commercial and executive jets at 13 FSI locations in Brazil, France, the Netherlands, South Africa, UK, and the USA, using a fleet of 32 full flight simulators and other training devices.

France. FSI has received a renewed Certificate of Approval from Dassault Aviation as an authorized training provider in accordance with the Falcon Training Policy Manual (FTPM).

UK. FSI is to offer a steep approach training program for London City airport on the East side of London. This is for the Gulfstream G650 and includes an eLearning module, ground school, and a simulator session at an FSI Learning Center. London City airport is in a built-up area and has unusually steep approach patterns. Training is available at FlightSafety Learning Centers in Dallas, Texas; Hong Kong; Long Beach, California; Savannah, Georgia; Wilmington, Delaware; and at Farnborough Airport SW of London.

USA. FSI now offers Enhanced Flight Vision System (EFVS) training for Gulfstream aircraft. This meets FAA requirements so that EFVS can be used to descend below decision height (DH) or minimum descent altitude (MDA) when straight-line visibility is not available.

FL Technics - www.fltechnicstraining.com

Lithuania. FL Technics Training, headquartered in Vilnius, Lithuania, is developing modules for training aircraft technicians using Virtual imagery. The first VR module covers the reverse thrust system of Boeing 737NG engines, and others are being developed to cover more aspects of maintenance training.

Frasca - www.frasca.com

China. Frasca International Inc of Urbana, S of Chicago, USA, is to deliver training devices to customers in China. These include a KingAir C90 Level 5 Flight Training Device (FTD) for the Civil Aviation Administration of China (CAAC) in Shenyang City, Liaoning Province. Others include a Piper PA28 Level 5 FTD to Fanmei Aviation Group, a Cessna 172 Level 5 FTD to Zhiyuan GA, a DA40/42 reconfigurable FTD to First Internationl Aviation Academy, and a Cessna 172 G1000 NXi Advanced Aviation Training Device (AATD) to Beijing Annaiten Technology.

USA - FTDs. Frasca has supplied Reconfigurable Training Devices (RTD) to the following customers. American Flyers (https://americanflyers.com); CAE Global Academy, Phoenix, Arizona (www.cae.com/civil-aviation/locations/cae-phoenix-aviation-academy); Eagle Flight Center, Michegan, SW of Detroit (www.suburbanaviation.com); Hillsboro Aero Academy, Oregon (https://flyhaa.com); Liberty University, Lynchburg, Virginia (www.liberty.edu); Metropolitan State University (MSU) of Denver, Colorado (https://msudenver.edu/aviation); Pilot Proficiency, Illinois (https://pilot-proficiency.com); Purdue University, Indiana (www.purdue.edu); Rainier Flight Service, Renton, Washington State (www.rainierflightservice.com); University of Dubuque, Iowa (https://www.dbq.edu). The Frasca RTD is reconfigurable between different aircraft including Cessna 172 and Piper Seminole. It can have a single- or three-channel visual and legacy or Garmin G1000 avionics.

USA - new Franca Business Unit. Frasca has formed a business unit called Frasca Pilot Proficiency with a training centre at Lisle, Illinois. This has a Frasca reconfigurable training device (RTD) and Frasca advanced aviation training devices (AATDs). The RTD has a three-channel visual, Garmin G1000 Nxi cockpit software and can be configured for Cessna 172 and Cessna and Piper Seminole.

InfoWERK - www.infowerk.at

Portugal. infoWERK Multimedia Communications System Inc of Innsbruck, Austria, is to supply eLearning systems to NetJets Transportes Aereos in Lisbon (www.netjets.com). This includes web-based and online training for flight operation officers (FOO), relevant by the IATA Operational Safety Audit (IOSA). This contains subjects such as Air Law and Regulations; Air Traffic Management; Aviation Security; Dangerous Goods; Flight Performance; Human Performance; Meteorology; Navigation; Operational Procedures; Weight and Balance.

Turkey. infoWERK is to deliver training systems for flight operations officers (FOO) to Onur Air of Istanbul (www.onurair.com/tr). This includes infoWERK's iv-track Learning Management System in which each course topic includes an examination at the end of the training sequence.

Jeppesen Training - http://ww1.jeppesen.com/aviation/business/training-solutions.jsp

Jeppesen Aviation Training, headquartered in Denver, Colorado, USA, is to supply Jeppesen and ForeFlight systems including flight planning, navigation data and dispatch training to a number of training organisations listed below.

Bahrain. Gulf Aviation Academy.

Kenya. Ninety Nines Flying School.

Saudi Arabia. OxfordSaudia.

USA. ATP Flight School, Allegheny County Community College.

L3 Commercial Training / L3 Harris - www.l-3com.com & www.l3harris.com
UK. L3 Commercial Training Solutions is now part of the worldwide L3 Harris organisation. At the L3 site at Crawley, S of London Gatwick airport, a further $100M has been invested. The Crawley site employs about 350 people in manufacturing simulators, and in training pilots in L3 flight simulators. The original simulation company at the Crawley site was named Redifon, then Rediffusion. The current Crawley production facility is over150,000 square feet in area, and can make over 30 Full Flight Simulators (FFS) per year. The Training Centre, co-located at the Crawley site, is currently used by 15 airlines and is part of the L3 Airline Academy cadet training programme. It has a range of RealitySeven FFS, lower-level flight training devices (FTDs), flat panel trainers, classrooms and briefing rooms.

one-G sim - https://flyone-g.com
USA. one-G simulation, headquartered in Seattle, USA, has developed a G1000 flight simulator for the Cessna 172. This is an advanced aviation training device (AATD) and can be used by client organisations. This includes an avionics emulator, control loading, and intercom.

Pelesys - www.pelesys.com
USA. Pelesys Learning Systems Inc, of Richmond, S side of Vancouver, Canada, together with GlennCo Aviation Training, has supplied B777 maintenance training for International Aerospace Coatings (IAC) of Victorville, California. A self-study module has reduced classroom time to two days. Self-study training is monitored using Pelesys Learning Management System and a workbook is completed before classroom training.

Q4 Services - www.q4services.com
USA. Q4 Services LLC of Orlando, Forida, USA, is to supply a SupraVue Lite Collimated display system to Auburn University, Alabama. This includes a 3-channel 4k projection system, back projection screen, and an alignment system. It will be fitted to an existing Flight Training Device (FTD).

Simthetiq - www.simthetiq.com
Panama. Simthetiq Inc of Montreal, Canada, is to supply its X2 Visual System to Copa Airlines in Panama City. This is for a Level D Boeing 737 MAX Full Flight Simulator (FFS).

Spatial - www.spatial.aero
Germany. Spatial Composite Solutions FZE LLC, RAK Investment Authority Free Zone, Al Hamra, Ras Al Khaimah, NW of Sharjah, UAE, is to supply a B777X Cabin Emergency Evacuation Trainer (CEET) to the Lufthansa Aviation Training (LAT) training facility in Frankfurt (www.lufthansa-aviation-training.com). This will train for safety and emergency procedures (SEPs) including fire and smoke, door and exit operation, secure cockpit procedures and use of emergency equipment. It will have an audio-visual system for forward and cabin views, virtual slide deployments plus emergency scenarios and aircraft malfunctions.
Russia. Spatial is to supply two A321 door trainers to the Aeroflot Crew Training Centre, Sheremetyevo Airport Moscow (www.aeroflot.ru/gb-en). Training will include door and handle jams, power assist failures, automatic and manual slide inflation and door indicator malfunctions.

Training Solutions - www.trainingsolutions.ch
Switzerland. Training Solutions, based in Geneva, Switzerland, has announced its 50th client for cabin crew training for VIP passengers. Clients are mainly companies operating private jets that specialise in carrying VIPs.

TRU Simulation - www.trusimulation.com
Australia. TRU Simulation + Training Inc, headquartered at Goose Creek, on the north side of Charleston, South Carolina, USA, has supplied a Level D full flight simulator (FFS) for the King Air to Ansett Aviation Training at Maroochydore Airport on the "Sunshine Coast", north of Brisbane. This has been certified by the Civil Aviation Safety Authority of Australia (CASA) and is convertible between King air 350i and B200. It has Rockwell Collins Pro Line 21 avionics, TRU RealCue motion and ADAS X digital audio.
Turkey. TRU is to supply an A320 and a 737 MAX Level D full flight simulator to the International Flight Training Center (IFTC) in Istanbul. IFTC currently operates five Level D TRU-built simulators in Istanbul and Antalya on the south coast.

Virtual Aviation - www.virtualaviation.co.uk
UK. Virtual Aviation Flight Training (VAAT), headquartered at Cambridge Airport, UK, has been approved by the UK CAA for EASA type rating training for the Airbus A320. VAAT has simulators for the A320 and B737. VAAT also has a training partnership with the airline Ryanair.

CIVIL ROTARY-WING SYSTEMS - *Helicopters and tilt wing / tilt engine designs capable of hovering*

Entrol - www.entrol.es
USA. Entrenadores Olarte, S.L (Entrol) of Madrid, Spain, has supplied a Level 5 Flight Training Device (FTD) for the Kaman K-MAX helicopter to Kaman Aerospace of Bloomfield, Connecticut (www.kaman.com).

Leonardo - www.leonardocompany.com
Malaysia. Leonardo S.p.A, headquartered in Rome, Italy, is to deliver a second Full Flight Simulator (FFS) to PWN Excellence Sdn Bhd (PWNE) at Subang Skypart (Subang Terminal Airport). This will be a Level D roll on/roll off system with interchangeable cockpits for the AW139 and AW189 helicopters.

one-G sim - https://flyone-g.com
USA. one-G simulation, headquartered in Seattle, USA, is offering the Torrance 44 Augmented Training Platform for the Robinson 44 helicopter. It includes an HTC Vive head mounted display (HMD) with 360 defree view, and a 1G-Wave haptic feedback system.

MILITARY FIXED-WING AIRCRAFT SYSTEMS
For rotary wing systems (helicopters and propeller-driven tilt engine / tilt wings), see later

BAE Systems - www.baesystems.com
UK. BAE Systems, headquartered in London, UK, is to deliver the Sceptre computerised mission planning system for Royal Air Force Typhoon fighters. Sceptre combines 3D cockpit views, flight and performance data, potential hazards and conflict detection, real time weather, intelligence, and other data. It is for mission rehearsal and can be used on tablets, computers and interactive touch tables such as those used for briefing and de-briefing.

Boeing Defense Training - www.boeing.com/defense-space/support/training
Qatar. Boeing Defense Training Systems and Services, headquartered in St. Louis, Missouri, USA, has a $500-million contract for F-15QA aircrew and maintenance training for the Qatar Emiri Air Force (QAEF). Work will be performed at St. Louis, Missouri, moving to Qatar in 2021 for completion in 2026.

CAE - www.cae.com
India. CAE, headquartered in Montreal, Canada, is to deliver an operational flight trainer (OFT) for the Boeing P-8 Poseidon maritime patrol aircraft (MPA) to the Indian Navy. This is for the Indian P-8I variant and is scheduled to be delivered to India Naval Station (INS) Rajali, west of Chennai in south India, in 2021.
UK. CAE is to deliver an additional P-8A operational flight trainer (OFT) to the Royal Air Force, for delivery to RAF Lossiemouth in Scotland in 2021. This is through a contract with P-8 manufacturer Boeing. It will be to FFS Level D standards and be similar to the P-8A OFTs for the US Navy and Royal Australian Air Force. CAE initially delivers the simulators to Boeing to add P-8 software.

CAE Australia - www.cae.com/Worldwide-Presence/cae-australia-pty-ltd
Australia. CAE Australia Pty Ltd, of Silverwater, Sydney, NSW, has supplied synthetic training for the Introductory Fighter Course (IFC) at RAAF Base Williamtown. This uses two CAE-built Hawk Mk127 full-mission simulators (FMS) that can also be networked together.   Training scenarios include air combat and multi-jet intercept, sing computer-generated forces.

CAE USA - www.cae.com
US Navy. CAE USA of Tampa, Florida, USA, is to provide training for the UC-12 aircraft, the Navy version of the Beechcraft King Air. Classroom and simulator training will be at CAE training centres in Dothan, Alabama; Dallas, Texas; and Morristown, New Jersey. The UC-12 is used by the Navy for transport, range clearance, and medical evacuation, and includes the UC-12B/F/M Huron variant of the King Air B200, and the UC-12W Huron variant of the King Air 350. Training on the King Air 200 Pro Line 21™ cockpit will be at Dothan; on the King Air 350 Pro Line 21™ and Fusion® cockpits will be at Morristown. Non-Pro Line training will be at Dallas.

Collins Aerospace - www.collinsaerospace.com
USA. Collins Aerospace, headquartered in West Palm Beach, Florida, USA, has US$7.6M task orders for computer systems and operator consoles of the US Air Force Common Range Integrated Instrumentation System (CRIIS), used in test ranges for all three US Services. CRIIS is replacing legacy range systems including Advanced Range Data System (ARDS) and Air-to-Air Range Infrastructure (AARI). The new system provides tracking of air elements up to 430 nautical miles; Multiple Independent Levels of Security (MILS); standard protocols including Test and Training Enabling

Architecture (TENA); enemy and friendly synthetic forces; up- and downlinks for ground and aircraft data. CRIIS includes consoles for mission setup, datalink control, post-mission analysis, and system maintenance.

Diamond Visionics - www.diamondvisionics.com

US Navy. Diamond Visionics (DVC) of Vestal, west of Binghamton, Upper New York State, USA, has installed its GenesisRTX Image Generator on a US Navy C-130T trainer. RTX can render imagery from the Navy Portable Source Initiative (NPSI) source data during runtime, allowing earlier visual data to be used. The system also enables the conversion of flat earth coordinates from earlier systems to elliptical WGS84 earth coordinates.

HTX Labs - www.htxlabs.com

USA. HTX Labs of Houston, Texas, USA, has developed the HTX EMPACT Virtual Reality (VR) platform for the US Air Force. This is for immersive training and will also quantify the effect of training simulations. EMPACT will measure hand and eye movement, reaction time, user interactions, score performance, and will include a student view plus a 3rd-person view.

Indra - www.indracompany.com

Spain. Indra Sistemas, S.A., headquartered in Madrid, Spain, and iAltitude have supplied a new type of hypoxia flight trainer to the Spanish Air Force Aviation Medicine Training Center in Madrid. This simulates a C101 jet trainer and enables a realistic mission to be flown that can include hypoxia incidents and how to deal with them. Previously hypoxia was trained in a "hypobaric" chamber in which atmospheric pressure can be reduced, but not in a realistic cockpit environment. The new trainer uses the "normobaric" principle where outside pressure is normal but different oxygen levels are supplied through the pilot's face mask for training purposes. This allows pilots to experience symptoms such as loss of sensory abilities in a realistic cockpit.

MetaVR - www.metavr.com

USA - Embedded Training in Aircraft. MetaVR Inc of Brookline, Boston, Massachusetts, USA, has sold 49 licenses for its Virtual Reality Scene Generator (VRSG) for training US Air Force Combat Systems Officers (CSOs). This is for VSRG systens in 21 U.S. Air Force T-1A Jayhawk twin-engined aircraft, giving a mixed reality Electro-Optical/Infra-Red (EO/IR) capability, combining simulated and live environments useing an EO/IR sensor model. The system is integrated with computer-generated semi-automated forces (SAF) and simulated targets are from MetaVR model libraries. In each aircraft, the co-pilot has one VRSG display, the other is at a student station to the rear. U.S. Air Force CSO Training is at Naval Air Station (NAS) Pensacola, Florida, under the 479th Flying Training Group of the USAF Air Education and Training Command (AETC). The Jayhawk phase is the first in 18 month CSO training, students going from the Jayhawk to EW classroom training, the T25 Simulator for Electronic Combat Training, a classified system which also uses VRSG; followed by training on the T-6A Texan II aircraft.

USA - Simulators. Buckley Air Force Base, Colorado. MetaVR has supplied 60 channels of its Virtual Reality Scene Generator (VRSG) for four new F-16C Block 30 simulators. This includes imagery at 4096 x 2160 resolution for terrain and models, HUD, HMD, real-time streaming protocol (RTSP) in the central display unit, ground map radar, targeting pod, and Maverick missile displays. Imagery includes the Buckley AFB and Greater Denver area using MetaVR Terrain Tools for Esri ArcGIS including 15 centimetre pixel imagery of the airfield. The F-16C simulators are similar to those at Lackland AFB and Tucson Air National Guard Base. Luke AFB in Arizona renewed 62 VRSG licenses and one MetaVR Terrain Tools for Esri ArcGIS license for its F-16C Block 30/40 full-mission simulators; F-16 simulators at Homestead Air Reserve Base and Ft. Worth Naval Air Station Joint Reserve Base have renewed 22 VRSG licenses.

Raytheon - www.raytheon.com

Afghanistan. The Raytheon Company, headquartered in Waltham, Boston, Massachusetts, USA, has a US$108M contract to train Afghanistan Air Force maintenance personnel. The Afghanistan Air Force Aircraft Maintenance Training (AMT) programme will be directed by the Combined Security Transition Command-Afghanistan and Train, Advise, Assist Command-Air. The contract is from the US Army Contracting Command in co-operation with the US Army Program Executive Office for Simulation, Training and Instrumentation (PEO STRI) in Orlando, Florida.

SimiGon - www.simigon.com

Israel. SimiGon Inc of Winter Park, Florida, USA, is to use Virtual Reality (VR) and Augmented Reality (AR) for aircraft maintenance training for the Israel Air Force (IAF) F-16.

USA. SimiGon is to provide SIMbox-based Mixed Reality (MR) training devices for Air Force Undergraduate Pilot Training (UPT) on the Beechcraft T-6A turboprop training aircraft at Laughlin Air Force Base, west of San Antonio, Texas. MR blends virtual and physical worlds and trainees will be able to see their hands interact with the simulated cockpit. Formation and tactical scenarios will use SimiGon's Distributed Mission Training (DMT) technology.

SoftekSim - www.softeksim.com
UAE. SoftekSim of Riga, Latvia, is to supply a Flight and Navigation Procedures Trainer (FNPTII) for Multi Crew Coordination (MCC) to Fujairah Aviation Academy (https://fujaa.ae) on the east coast of the Gulf of Oman, east of Dubai.

Thales UK - www.thalesgroup.com
UK. Thales UK of Crawley, S of London Gatwick airport, and training aircraft manufacturer Aeralis Ltd (https://aeralis.com) of Stowmarket, are to develop a training systems for the UK Tempest future fighter programme. This includes information and simulator systems for use in basic training through to lead-in fighter training, with data on student performance, aircraft utilization and courseware.

TRU Simulation - www.trusimulation.com
Argentina. TRU Simulation + Training Inc, headquartered at Goose Creek, on the north side of Charleston, South Carolina, USA, is to deliver an operational flight trainer (OFT) for the Beechcraft T-6 Texan II turboprop trainer for the Argentine Air Force. It has an Epic-Dome visual display system from Redifun Simulation inc (Rsi - www.rsi-visuals.com) with 270° by 80° field of view in a 10-foot radius dome, with seven Sony GTZS 240 8.8M pixel projectors. The RSi RS200 image generator has 20 million polygons and 250,000 light points per channel.

MILITARY ROTARY-WING SYSTEMS
Helicopters and tilt wing / tilt engine designs capable of hovering

Bluedrop Training - http://bluedropts.com
Canada. Bluedrop Training and Simulation Inc of Halifax, Nova Scotia, is to produce a Special Mission Aviator Ramp Trainer (SMART) for the Boeing V-22 Osprey tilt-rotor aircraft. This is part of Boeing's Innovation, Science and Economic Development Canada (ISED), Investment Framework Transaction program which includes funding to Bluedrop and engineering support from Boeing. The trainer will include ramp operation, hoisting and gunnery systems, mission critical training, and will connect with cockpit training devices to allow full crew training. This follows a previous SMART trainer for the CH-47 Chinook helicopter.

CAE - www.cae.com
Canada. CAE, headquartered in Montreal, Canada, has announced the 700MR Series flight training device (FTD) for military helicopter training. This is based on the CAE 3000MR Series full-mission simulator but is fixed-base with a dynamic seat for vibration and limited motion cueing.

CAE USA - www.cae.com & **Leonardo Helicopter** - www.leonardocompany.com/en
USA. CAE USA of Tampa, Florida, USA, and Leonardo Helicopter Division, headquartered in Rome, Italy, have signed a Memorandum of Agreement (MoA) to collaborate in helicopter training packages in the USA and for Foreign Military Sales (FMS). The companies will provide aircraft, simulators, training devices, courseware, and training centres.

Collins Simulation - www.collinsaerospace.com/simulation
Bahrain, Saudi Arabia, UAE. Collins Aerospace Simulation & Training Solutions, headquartered in Sterling, Virginia, N of Washington Dulles airport, USA (ex Rockwell Collins Simulation), has a $30.95M contract for a Transportable Black Hawk Operations Simulator (T-BOS) for the National Guard of Saudi Arabia. Other customers include Bahrain and the UAE. T-BOS is a containerised device with its own power supply and environmental control. It can be deployed by sea, land or air to Forward Operating Bases (FOB) and is designed to be operational within about 8 hours. It is developed from a training device for the UH-60L and M that is used by the US Army and Air National Guard.

Inzpire - www.inzpire.com
UK. Inzpire Ltd of Lincoln, UK, has upgraded its Targeted Fidelity Simulator (TFS) with higher fidelity instruments and displays. It is configured as an EC135 helicopter and uses Bohemia Interactive Simulations Blue IG and VBS3 software. Rear cabin simulation uses VR headsets with 360 degree view for weapon and winch operator training. The TFS will have Pitch Talk software with networked communications.

Lockheed Martin Training - http://www.lockheedmartin.com/training
US Army. Lockheed Martin Training and Simulation, headquartered in Orlando, Florida, USA, has launched the RELY3D training tool for Apache AH-64 maintainers. This is said to reduce training time by up to 60 percent. RELY3D uses tablets and laptop computers to model systems such as the Apache Modernized Target Acquisition Designation Sight and Pilotage Night Vision Sensor (M-TADS/PNVS) and LONGBOW Fire Control Radar (FCR). Maintenance can be carried out on the flight line rather than in workshops, reducing cost and increasing system availability.

Pinnacle - www.pinnaclesolutionsinc.com
Greece. Pinnacle Solutions Inc of Huntsville, Alabama, is to maintain OH-58D Kiowa helicopters and Training Aids, Devices, Simulators and Simulations (TADSS) for the Hellenic Army Aviation Command. This is a $4.2-million firm-fixed-price contract.

Thales Australia - www.thalesgroup.com/Countries/Australia/Home
Australia. Thales Australia, headquartered in Garden Island, Sydney, has achieved Initial Operating Capability (IOC) for their Helicopter Aircrew Training System (HATS) in the Australia Defence Force (ADF). Thales Australia was subcontracted by Boeing for synthetic and classroom training. Thales has delivered three Level B Reality H Full Flight Simulators; virtual reality trainers for rear-crew training; part task trainers and desktop trainer classrooms. Thales also delivered the Joint Helicopter School ICT system. The ADF HATS acquisition program team was awarded the Essington Lewis Award for collaboration between industry and the Department of Defence.

AIR CONTROL SYSTEMS - including Air Traffic Control training systems

MetaVR - www.metavr.com
US Air Force. MetaVR Inc., of Brookline, Boston, Massachusetts, USA, has supplied software licenses to QuantaDyn for 51 MetaVR Virtual Reality Scene Generator (VRSG) systems. These are for 24 US Air Force Joint Terminal Control (JTC) Training and Rehearsal System (TRS) desktop systems. These will be installed at ACC, AETC, AFSOC, and PACAF units for close-air-support (CAS) training. JTC TRS is based on the QuantaDyn Desktop Trainer 100 (DT100) with stations for instructor, student and pilot/role player in a 10 x 9 f t area. It uses VRSG for battlespace imagery, and friendly and enemy forces are simulated by the Modern Air Combat Environment (MACE) by Battlespace Simulations.

QuantaDyn - www.quantadyn.com
UK. QuantaDyn Corporation of Herndon, Virginia, USA, E side of Washington Dulles airport, is to upgrade the UK version of its QFires Joint Fires Mobile Trainer (JFMT) with VBS Blue IG by Bohemia Interactive Simulations (BISim). The JFMT is a self-contained mobile classroom to train JTACs, FACs, and JFOs, produced under the Close Air Simulation and Support System (CAS&S) contract with Elbit Systems as prime contractor. Under the contract, QuantaDyn provides the training system housed in a trailer and Elbit UK provides training and logistics. Based on the latest UK JSP 918 Joint Terminal Attack Controller Policy, the JFMT is approved by the Joint Air Land Organization (JALO). For during action reviews (DAR), and after-action reviews (AAR), a four-person brief area has a large screen display and the main trainer has a 1.8m diameter dome with 220 x 58 degree view.

Textron Airborne Solutions - www.textronair.com
US Navy. Textron Airborne Solutions, subsidiary of Textron Airborne Tactical Advantage Company (ATAC), of Newport News, Virginia, has a contract under the U.S. Navy's Terminal Attack Controller Trainer (TACT) program. This will provide aircraft for training Forward Air Controllers (FACs), Joint Terminal Attack Controllers (JTACs), and Forward Air Controllers (Airborne), including A-27 Tucano, Beechcraft AT-6 Wolverine and L-39 Albatros.

UFA - www.UFAinc.com
Canada. UFA, Inc., of Burlington, NW side of Boston, Massachusetts, USA, has delivered four ATTower Tower Simulators to the Canadian Forces School of Aerospace Control Operations (CFSACO) in Cornwall, Ontario, Canada. Each has a 12-channel 75-inch LCD-based visual system with imagery of Saguenay-Bagotville Airport (CYBG). Each simulator has instructor and pseudo pilot positions to see what the controllers see. Editing tools allow the school to develop training content and CFSACO training capacity has increase by 50 percent.
Singapore. UFA has installed a new aerodrome simulator for the Civil Aviation Authority of Singapore (CAAS). This has tower and ground controller positions and a 360-degree visual system including imagery of Changi and Seletar airports.. There is also a table-top training system with debrief capability. All systems have voice recognition with UFA ATVoice and there is a 10-year maintenance and support agreement.

US Air Force - www.airforce.com
USA. The US Air Force has introduced virtual reality (VR) training for Airfield Management students at Keesler Air Force Base, Mississippi. This is conducted by the 334th Training Squadron and gives a visual representation of airfields and their hazards.

UNMANNED AIR SYSTEMS (UAV)

MetaVR - www.metavr.com

US Army & Air Force. MetaVR Inc., of Brookline, Boston, Massachusetts, USA, has supplied 86 new Virtual Reality Scene Generator (VRSG) licenses to the U.S. Army Joint Technology Center and Systems Integration Lab (JSIL) for the U.S. Air Force MQ-9 remote piloted air vehicle simulator. The simulator is also known as the MALET-JSIL Aircrew Trainer (MJAT), and adds a simulation capability to a tactical MQ-9 ground control station. MJAT uses the Air Force Synthetic Environment for Reconnaissance and Surveillance (AFSERS) software with VRSG imagery for air vehicle and weapon training and mission planning.

TCS - www.topcoversolutions.co.uk

UK. The Top Cover Solutions (TCS) Consortium is to provide simulator support for the Royal Air Force MQ-9 Reaper UAV. TCS includes 3SDL, headquartered at Malvern UK (www.3sdl.com), and Eagle Eye Innovations of Lincoln, UK (www.eeinnovationsltd.com), and will use the MALET-JSIL Aircrew Trainer (MJAT) based with 13 Squadron at RAF Waddington, UK, and the RAF's 39 Squadron at Creech Air Force Base (USA). This provides training for Intelligence, Surveillance, Target acquisition, and Reconnaissance (ISTAR).

MULTI-ROLE SYSTEMS
Simulators and training systems for more than one of the land, sea and air environments, including Cyber

ManTech - www.mantech.com

US Army. ManTech International Corporation, headquartered in Fairfax, Virginia, USA, SE of Washington Dulles airport, has a three-year $21M Other Transaction Agreement (OTA) award for the U.S. Army Persistent Cyber Training Environment (PCTE). The company will develop software and computing for planning and executing cyber training for thousands of operatives.

Indra - www.indracompany.com

Spain. Indra Sistemas, S.A., headquartered in Madrid, Spain, has supplied its Cyber Range system to the Joint Cyber-Defence Command of the Spanish Army. This is for cyber exercises with the Spanish and other armies.

Plexsys - www.plexsys.com

Australia. Plexsys Interface Products, Inc., of Portland, Washington State, USA, has delivered an Advanced Simulation Combat Operations Trainer (ASCOT) 7, to Raytheon Australia. ASCOT-7 is a Computer-Generated Forces (CGF) platform for modeling and simulation environments and the development of complex scenarios. In addition to ASCOT-7, Video Audio Data After Action Review (VADAAR) Live Virtual Constructive (LVC) and Sonomarc were integrated into the Raytheon system. This supports communications simulation and streaming of the situational display from the Warfighter Systems Integration Facility to Raytheon Australia's Cave Automatic Virtual Environment.

Trideum - www.trideum.com

USA. Trideum Corporation of Huntsville, Alabama, USA, has been awarded the Joint Base San Antonio (JBSA - www.jbsa.mil) Mission Training Complex (MTC) contract. Trideum will provide mission training for commanders, their staffs, and JBSA MTC personnel. JBSA includes units from the Army, Navy and Air Force.

LAND SYSTEMS - *Simulators and training systems for the land environment*
(except Medical Training, which follows this section)

Calytrix - www.calytrix.com

Austria. Calytrix Technologies of Orlando, Florida, USA, and Perth, Australia, is to supply its Titan real-world terrain modelling system to the Austrian Army. Titan will be used in school houses and have combined arms capabilities with its integration with eSim Games Steel Beast. In addition, an air defence simulator will be upgraded to Titan.

Close Air - www.closeairsolutions.com

UAE. Close Air Solutions (CAS) of Ripon, Yorkshire, UK, has upgraded the UAE Presidential Guard (PG) Joint Fires Training Simulator (JFTS) system. This includes MetaVR VRSG and Battlespace Simulations MACE software. 49 VRSG licenses were renewed and two new licenses were purchased. The upgrade also includes a Harris 7850 radio and a new classroom with an 8m display from Immersive Display Solutions (IDSI) using four Barco FS70 projectors. In addition, an RG-31 AGRAB vehicle mortar simulator can be used with the JFTS so that AGRAB Fire Teams can train with joint forward observers (JFO) and joint terminal attack controllers (JTAC).

Cubic Defense - www.cubic.com

Latvia. Cubic Defense Systems, headquartered in San Diego, California, USA, has supplied their Multiple Integrated Laser Engagement Simulation system (MILES) to the Latvian Armed Forces in a 2.7 million Euro contract. MILES can be attached to military equipment, weapons or vehicles, and records engagement, firing and casualty data.

Indo-Pacific Region. Cubic has US$150M contracts from various customers in the Indo-Pacific (IPAC) region. This is for Air Combat Maneuvering Instrumentation (ACMI), training support for Combat Training Centers and upgrades and maintenance services for live fire ranges. This includes Cubic's Multiple Integrated Laser Engagement Systems (MILES) and maintenance for live fire ranges.

MASA Group - www.masagroup.net

Bangladesh. MASA Group, headquartered in Paris, France, has contract with the Bangladesh Army for its MASA SWORD war gaming system at the Army War Game Center (AWGC), headquartered at Mymensingh Cantonment, North of Dhakar. This includes software upgrades and support for exercises and training until 2023. AWGC uses SWORD for command post training from Battalion- to Division-level. In Bangladesh, SWORD is now called the Army War Game Simulation System (AWGSS) by the Army Training and Doctrine Command (ARTDOC). MASA works with the AWGC in two major training exercises each year, with a week for preparation and planning, followed by the exercise and finally the debrief.

Plexsys - www.plexsys.com

USA. At ITEC, Plexsys Interface Products, Inc., of Portland, Washington State, USA, announced its Advanced Simulation Combat Operations Trainer (ASCOT) 7 system for Computer-Generated Forces (CGF). This can be used with the company's Video, Audio, and Data for After-Action Review (VADAAR) system.

Raytheon - www.raytheon.com

Germany - US Army. The Raytheon Company, headquartered in Waltham, Boston, Massachusetts, USA has a $159M contract to support training exercises at the US Army Joint Multinational Readiness Center (JMRC) in Hohenfels and other US forces in Europe. This includes the Raytheon Mobile Instrumentation System for distributed training. At JMRC, Raytheon provides a range of services including training area instrumentation, after action reviews and battlefield effects.

Saab Defence - www.saabgroup.com

Finland. Saab Security and Defence Solutions, headquartered in Järfälla, Sweden, has a 9M Euro contract to supply simulators for marksmanship and combat training to the Finnish Defence Forces Logistics Command. This will include Saab's Ground Combat Indoor Trainer (GC IDT) system.

SAIC - www.saic.com

US Marine Corps. Science Applications International Corporation (SAIC), headquartered in McLean, Virginia, NW side of Washington DC, USA, has been selected as one of seven contractors for the $245M U.S. Marine Air-Ground Task Force Training Systems Support contract. This includes exercise and mission rehearsal, training scenarios and support.

Systematic - www.systematic.com

Germany. Systematic A/S, headquartered in Aarhus, Denmark, has developed an e-learning programme for users of their SitaWare Headquarters training product for army HQ staff. A German-language version is in use by the German Army. The programme includes explanatory videos and multiple-choice assessments in seven 30-45 minute periods.

Thomas Solutions - www.thomasolninc.com
USA. Thomas Solutions Incorporated (TSI), headquartered in Arlington (south side of Washington DC), Virginia, has a five-year, $20M contract for Survival, Evasion, Resistance and Escape (SERE) training at the U.S. Army Special Operations Command (USASOC) at Fort Bragg, North Carolina. This is classified as a Level C High Risk activity, and will train military and other US government personnel.

Trideum - www.trideum.com
USA. Trideum Corporation of Huntsville, Alabama, USA, is to support the U.S Army Intelligence Center of Excellence (USAICoE) at Fort Huachuca, SE of Tucson, Arizona. Under the Huachuca Training and Support Contract (HTASC), Trideum will provide classroom simulation and field exercise training. This is as a subcontractor to Jacobs Engineering (JEC - www.jacobs.com) and the main contract has an estimated value of $785M over seven and a half years if all options are exercised. Work will be at Fort Huachuca, Davis Monthan AFB, Tucson, Arizona; Corry Naval Station, Pensacola, Florida; and Goodfellow AFB, San Angelo, Texas.

US Air Force - www.airforce.com
USA. The US Air Force Security Forces (SF) Academy at Lackland Air Force Base, Texas, has acquired eight Multiple Interactive Learning Objectives (MILO) simulators and a VR-based training system under the Air Force AFWERX programme (www.afwerx.af.mil). These are operated by the 343rd Training Squadron schoolhouse at the Medina Annex training campus and used to create training scenarios for law enforcement and air base defence. There are six MILO systems, two with 180-degree video, and four single-screen systems. MILO training includes weapons familiarization drills and courses of fire for Air Force weapons qualification. The M9 Beretta pistol is being replaced by the M18 SIG Sauer Modular Handgun System and the M18 is included in the training system. The system expands on the civil police Street Smarts VR system (https://streetsmartsvr.com). The United States Air Force Security Forces (SF or SECFOR) is the USAF military police force, formerly known as Air Police (AP), Military Police (MP), and Security Police (SP).

US Army - www.army.mil
USA - Fort Knox. The US Army is to build a Digital Air-Ground Integration Range (DAGIR) at the Yano Range area, Fort Knox, Kentucky. This will be a computerized 8 x 3 km live-fire range with ground and air capability. Total cost will be about $52M split with half for construction and half for instrumentation. The range will include various types of targets, battlefield effects simulation, and air weapons scoring. It will allow training for different scenarios and qualification requirements, including individual and platoon tank gunnery, infantry live-fire exercises, artillery fire, plus rotary and fixed wing aircraft. Existing Yano Range activities will be transferred to Wilcox Range while DAGIR construction proceeds.

USA - IVAS. The US Army is developing the Integrated Visual Augmentation System (IVAS). This is a head-up display (HUD) system that can be used for training and also on the battlefield itself. The US Army Soldier Lethality Cross-Functional Team (SLCFT) identified technology similar to that used by the Navy and Air Force for pilot training. IVAS adds simulated images to the view of the real world and can therefore be classified as Augmented Reality (AR). Processing is through a small computer on the soldier's body. Mapping data and training management tools enable combat scenarios to be created and repetitions to be made where needed. This is said to give a greater range of training options than exercises on military ranges. The hardware is similar to the Enhanced Night Vision Goggle-Binocular (ENVG-B) system, and IVAS will use thermal imaging but without the green tint seen in earlier NVG systems.

VT MÄK - www.mak.com
USA - Army - VT MÄK, of Cambridge, Massachusetts, USA, has a US$95M Prototype Other Transaction Agreement from the US Army for collective training. Working through the Training and Readiness Accelerator (TREX), VT MAK will deliver Training Simulation Software (TSS) and Training Management Tool (TMT) for the US Army Synthetic Training Environment (STE). TMT, TSS and One World Terrain (OWT), form the STE Common Synthetic Environment (CSE) used in the Army's Reconfigurable Virtual Collective Trainer (RVCT), Soldier Squad Virtual Trainer (S/SVT), and Integrated Visual Augmentation System (IVAS).

MEDICAL TRAINING SYSTEMS

US Army - www.army.mil
USA - Medical Visualisation. The U.S. Army Research Institute of Environmental Medicine (USARIEM), the Farrelly Health Clinic, Fort Riley, Kansas, and the Texas Army National Guard are to develop Augmented Reality (AR) visualization software (ARVS) so that medics can see a patient's internal anatomy.   ARVS will display a soldier's medical imaging information, showing a full-body avatar with full body display. AR goggles will display features below the body surface such as blood vessels and anatomy, and at the same time the operator will be able to see the patient directly. The system can be updated with information from X-ray absorptiometry or from a DXA scan, and each soldier can have their avatar information on their person with a fingernail-sized micro-SD chip so that it can be used later in case of injury.

MARITIME SYSTEMS - *Simulators and training systems for the ship, maritime and port environments*

CAE - www.cae.com

Canada. CAE, headquartered in Montreal, has a contract from Lockheed Martin Canada (LM-Can) in the programme for the future Canadian Surface Combatant (CSC) ship. During ship design, CAE will provide Training Needs Analysis (TNA) for training systems, and will also provide human factors and other services for the design of critical spaces in the ship and to produce an integrated data environment. LM-Can was awarded the CSC design contract by the ship prime contractor, Irving Shipbuilding (www.irvingshipbuilding.com) which will build all 15 CSC ships at its shipyard in Halifax, Nova Scotia, on the East coast of Canada. The CSC ship design is based on BAE Systems Global Combat Ship and will include the CMS 330 combat management system (CMS) developed by LM-Can.

Sweden. CAE is to upgrade the Naval Warfare Training System (NWTS) at the Swedish Naval Warfare Centre (NWC) in Karlskrona, Sweden. This is under a contract from the Swedish Defence Materiel Administration (FMV). The NWTS was developed by CAE in 2016 and trains for sensor operations and command, control, communications, and computing (C4). It has 52 student stations and 13 instructor stations. Upgrades will include sonar training, electronic warfare training, and improved training scenarios. CAE will also add computer generated forces (CGF) for friendly and enemy forces. The synthetic maritime environment has been built to the Open Geospatial Consortium Common Database (OGC CDB) standard.

Cervus Defence - www.cervusdefence.com & **Stucan** - www.stucan-solutions.com

USA. Cervus Defence Ltd of Westbury, SE of Bath, UK, and its US partner Stucan Solutions, headquartered in Virginia Beach, Virginia, has a contract for Risk-Reduction Prototyping of the US Marine Corps Wargaming Capability Center. This will include post-game analysis and use the STUCAN-HIVE system.

Kongsberg Digital - www.kongsberg.com/digital

Australia. Kongsberg Digital of Kongsberg, W of Oslo, Norway, is to deliver two K-Sim full mission bridge simulators to the Royal Australian Navy Watson Bridge Simulator Facility, Watsons Bay, Sydney. In addition, ship-handling and engine room simulators will be delivered to training facilities across the country. This includes training for Arafura Class offshore patrol vessels, the new Hunter Class anti-submarine Future Frigates, and Supply Class Auxiliary Oiler Replenishment (AOR) vessels.

Kratos - www.kratosdefense.com

Saudi Arabia. Kratos Defense & Security Solutions, Inc., of San Diego, California, has a US$15.1M Task Order from the Naval Air Warfare Center Training Systems Division (NAWCTSD) to provide training-related products and services in a variety of disciplines to the Royal Saudi Naval Forces (RSNF). This was issued under a U.S. Foreign Military Sales (FMS) indefinite delivery indefinite quantity (IDIQ) contract.

QinetiQ - www.qinetiq.com

UK. QinetiQ Group plc, headquartered in Farnborough, UK, has a contract with the Royal Navy for QinetiQ's Pointer data analysis and measurement system. Developed together with the UK Defence Science and Technology Laboratory (DSTL), Pointer links Command and Control functions and weapon operators for training to counter threats from Fast In-shore Attack Craft (FIAC) and also Swarms of such craft. It will be used in exercises on a range of platforms under Flag Officer Sea Training (FOST) . It uses weapon-mounted Laser Range Finders to record position and state of weapon systems and GPS-tracked threats, calculates hits and their effect, and displays results in real time.

Saab Defence - www.saabgroup.com

UK. Saab Security and Defence Solutions, headquartered in Järfälla, Sweden, is to supply its AUV62-AT underwater vehicle for anti-submarine warfare (ASW) training to the Royal Navy. This follows a period of testing and evaluation together with QinetiQ and the Royal Navy.

US Navy - www.navy.mil

USA - Augmented Reality. The US Navy, headquartered in Washington DC, is testing an augmented reality (AR) environment as a training tool for sailors and marines security personnel, to be used onboard ships at sea. The system is called TRACER, standing for Tactically Reconfigurable Artificial Combat Enhanced Reality, and consists of a VR headset, backpack processor, plus model weapons with recoil. Development involved the Office of Naval Research (ONR), Naval Surface Warfare Center (NSWC), US Army Combat Capabilities Development Command, and industry partners Magic Leap Horizons and Haptech Inc.

USA - Surface Warfare. The Carderock division of the US Navy Surface Warfare Center (NSWC), headquartered at Potomac, Maryland, USA, on the NW side of Washington DC, has developed and installed a Combined Integrated Air and Missile Trainer (CIAT). This combines training for Integrated Air and Missile Defense (IAMD) and Anti-Submarine Warfare (ASW). CIAT is a Combat Systems Team Trainer for ship's crew to train at a shore site. It includes a periscope simulation for a submarine as well as surface ship training. Another CIAT installation is at Naval Station Norfolk.

VSTEP - www.vstep.nl
Greece. VSTEP B.V. of Rotterdam, Netherlands, is to provide three NAUTIS Console simulators for the Greek Navy training facility in Piraeus, Athens. They will have three screens with a 120 degree view and 15 types of vessels will be modelled.

CORPORATE AND INTERNATIONAL NEWS
International Agreements, Corporate Acquisitions, Partnerships and Changes

Battlespace Simulations - www.bssim.com & **Cubic Defense** - www.cubic.com
USA. Cubic Defense Systems, headquartered in San Diego, California, and Battlespace Simulations (BSI) of San Antonio, Texas, are to co-operate. The BSI Modern Air Combat Environment (MACE) will be integrated with Cubic Global Defense (CGD) air and ground training systems.

CAE - www.cae.com
Canada, UK & USA. CAE, headquartered in Montreal, Canada, is to acquire a 50 percent stake in SIMCOM Holdings Inc, headquartered in Orlando, Florida, USA (www.simulator.com). SIMCOM operates 47 simulators in Orlando, Scottsdale, Arizona, and in the UK. As part of the deal, SIMCOM is to purchase 5 CAE-built full flight simulators.

Esterline - www.esterline.com
USA. Esterline Corporation, headquartered in Bellevue, Seattle, Washington State, USA, was acquired by TransDigm Group Inc on 14 March 2019 (https://www.transdigm.com). The brand name for Esterline Simulation Visual Systems (SVS) products is TREALITY®, standing for "Training Reality" and includes multi-channel, curved screen visuals.

Euramec - https://euramec.com
China. Euramec NV of Hamme, Belgium, SW of Antwerp, has opened a Hangzhou Sales and Support office. This will develop flight simulation systems for Civil Aviation, General Aviation and Ultra-Light aircraft (ULM).

JAA TO - https://jaato.com
Netherlands. The Joint Aviation Authorities Training Organisation (JAA TO) has moved from Hoofdorp to an new site south of Schiphol Airport, SW of Amsterdam.

L-3 Technologies - www.l3t.com becomes part of **L3Harris Technologies** - https://www.l3harris.com
USA. L-3 Technologies, headquartered in Arlington, Texas, is now the Aviation Systems segment of Harris Corporation, now known as L3Harris Technologies. Headquartered in Melbourne, Florida, L3Harris is said to be the sixth largest defense company in the US and has some 50,000 employees. L3Harris has four segments:
(1) Integrated Mission Systems headquartered in Palm Bay, Florida, for intelligence, surveillance and reconnaissance; electro optical and infrared systems; maritime power and navigation.
(2) Space and Airborne Systems headquartered in Palm Bay, Florida, for space payloads, sensors and mission systems intelligence and cyber defense; avionics; and electronic warfare.
(3) Communications Systems headquartered in Rochester, New York, for tactical and broadband communications; night vision; and public safety.
(4) Aviation Systems, headquartered in Arlington, Texas, for aviation products including air traffic management.

Leonardo - www.leonardocompany.com
Italy. Leonardo S.p.A., headquartered in Rome, Italy, and investment bank Cassa Depositi e Prestiti (CDP - https://www.cdp.it) headquartered in Rome, have signed a Memorandum of Understanding (MoU). Activities covered include support to the supply chain, Leonardo's investments, and finance for exports. In particular, CDP is to support Leonardo in foreign sales and in the development of new products and technologies.

Raytheon - www.raytheon.com and **United Technologies** - www.utc.com
USA. The Raytheon Company, headquartered in Waltham, Boston, Massachusetts, and United Technologies Corporation, headquartered in Farmington, Connecticut, are to merge under the name of Raytheon Technologies Corporation, headquartered in the Boston area. United Technologies consists of Collins Aerospace and Pratt & Whitney. On completion, United Technologies shareholders will own 57% and Raytheon shareholders 43% of the combined company. This will have a spend of about US$8 billion, seven main bases, and over 60,000 engineers. Areas of activity include artificial intelligence (AI), cyber protection, directed energy weapons, hypersonics, ISR (intelligence, surveillance, and reconnaissance), and missile systems.

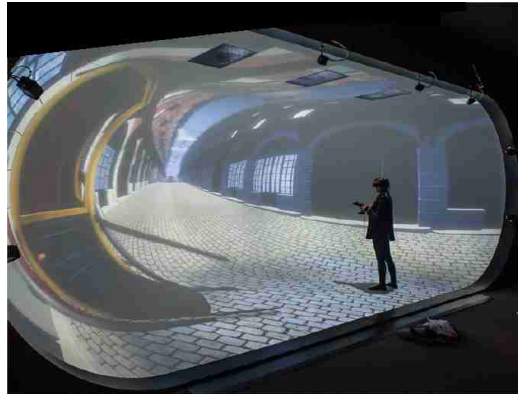**Thales Group** - www.thalesgroup.com
France & USA. The Thales Group, headquartered in Paris, France, has acquired Psibernetix Inc of Liberty, Ohio, USA (www.psibernetix.com) that specialises in artificial intelligence (AI). Psibernetix has developed an aerial combat application called ALPHA which as been known to defeat top pilots in simulated air combat. For Thales, the acquisition will allow AI to be used in safety-critical environments. Psibernetix has developed a machine-learning process called Genetic Fuzzy Trees, thought which AI decisions can be verified.

SIMULATION AND TRAINING SYSTEMS
New or updated systems that can be applied generally to simulators and training devices
(less systems specific to one of the Land, Sea or Aviation areas).

Antycip - www.antycipsimulation.com
France. Antycip Simulation of Argenteuil, Paris, has developed a system called The Open Reality Experience (TORE). This is a 4 x 8 x 8 metre visualisation system on two-floors and uses curved acrylic "petals" rather than the flat screens of a cube-shaped Cave Automatic Virtual Environment (CAVE) system. TORE has been developed for the University of Lille and is at the so-called "Imaginarium" in Tourcoing on the NE side of Lille.

Barco - www.barco.com
Belgium. Barco NV, headquartered in Courtrai (Kortrijk), west of Brussels, Belgium, has developed its XT LED series. Each XT LED tile has a 16:9 aspect and has pixel dimensions of 0.9, 1.2, 1.5 and 1.9 mm. The LED displays are accessible from the front and have a shallow depth, convenient for wall-mounting. An Assisted Module Extraction feature allows tiles to be removed for maintenance or replacement.

Bohemia Interactive - www.bistudio.com
Czech Republic. Bohemia Interactive a.s., headquartered S of Prague, has introduced the VBS3 Bundle. This adds features to VBS3, including Artificial Intelligence features, behaviours, simulated radio, expanded connectivity, and more content. The VBS3 Bundle brings together VBS Control Behavior Pack 1, VBS Chalkboard Pro, VBS Radio Pro, and Terrain Pack.

Britannica - www.britannica-ks.com
USA. Britannica Knowledge Systems (BKS) headquartered in Chicago, USA, has launched "Fox for Flight Schools" a new training management system optimised for flight schools. This is a development of the company's Fox training management system. It monitors student progress, logbooks, schedules and can be used for managing grading and qualification, dispatch and flight records, training and learning. New customers in 2019 include Pacific Sky Aviation, Pobeda Airlines, and Singapore Flying College

CAE USA - www.cae.com

USA. CAE USA Mission Solutions Inc (CAE MSI) of Tampa, Florida, USA, is to support the Open Geospatial Consortium Common Database (OGC CDB) for rapid prototyping in a contract from USSOCOM (US Special Operations Command). CAE originally designed the Common Database (CDB) for USSOCOM. The Open Geospatial Consortium is an international body and in 2016 approved CDB as a standard. The OGC CDB includes Geospatial Intelligence (GEOINT) so that the simulation industry can use common geospatial data. The intention is that the OGC CDB will be used across the US DoD.

CM Labs - www.cm-labs.com

Canada. CMLabs Simulations Inc of Montreal, announced Vortex® Studio 2019b, an update to their Vortex real-time simulation system. Wheels of vehicles now create texture-based ruts and marks based. A number of pre-built vehicle templates can be modified to match the real vehicle to be simulated.

Diamond Visionics - www.diamondvisionics.com

USA. Diamond Visionics (DVC) of Vestal, west of Binghamton, Upper New York State, USA, has launched GenesisLunar landing simulation. It uses GenesisRTX to produce imagery of the moon's surface including reflections, shadows and dust.

DiSTI - www.disti.com

USA. Distributed Simulation Technology, Inc (DiSTI) Corporation of Orlando, Florida, USA, has released GL Studio 6.3. This has some 50 improvements, plus enhancements to the GLS-Map Toolkit. The Human Interface Device and User Interface (HMI/UI) allows developers to create 2D and 3D imagery.

Indra - www.indracompany.com

Spain. Indra Sistemas, S.A., headquartered in Madrid, has developed a system that will enable soldiers to train with real equipment, but use a VR headset to add a virtual environment in which they can move. This is part of the iVictrix marksmanship simulator, related to some 40Victrix simulators that are currently used by the Spanish Army. The flexibility offered by VR allows training in different areas such as for vehicles and gunners.

Lockheed Martin Australia - www.lockheedmartin.com.au

Australia. Lockheed Martin Australia, headquartered in Kingston, Canberra, together with with Calytrix Technologies and NEC Australia, is to deliver a networked simulation system to the Australian Defence Force (ADF) under the JP9711 programme.

Netizen - www.netizencorp.com

USA. Netizen Corporation, headquartered in Allentown, Pennsylvania, west of New York, has an $845k contract with the US Army Project Manager Training Devices (PM TRADE) in Orlando, Florida, for Cyber Security support. This is for Department of Defense (DoD) training and simulation systems in locations across the United States and around the world, to ensure that its technology is protected from a variety of cyber threats, and also complies with the National Institute of Standards and Technology (NIST) Risk Management Framework (RMF), the Federal Information Management Security Act (FISMA), and other requirements.

Pitch - www.pitch.se

Sweden. Pitch Technologies AB of Linköping, Sweden, has released version 5.0 of Developer Studio. This now generates code in C# in addition to C++ and Java, and there are also performance and API improvements. C# code generation includes HLA functions for objects, interactions and data types. With new time-management functions, C++ and Java code now support HLA federations using the Space FOM.

Q4 Services - www.q4services.com

USA. Q4 Services LLC of Orlando, Forida, USA, is to supply five of its DirectVue display systems to SGB Enterprises (https://sgbent.com/) of Santa Clarita on the N side of Los Angeles. The DirectVue dome display has a 6-foot radius with 3 projectors.

Varjo - https://varjo.com

Finland. Varjo Technologies of Helsinki, Finland, has developed a headset named XR-1 Developer Edition with high quality imagery and eye-tracking. The XR-1 upgrades the Varjo VR-1, adding a front plate with two 12 mpx cameras and video-pass-through. The device uses cameras to digitize the world in real time, and adds virtual content so that the user sees the combined result. Virtual objects can cast shadows or project lights, and users can switch between mixed and virtual modes.

VT MÄK - www.mak.com

USA. VT MÄK, of Cambridge, Massachusetts, has released Version 1.4 of its multi-role virtual simulator VR-Engage. This system can control a character, for instance the driver, gunner or commander of a ground vehicle; the pilot of an aircraft; or a sensor operator. VR-Engage 1.4 is the first version to be built on VR-Vantage 2.5 and VR-Forces 4.7, released in May2019. VR-Forces 4.7 and VR-Engage 1.4 can be used to provide Computer Generated Forces (CGF) and player-controlled entities. This release also includes a new drone operator system in which human characters can control a quadcopter drone.

Sections	Words	%
Editorial & Events	1153	10.1
Aviation Systems	5914	52.0
Space Systems	0	0.0
Multi role Systems	338	3.0
Land Systems	1315	11.6
Medical Systems	137	1.2
Maritime Systems	807	7.1
Corporate changes	602	5.3
Simulation Systems	1018	8.9
Word count	100	0.9
Total	**11384**	**100.0**

Aviation Sections	Words	%
Civil Fixed Wing	2968	26.1
Civil Rotary Wing	136	1.2
Mil Fixed Wing	1507	13.2
Mil Rotary Wing	605	5.3
UAVs	177	1.6
ATC & Air Control	521	4.6
Total Air Sections	**5914**	**52.0**

Air	Words	%
Civ total	3104	27.3
Mil total	2112	18.6
RW total	741	6.5