## DAY 1 - TUESDAY 25 OCTOBER 2011

07.30-08.50 Registration & Exhibition
08.50-09.00 Official Opening

### Session 1 - Current & Potential UAS Activities in Brazil

**01 09.00-09.20 UAS & access to Brazilian Airspace**
**25 October Major Cyro André Cruz, Brazilian Air Force - DECEA (Department of Aerospace Control), Brazil**

**Bio data:**

Major Av Cyro André Cruz is from Niterói - RJ, and joined the Brazilian Air Force in 1990. He concluded the Officer Improvement Course, an MBA in Public Management and several operational courses, among them: Airborne Transport Pilot, Chief Controller of Military Air Operations and Inspector Pilot of the Special Flight Inspection Group (GEIV). Internationally, he completed the course *Composite Air Operations,* at BAE Systems (UK), attended the 16th *International Flight Inspection Symposium* (Beijing - China), the AUVSI *Unmanned Systems North America* 2010 (Denver - USA) & 2011 (Washington, DC - USA), and represented Brazil as member of ICAO's Unmanned Aircraft System Study Group (UASG) in the 6th and 7th Meetings (Montreal - Canada and St. Petersburg - Russia, respectively). He has held the positions of Social Communication Officer and Head of the Maintenance Section of the 5th Air Transport Squadron; Social Communication Officer, Head of the Personnel and Operations Sections of the 2nd Squadron of the 1st Communications and Control Group; and Deputy Head of the Special Equipment Inspection Section - GEIV. He is currently the Deputy Head of the Military Operations Division of the Department of Airspace Control and UAS Project Coordinator.

**Abstract:**

The presentation aims at showing the peculiarities involving the UAS access to the Brazilian Airspace. The competencies of the Brazilian Department of Airspace Control (DECEA) within its responsibility, the current regulation and the flight authorization process will be presented, as well as the representation in the UASG (Unmanned Aircraft System Study Group) of the International Civil Aviation Organisation (ICAO) and the main issues and initiatives to support the UAS operations and associated systems in Brazil and abroad.

**02 09.20-09.40 Use of UAS data for the monitoring of illicit activities in Legal Amazon: Potential & Perspectives**
**25 October Eristelma T. de Jesus Barbosa Silva, Brazilian Ministry of Defence - CENSIPAM (Operations & Management Center of the Amazonian Protection System), Brazil**

**Bio data:**

Eristelma T. de Jesus Barbosa Silva has over 10 years of experience in remote sensing. She is a geographer and doctoral candidate at the Institute of Geosciences, University of Brasilia (UNB) in the field of radar sensor images for applications in the Amazon. In 2004, she obtained a Master's degree in geology, focused on GIS / Remote Sensing for environmental analysis. The participation in various research projects provided extensive experience in image processing of remote sensors for various applications related to environmental analysis and the monitoring of changes in the vegetation covering the earth's surface. Since 2006, she has been working at CENSIPAM in the Intelligence Department, managing projects in the field of IMINT/GEOINT for identification and monitoring of illegal activities in the Amazon, especially those related to environmental crimes. She has also worked as a consultant in remote sensing for the Inter-American Institute for Cooperation and Agriculture (IICA) and participated in many research projects with the Brazilian Agricultural Research Corporation (EMBRAPA) involving the usage of geo-technologies to monitor the Cerrado Biom and in support of agriculture.

**Abstract:**
In a region with continental dimensions like the Amazon, the identification and monitoring of many kinds of illicit activities is a growing challenge for governmental institutions in their different spheres of activity. At CENSIPAM, for example, some of these challenges are related to opportune intelligence generation to support the environmental enforcement agencies on detection of selective logging and low cut de-forestation, illegal mining activities and unauthorized runways, among others. In response to these challenges, Unmanned Aircraft Systems (UAS) are becoming the newest Brazilian trend in remote sensing. Besides the low cost of its data acquisition, compared to traditional aerial platforms, the use of UAS opens new perspectives for environmental crimes monitoring. Given this scenario, this study aims to examine the advantages and possibilities of integrating data from sensors onboard UAS for the identification of illegal activities in the Amazon and the recent developments in the area of images processing of these data. The main conclusions indicate that the integrated use of collected data from UAS sensors with the new techniques of image processing in real time will increase the governmental capability of monitoring wide areas in a short period of time, which is one main lack of the current monitoring systems. Moreover, the special correlation of simultaneous information allows the identification of special patterns associated to the environmental offenders' activities which are essential to timely decisions and operation mission planning. The range of possible applications of such data represents a landmark in the areas of defense, public security, environmental protection and others that require the usage of high resolution data.

**03 09.40-10.00 UAS employment by the Federal Police Department of Brazil**
**25 October Jose Luiz Boanova Filho & Frederico Novaes De Almeida, Brazilian Ministry of Justice, Federal Police, Brazil**

**Bio data [Jose Luiz Boanova Filho]:**

Jose Luiz Boanova is a former Brazilian Navy officer and since 1989 a Special Agent of the Federal Police Department of Brazil. He has Bachelor degrees in Civil Aviation, Mechanical Engineering and Law. He has also a post-graduate degree in Civil Aviation Management and is a Civil Aviation Specialist, besides other specializations in the aeronautical field. As a Commercial Helicopter Pilot at the Federal Police, he acquired extensive experience in various types of police air operations: combating trafficking in arms and drugs, smuggling, environmental crimes and several other constitutional obligations of this national law enforcement agency. Since November 2007, initiated the UAS Working Group, which selected, acquired and has been operating in the Brazilian territory a Heron I UAS, produced by IAI - Israel Aerospace Industries Ltd., using all his experience and academic knowledge in the operation of this system, as an UAS Pilot. He has assisted in developing the doctrine of police operations with the use of UAS, the flight rules and air traffic, in full coordination with the Brazilian Air Force (Military Aviation Authority) - which controls military and civil air traffic - and the National Agency of Civil Aviation (Civil Aviation Authority) - which regulates all civil aviation activity in Brazil. He serves on various UAS working groups, including the VANT/BR WG, which includes Navy, Army, Air Force and the Federal Police Department.

**Bio data [Frederico Novaes de Almeida]:**

Frederico Novaes de Almeida is an Agent of the Brazilian Federal Police Department. He has Bachelor Degrees in Computer Science and Philosophy, having worked with remote sensing and laser mapping using an airborne LIDAR system. After joining the Federal Police Department in 2005, he acquired considerable experience in combating organized crime through intelligence and field operations against trafficking in drugs, environmental crimes and corruption. In 2010, he joined the UAS Project to be an Observer and to work with GEOINT/IMINT between the UAS and CINTEPOL (Integrated Centre of Police Intelligence and Strategic Analysis). He is also currently undertaking a post-graduate degree on Police Science and Intelligence focusing UAS use as a tool for police intelligence.

**Abstract:**
Since November 2007, the Federal Police Department of Brazil has been studying the selection, acquisition and operation of an UAS capable of being employed in the various constitutional mandates of this law enforcement agency, through its Directorate of Intelligence. Having the first crew trained and ready between 2009 and 2010, the selected IAI's Heron I UAS now begins to be deployed regularly from the first Federal Police Operational

UAS Base located in the Foz do Iguaçu region. Due to the flight operations, the operational concepts and doctrine of employment are constantly evolving, including the establishment of flight rules and air traffic control by the Brazilian Aeronautical Authority. Thus, the Brazilian Federal Police Department has accumulated knowledge and experience in:

- Development of flight rules and air traffic control in the Brazilian National Airspace;
- Development of UAS employment doctrine and employment of UAS in the following operations:
  a) Tactical border control and combat of smuggling and trafficking in drugs and arms;
  b) Monitoring of national parks and related environmental crimes;
  c) Police and inter-agency operations, with the UAS as a tool of intelligence in CINTEPOL (Integrated Centre of Police Intelligence and Strategic Analysis).

These steps unveil the realization of the Federal Police UAS Programme.

10.00-10.15 Panel discussion: Questions & Answers
10.15-11.15 Refreshment Break

## Session 2 - UAS Standards & Flight Testing

**04 11.15-11.35 EUROCAE WG73 and its UAS-related activities**
**25 October Tore Kallevig (Avinor), EUROCAE Working Group 73 on UAS, Europe**

**Bio data:**

Tore B. Kallevig (36) works for Avinor, the Norwegian Air Navigation Service Provider. He started out his career as Officer in the Royal Norwegian Navy, but in 1994 aviation caught his interest and he started in Luftfartsverket (now Avinor). After completing his ATCO training at Serco IAL, Bailbrook College, Bath, England in 1996 he worked both Tower and Approach Control in several parts of Norway. Since 1997 he has worked Area Control, and for the last six years, he held the position as Chief Air Traffic Controller at Stavanger Air Traffic Control Centre in the south western part of Norway. Mr. Kallevig was also responsible for the operational implementation of a new automated radar control system for 8 ATS units in 2004, as well as the training of relevant operational staff. Amongst other positions he held, he has also been the Centre's Head of Training and Procedures Specialist. Mr. Kallevig is the newly elected chairman of EUROCAE Workgroup 73 UAS, and he is also representing Avinor in the NEAP project NEFAB. NEFAB is the North European Functional Airspace Block with member states Denmark, Estonia, Finland, Iceland, Latvia, Norway and Sweden. NEFAB is organised under the umbrella of North European ANS Providers (NEAP) and is one of the improvement initiatives in the NEAP ATM Master Plan. Mr. Kallevig is a member (observer) of the UVS International Board of Directors.

**Abstract:**
One might say that the UAS Standards Development for some time now has moved forward at a slow although firm pace, just like a glacier. In the wake of the now published Concept Document (Deliverable 3), which identifies the main topics and the possible conceptual ways to address them, the past year's activities were mostly dedicated to defining and agreeing on realistic and affordable medium term WG73 objectives to establish the corresponding Work Plan and to organize and start the related tasks. Transatlantic discussions with RTCA Special Committee 203 leadership team (the US WG73 counterpart) helped defining a common global perspective, thus establishing further cooperative and collaborative activities in order to maintain progress and to enhance harmonization of outputs of the two standards groups. Discussions also took place during the last year to identify the most efficient way to progress towards recommendations and standards for Visual Line Of Sight (VLOS) flight operations with an 'external pilot' controlling the unmanned aircraft using his own eyes, taking into account the request from the European Commission to consider establishing a separate group working on small UAS. Indeed VLOS operations with small UAS are identified as a short term promising market. As a conclusion it was decided that VLOS operations standardization activities remain part of WG 73.

**05** **11.35-11.55** **25 October** **EUROCAE's Smaller RPA Sub-Group: How Latin America can participate & the advantages**
**Peter van Blyenburgh, UVS International, The Netherlands**

**Bio data:**

Peter van Blyenburgh, a Dutch national residing in Paris, France, was born in The Netherlands ('48), educated in Canada, the Netherlands Antilles and The Netherlands, studied in Switzerland (Business Administration) and has held various management positions with a number of industrial and service supplying corporations in the USA, Europe and the Middle East. He has been involved with unmanned systems since 1987 and has supplied advisory services in this field to corporate and/or governmental entities in Europe, the Middle & Far East and North America. In 1995 he instigated, and in 1997 founded, the European Unmanned Vehicle Systems Association (EURO UVS), which changed its name to UVS International in January 2004; he is currently in his 7th two-year term as president of this internationally operating non-profit association registered with the Chamber of Commerce in Den Haag, The Netherlands, which deploys its activities out of offices in Paris, France. He is also the founder and Chief Executive of Blyenburgh & Co (B&C), a company registered in Paris, France, to which the UVS International Board of Directors has contractually entrusted its administration, as well as the organisation of its unmanned systems-related conferences. Blyenburgh & Co is the publisher of the annual UAS Yearbook (UAS: The Global Perspective - the international UAS publication of reference) of which Mr. van Blyenburgh is the editor. He is the initiator of the Global Access Initiative & the International Coordination Council on UAS, a member of the ICAO UAS Study Group, the European Commission UAS Panel, and standing advisor to EUROCAE WG73 on UAS.

**Abstract:**
Various studies in various countries, as well as the European Commission's Hearing on Light UAS, have brought out that the initial market for UAS with non-military applications will principally concern Small UAS. It is now also quite clear that the majority of the producers of such systems are small & medium-sized enterprises, which do not have the economic means, nor the time and personnel to be actively involved in creating the standards required to make it possible to "certify" such systems and thereby create the basis for their admission into civil-managed airspace. This presentation will explain the International Coordination Council and its activities, as well as how its members can contribute to the work being undertaken by EUROCAE's Smaller Remotely Piloted Aircraft (RPA) Sub-Group. The structure, functioning and objectives of the Smaller RPA Sub-Group will be exposed and the speaker will explain how Latin American civil and military aviation authorities, as well as the manufacturers of Small RPA can participate, benefit and contribute to international harmonisation.

**06** **11.55-12.15** **25 October** **Performance orientated flight tests**
**Yariv Kinstler, Elbit Systems, Israel**

**Bio data:**

Yariv Kinstler is Elbit systems UAV division's performance engineer, since 2006. His areas of expertise include aerodynamics and performance, flight testing planning and analysis, propeller adjustment and evaluation, and more.
Prior to Elbit systems, he worked as a performance engineer in IAI's (Israeli Aerospace Industries) preliminary design department.
He holds a Bachelor of Science (B.Sc) degree in Space & Aeronautics from the Technion, the Israeli Institute of Technology.

**Abstract:**
Flight testing is a part of every manned and unmanned aircraft development procedure. Usually, 3 fundamental reasons for flight testing are listed:
a) Determining the aircraft's actual characteristics;
b) Providing development information;
c) Obtaining research information;
Performance oriented flight testing is born from the same reasons, while performance research and validation are

emphasized. The testing covers a variety of flight phases (climb/descent maneuvers, cruise maneuvers, ground performance etc.) as well as technical issues (e.g. pitot-static system calibration). Such a process usually consists of preliminary considerations, implementation, and finally, data reduction and analysis.
The presentation will describe how performance oriented flight tests are carried out in Elbit System's UAV division, how common difficulties are dealt with, and how required data is obtained, using unique semi-automatic procedures. In addition, several practical examples will be given for demonstration purposes.

12.15-12.30 Panel discussion: Questions & Answers
12.30-14.00 Open Bar & Lunch

## Session 3 - UAS Standards & Certification

**07 14.00-14.20 Patroller, an innovative dual-use MALE UAS**
**25 October Olivier Reichert, Sagem, France**

**Bio data:**

Olivier Reichert graduated from the French Engineering School "Ecole Nationale Supérieure des Télécommunications de Paris" and has a MBA from the University of Hartford, Connecticut. He joined Sagem in 1988. After several years as an engineer and project manager in the field of missile guidance and navigation, he moved to the business development area. Olivier has 12 years of experience in the domain of unmanned aircraft systems. From 2000 to 2004 he was the Program Manager of the French SDTI tactical UAS up to its delivery to the French Army. Olivier is today Program Manager in the Unmanned Aircraft Systems Programmes Directorate, where he is in charge of the Business Development, as well as R&D projects and programmes.

**Abstract:**
In view of the forthcoming UAS integration in non-segregated airspace, new platforms and new operating concepts have to be proposed to meet the growing requirements of airborne-based surveillance for homeland security as well as military missions. This paper presents the Sagem Patroller surveillance UAS, an innovative concept built around an existing manned platform that has been transformed into a long endurance surveillance UAS. The Patroller is designed to address both military and civil applications and is optimized for reduced cost of operations. The presentation elaborates on the benefits of using an EASA certified platform and fail-safe flight control system to reach the highest level of flight safety and operational availability in its category and to prepare technical conformity to future UAS certification requirements. It also describes the advantages of a dual-mode design (UAS / OPV) and its flexibility for a large range of end-users and mission requirements. Payload customization to the end-users needs is a key for modern UAS. The presentation illustrates how the Patroller's open architecture design allows for easy integration of a wide variety of sensors as well as Satcom data link. As such, the Patroller can cover a wide range of governmental missions including coastal and border surveillance, police monitoring missions, fight against terrorism and trafficking, protection of major or sensitive sites (scientific, industrial or resource extraction sites), environmental protection (forest exploitation, pollution detection, maritime cleanups, etc.), natural disaster prevention or monitoring (forest fire detection, meteorological missions, situation assessment after earthquakes, tidal waves and hurricanes, victim search, etc.).

**08 14.20-14.40 Update on ASTM's UAS-related standards activities**
**25 October Jeffery Goldfinger (L-3 Com), ASTM International, USA**

**Bio data:**

Jeff Goldfinger retired from the United States Navy upon completion of twenty years of service as a naval flight officer. During his military career, he accumulated over 1500 flight hours in various carrier-based tactical aircraft. Additionally, he was a qualified Pioneer UAS internal pilot and served as the officer-in-charge of a shipboard Pioneer detachment during a deployment to the Indian Ocean and the Arabian Gulf. Since retiring, Jeff has remained active in the unmanned aircraft community providing consulting and flight operation services to both U.S. government and industry customers. He has a Bachelor of Science degree in Computer Science and is

currently a Director of Business Development at L-3 Communications, Interstate Electronics division. Jeff is also serving his 2nd year of a two-year term as Chairman of ASTM International's Committee F38 on UAS Standards.

**Abstract:**
In 2003, ASTM International established committee F38 on Unmanned Aircraft Systems. The purpose of the committee is to produce cost-effective, timely consensus standards that, when applied, will enhance the safe design, manufacture, maintenance, and operation of unmanned aircraft systems. It is anticipated these standards can play a role in system certification and design, as the industry and regulatory guidance mature. Since 2003, the Committee F38 has produced more than a dozen industry consensus standards, some of which have been adopted by military organizations and commercial companies worldwide. In April 2010, ASTM and the U.S. Federal Aviation Administration (FAA) signed a Memorandum of Agreement whereby ASTM F38 can «participate in, and help facilitate, the development of standards utilizing the ASTM voluntary consensus process. The work under this MOA is in support of a pending new rule which will allow small UAS to routinely fly in civil airspace for compensation or hire. The presentation will cover how F38 is organized and structured to support both the U.S. FAA efforts, as well as our other constituents the world over.

**09 14.40-15.00 UAS legal framework in Mexico: A status report**
**25 October Adrian Peña Cervantes, ImpactoAereo, Mexico**

**Bio data:**

Adrian Peña has an extensive background in avionics, telemetry, automation and control design. Since 2005 he has participated in various projects involving the development of RPVs (Remote Piloted Vehicles) and Small Unmanned Airships, as well as other Light Unmanned Aerial Systems (UAS) platforms in Mexico. He has received training in South Korea, Japan, Spain, and other countries and has participated in R&D projects with the UAS community in other countries of Latin America and Europe since 2009. His experience in the unmanned lighter than air vehicles and other UAS systems ranges from payload applications, sensors, GNC (Guidance, Navigation and Control) design, GCS (Ground Control Station) design and data link connectivity to vision machine, electro-optics and photogrammetry. As an active member of AUVSI and the International Airship Association, and as UAS researcher, he has made efforts with the aerospace industry and academy research centers in Mexico and Latin America to promote the use of light UAS systems by government and non-government organizations.

**Abstract:**
UAS are becoming an acceptable part of the military inventory in Mexico as well as the civilian projects are developing ways of introducing more applications to key industry sectors of the country's economy. However, there is considerable public debate about their operation on segregated and no segregated airspace airworthiness approved by the national air authority. This paper provides a report of the authors in recent activities with UAS equipment and UAS design in Mexico. It reviews the current situation with regard to airworthiness regulatory developments and indicates what progress has been made in the development of operational regulations for UAS legal framework in Mexico.

**10 15.00-15.20 Experimental certification of the Brazilian UAS Apoena 1000**
**25 October Fabio Henrique de Assis, Xmobots, Brazil**

**Bio data:**

Fabio Henrique de Assis is one of the founders of XMobots Robotic Systems. He has a MS in Mechatronics Engineering from the University of São Paulo, and has been working for the last 6 years with the development of Unmanned Aircraft Systems and Underwater Vehicles. He is currently the director of Aeronautical Certification at XMobots, and is the manager of the «Experimental Certification Program of Apoena 1000 UAS», the first UAS certification process occurred in Brazil.

**Abstract:**
XMobots is a Brazilian company specialized in developing, manufacturing, maintaining and

operating unmanned systems, including UAS, AUVs, ROVs, USVs, UGVs and Ground Control Stations. Its name came from the union of the prefix «X», which represents the polyvalence of the medium where our systems operate, being in air, land or water with the word «mobots», and a well-known contraction term for «mobile robots». Since its first UAS developments, XMobots focused on certification. Due to the lack of regulations for UAS at that time, it was used certification standards of manned aircrafts like FAR 23 and DO178B/160F as guidance for the development of Apoena 1000, a tactical UAS with 8 hours of autonomy and 60 km of LOS communication range. As a consequence, the project started with several safety and performance requirements, resulting in a design with redundancies in the most important parts and other characteristics like retractable landing gear, wingtip fence and double flap. XMobots started a certification process for the Apoena 1000 under the experimental category in 2010, with the restriction of operation in remote areas and with segregated airspace. This was the first initiative of UAS certification in Brazil, and is expected that Apoena 1000 be the first Brazilian UAS to have this certification by the end of 2011. XMobots also have another UAS certification project, but this one is focused on the operation in urban areas and in non segregated airspace. The focus is the development of a Certified Avionics System for UAS based on the certification standards of manned aircrafts like DO178B/160G and ARP4761/4754.

15.20-15.40 Panel discussion: Questions & Answers
15.40-16.25 Refreshment Break

## Session 4 - UAS Market Issues

**11 16.25-16.45 Saab UAS overview, current activities & future trends: the importance of coexistence between manned and unmanned aviation**
**25 October Carl-Henrik Arvidsson, Saab, Sweden**

**Bio data:**

Carl-Henrik Arvidsson holds an M.Sc in Mechanical engineering from Linköping University and has been employed at Saab since 1983. He started as a design engineer in the Gripen program and has since then held several engineering management and program management positions both within civil and military aeronautics. During the past decade Mr Arvidsson has been dealing with Aeronautic Strategy and Business Development including UAS and is now head of the Future Air System activities within Saab. Mr Arvidsson is also active in the European branch organization, since 2004 he is the Chairman of the Aircraft Sectoral Group, Management Team within the *Aerospace and Defence Industries Association of Europe* (ASD). Mr Arvidsson was engaged (2002-2005) as the Director for the *Swedish Aerospace Industries* (SAI) which is the Swedish branch association.

**Abstract:**
This presentation addresses the Saab UAS business with the purpose to clarify the knowledge foundation, products development, offers and strategy. To support the presentation some key aspects of the evolution of the future military air system and civil applications are given. The future military air system will consist of a combination of manned and unmanned components; the following important trends could be seen for the UAS integrated into the system:
- Increased technology content and performance requirements
- Traffic Insertion and Certification increases similarities with manned aviation
- Support, logistics etcetera is moving from experimental stages to mature requirements analogous to other defence systems
- Collaborative and Mixed Initiative needs for mission success
- Affordability

UAS civil security applications presented will highlight some applications relevant for Latin America, including upcoming large events and monitoring of Amazonas. Interesting early applications of a combination of manned AEW platforms and UAS includes similar trends as those described above for the future military air system. The coverage of Saab activities will include: involvement in Neuron; activities for Tactical UAS, including VTOL (Skeldar V200) and fixed wing; technology demonstration and insertion into non segregated air space including MidCAS, the European S&A project; the roadmap illustrating how it fits together, including some possible future steps. As conclusion it is shown that Saab has a demonstrated deep and wide knowledge of defence and aviation systems and commitment

to long term partnerships making us the ideal partner for the exciting journey we have in front of us.

**12 16.45-17.05 Brazilian UAS market: An opportunity for global competitiveness**
**25 October Nei Brasil, Flight Technologies, Brazil**

**Bio data:**

Nei Brasil is Co-Founder and President of Flight Technologies S.A.. He started as an entrepreneur in his own company, in 2005. From 2006, he lead the Unmanned Aircraft Systems development programmes at the company. He has conducted several flight testing campaigns for the Brazilian Armed Forces development programmes. Since 2009, he has been leading the company's re-structuring and leveraging it as a Command, Control and Intelligence company for the Defense and Security market. Nei Brasil is commercial pilot and graduated in Aeronautical Sciences with honours from the Pontifícia Universidade do Rio Grande do Sul (PUCRS). He is an aeronautical accident investigator graduated from the Centro Nacional de Investigação e de Acidentes Aeronáuticos (CENIPA), and a specialist in Continued Airworthiness and Aviation Safety; he has a Masters in Aeronautical Engineering from the Instituto Tecnológico de Aeronáutica (ITA). He graduated in UAS Flight Testing from the National Test Pilot School (NTPS, Mojave, USA) and he is currently following the CEO FGV course, a Masters in Business Administration at the Fundação Getúlio Vargas (FGV).

**Abstract:**
This work presents an analysis about how the potential growth of the Brazilian Defence and Civil UAS market can leverage the competitiveness of the local industry, developing global leaders in strategic fields. The work is part of the Flight Technologies' strategic planning, which is underway and focused on the design of the positioning of the company to become a strategic business and a leadership in the UAS defence and homeland security market. The analyses is based on the opportunity that the long term plans for the country (elaborated by the Brazilian Strategic Affairs Secretariat and consolidated as the 2022 Plan), the last changes and improvements in the structure and polices of the Defence Ministry, and the current challenges for the Brazilian national defence and homeland security, as well as the capacity and capabilities of the Latin America scientific and technology industry, can represent for the development of a regional defence industry with global competitiveness. This hypothesis is analyzed considering the potential volume of the mid-long term investments of the Brazilian Government in the defence and homeland security activities. It is also discussed, as a key point, the clear understanding about how to take into advantage the purchase and financing power of the Brazilian State for the long-term strategic development of the country. 2022 Plan is analyzed and the discussion is addressed by how the long-term view for the country, inserted in the Latin American and Global Market, can contribute for the global competitiveness of a brand new UAS industry base. The economic, social and infrastructure goals defined in this plan are presented as fundamentals that shall be observed in order to make viable the view of the Brazil in 2022. Furthermore, a lot of this view is appointed as function of the future and potential competitiveness of the local UAS industry in high strategic fields, such as the defence. On the other hand, the re-organisation efforts of the Defence Ministry and the design of huge projects for the Defence Forces which will necessary involve UAS are presented as the basis for the leveraging of this local industry. Finally, the capabilities and capacity of the regional industry to envisage scientific and technology challenges is shown as a reality, which can support the necessary skills for the presented challenges. Furthermore, the presence of strong players with histories of organic growth, such as the biggest business groups of the country, validates the possibility and capability of the local market for the development of high performance UAS business for global competitiveness.

**13 17.05-17.25 Internet meets UAS - A new business model**
**25 October Thomas Goletz, AeroSpy, Austria**

**Bio data:**
Thomas Goletz holds a German Dipl. Ing. degree in Mechanical & Process Engineering from the University of Nuremberg-Erlangen (1989). He is responsible for International Business Development in AeroSpy Sense & Avoid Technology GmbH working on Unmanned Aerial Vehicles (UAS) and Unmanned Ground Vehicles (UGV). He is a recognized high technology industry veteran with multinational front-line business as well as restructuring leadership experience. His professional career includes roles as CEO of LINTEC AG, a listed company in

Germany - having served previously as a board member and Chief Operations Officer (COO). Before that he spent ten years as a successful entrepreneur in both IT and automation industries in Europe and China. Thomas's special expertise and most recent focus has been with start-ups, turnarounds, takeovers, joint ventures, and providing professional services for companies to support their European and Chinese expansion. He was one of the first people selling manufacturing services to Chinese suppliers while most companies moved their manufacturing activities to China.

**Abstract:**
Looking into the world of Unmanned Aerial Systems (UAS) one can recognize that there exist hundreds of different airframes around the world. People are fascinated designing their own aircrafts and get them flying. Asking them about their commercial ideas, many don't have one. Even today you can find several small companies already producing high quality sub-systems like autopilots or ground control station. They show that is possible getting an UAS safe flying on a low budget. There had been a few ages in the internet business; UAS are much more known and useable today. But there isn't any approach combining UAS and internet services. An internet based UAS service business model will fulfill many demands today and future. It brings together the strength of both industries. Customers are in need of remote sensing service (but not only) like mining companies, NGOs, land surveyors, governmental organisations, … We will demonstrate how the business model is practically applied using a low cost UAS frame with an autopilot and installed EO sensor. We show how customers order and receive their required products online and demonstrate the work flow for a UAS service provider generating raw data by using our UAS. Additional services i.e. operator training or UAS maintenance will be covered, too. We discuss the business opportunities arising for people in rural environments. This is an interesting economic factor and can generate jobs. Finally we show threats to the business model (i.e. legal issues).

**14 17.25-17.45 VTOL UAS: Potential applications & advantages**
**25 October Tim Williams, Eurocopter, France**

**Bio Data**:
Tim Williams is a graduate of Ship Science from Southampton University. He spent most of his career in the UK's Royal Navy as a helicopter pilot and warfare officer. During that time, in addition to operational activities, he also completed appointments leading the naval Human Factors Integration project and in the Future Concepts department where, in particular, the UK's early steps were taken towards defining the need for and operating methods of VUAV. On leaving the Royal Navy in 2008 he joined Eurocopter, the world's leading helicopter manufacturer, as their Director of Market Development for Naval, SAR and UAV systems with a special focus on emerging technologies.

**Abstract**:
While fixed wing UAS have been developing rapidly due to their specific advantages on the modern battlefields of Iraq and Afghanistan, the development of rotary wing UAS has been much slower in the absence of an overriding operational need. The approach to their development has been more intellectual and commercial. However, many of the control, support, payload and regulatory issues are aligned with those of fixed wing UAS and will lead to a shortened evolutionary period once a widely applicable solution to vertical launch and recovery is clear. Their major operational development is likely to be at sea where they have clear advantages and the environment is relatively safe for a development vehicle. The paper looks at the reasons for this and projects the demand for the particular qualities of VTOL UAS in naval/military, public service and commercial applications. It points out the need to treat VTOL UAS as a distinct class different in some areas from both fixed wing UAS and helicopters, for regulations and application. It highlights that VTOL UAS are complimentary to current helicopters, while also offering limited modern aviation capability to smaller navies, ships and operators.

17.45-18.00 Panel discussion: Questions & Answers

## DAY 2 - WEDNESDAY 26 OCTOBER 2011

### Session 5 - Regulatory Views

**15 09.00-09.20 Proposal for regulation of Small UAS focused on aerial inspection of power lines**
**26 October**
**Fernando Augusto Cardoso de Mello, Embraer, Brazil**

**Bio data:**

Fernando Augusto Cardoso de Mello graduated in July 2006 as an Electric Engineer at the Universidade Federal de Minas Gerais, Belo Horizonte, Brazil. In April 2011, received a Professional Master´s Degree in Aeronautical Engineering from ITA, São José dos Campos, Brazil. The title is part of a partnership programme between Embraer and ITA, Engineering Specialization Program. The final study approved by ITA board is about flight regulation and certification standards, constraints and rules for operation of an UAS System designed for aerial inspection of power lines to be operated within Brazilian aerospace. Fernando has been working at Embraer since September 2009, in two different job positions. Initially as a manufacture engineer, when responsible for resource and tooling definition used on shop floor, assessment of assembly sequence, assembly tolerance studies, definition of requirements for system tests, and recently, assumed a Business Entrepreneur Analyst role, being responsible for the conception, development, implementation, and controlling of products for Executive Aviation.

**Abstract:**
Owning one of the largest aerial power lines structures of the world with length as much as 95.000 km long, there is a large demand for aerial inspection of these structures in Brazil, especially on remote areas. Standard procedure normally used for aerial inspection is expensive and dangerous for the technical staff. As civil operation of UAS in Brazil is not yet regulated, operators need to request an experimental flight authorization to perform a mission. Regulation of civil and commercial operation of UAS could mean an increase of investments on the sector that could lead to the development of important technologies not yet produced in Brazil. Through the analysis of international regulations and standards, mainly from Japan, Australia, USA and Europe, some tendencies were identified. Aspects as continued airworthiness, communication, UAS flight autonomy, operational requirements and civil security on the ground have been considered. Regulations have been modified to comply with the aerial Brazilian airspace special features, and a proposal of regulation concerning small UAS (less than 150 kg) focused on aerial inspection of power lines is presented.

09.20-09.25 Question & Answers

**16 09.25-09.45 UAS Regulation Harmonization - The view of the JARUS members & ANAC on regulating Small UAS**
**26 October Ron van de Leijgraaf (IVW, The Netherlands), JARUS - Joint Authorities for Rulemaking on Unmanned Systems**

**Bio data:**

Ron joined the Dutch Civil Aviation Authorities as an Avionics Certification Specialist in the Airworthiness Department in October 2005. His primary activity is certification of aircraft design, both as a national authority and on behalf of EASA. Besides this, he has a number of other responsibilities within the department. One of these is his role as the focal point within CAA-NL for UAS activities. As a consequence of this task, he is responsible for the project in which the required rulemaking will be developed for the certification of a 100 kg rotary wing UAS in The Netherlands. Part of this project is to establish the international harmonization on airworthiness regulation with other national aviation authorities, EASA and EUROCONTROL. For this harmonization, Ron established the authorities coordination group JARUS. This group will cooperate with the EUROCAE WG 73, by providing draft regulation to this group for consultation with industry and stakeholders. Ron is the CAA-NL member and chairman of SG4 of EUROCAE Working Group 73 and member on behalf of The Netherlands of the ICAO UAS Study Group. Ron graduated from

the Technical University of Delft with a degree in Electrical Engineering and an avionics specialization. Before joining the Dutch CAA, he worked, amongst others, at the Dutch National Aerospace Laboratory (NLR). Here he worked on the development of fight test instrumentation systems and research on navigation systems and avionics for future ATM applications.

**Abstract:**
This paper describes the efforts of National Aviation Authorities in defining a harmonised set of airworthiness, operational and airspace requirements for (Light) UAS. According to Article 4.4 of EC Regulation 216/2008 the certification and operational requirements for UAS with a MTOM below 150kg are the responsibility of the European National Aviation Authorities (NAA). The European Aviation Safety Agency (EASA) is responsible for UAS with a MTOM larger than 150kg. In theory, this could lead to the development of differing requirements for Light UAS by each individual NAA. In an attempt to avoid this differentiation CAA-NL initiated an international coordination group called JARUS (Joint Authorities for Rulemaking on Unmanned Systems). This group intends to discuss and harmonise the requirements and limitations for Light UAS certification and operation. The output of the panel will consist of a single set of draft airworthiness, operational and airspace requirements accepted by a significant number of European NAAs, as well as EASA and Eurocontrol. At the same time, an effort is being made to harmonise the requirements with a number of non-European Union countries such as the Australia, Brazil, Canada, South Africa and the US. Once the group has reached agreement on these draft requirements, they will be provided to rulemaking activities within EUROCAE and RTCA, where consultation with industry and other stakeholders will take place. In the first years of operation, the group has drafted documents on system safety requirements, flight crew licensing requirements and certification specifications for light unmanned rotorcraft systems and delivered these to EUROCAE WG-73. Work on operator requirements, system safety requirements for detect and avoid systems and certification specifications for light unmanned aircraft systems will start soon or have already been started. During the presentation a short overview of the organisational structure of the group, the draft documents delivered and the remaining work schedule will be presented.

**17 09.45-10.05 Brazilian airworthiness regulation perspectives on UAS**
**26 October Roberto José Silveira Honorato, ANAC, Standards & Process, Brazil**

**Bio data**:
Roberto Honorato is manager of Airworthiness Standards and Process (GTPN) for ANAC - the Brazilian Civil Aviation Agency. The GTPN is responsible for the development of requirements, guideline material, international agreements and procedures related with airworthiness. He holds degrees in Electronic and Telecommunications engineer and is a post-graduate in Civil Aviation Management. Before joining ANAC, he worked for ten years with avionics, maintenance and supplemental type certification. He has been actively involved in UAS rulemaking in Brazil.

**Abstract**:
In Brazil, in accordance with the national law, just as in most other countries, any airplane must have an Airworthiness Certificate (CofA) in order enter the airspace. The type certification is one of the requirements for issue of CofA. The safety requirements regarding the emission of the type certificate (TC) and CofA are established on the Regulamentos Brasileiros de Aviacão Civil - RBAC. The current regulation isn't ready to adequately deal the UAS airworthiness certification. In terms of regulation and permissions ANAC's airworthiness team has considered three stages: The first, addressing experimental purposes (research and development). In the second stage, in which a new regulation will be proposed, the UAS operation will be held under special permit to fly. The third (long term) stage considers the issue of requirements for UAS type certification, harmonized with international standards. This presentation explores how ANAC's team has handled the UAS airworthiness subject.

10.05-10.25 Interactive panel discussion
10.25-11.00 Refreshment Break

## Session 6 - UAS Development

**18 11.00-11.20 Falcao UAS: Project status & typical missions**
**26 October Renato Bastos Tovar, Avibras Industria Aerospacial, Brazil**

**Bio data:**

Renato Bastos Tovar is an Aeronautical Engineer (1981), a Post-Graduate in Internet Technology (1998), and Certified PMP (since 2004). Since 2001 he is employed at Avibras Industria Aerospacial S/A. From 2001 to 2006 he was Senior Engineer responsible for technical support to the sales area, definition of scope of systems and their developments, as well as development of international suppliers for «critical items» of the systems. In 2005 he appointed Coordinator of the UAS Project. From 2006 to 2008 he was Manager for Planning of Commercial Proposals. In 2008 he was appointed General Manager of International Business Development and is responsible for the coordination of the commercial teams aiming at the participation in new international business opportunities.

**Abstract:**
Avibras has been developing UAS technologies since late 80's. In the 90's Avibras developed the project called Scorpion, with maximum take-off weight of 200kg and pay-load of 30kg. Four prototypes were manufactured and tested in flight and they are currently being used for training of Avibras team in UAS integration and flight test preparation. From 2005 to 2010, Avibras continued its technological evolution of the UAS systems, through a partnership with the Brazilian Armed Forces funded by FINEP, resulting in a development of a multi-platform Guidance, Navigation and Control System, including onboard electronic equipment and ground control station. The success of the GNCS and the open architecture developed were confirmed with 10 Flight Test Campaigns involving more than 55 successful flights. Upon those achievements, Avibras with the support of FINEP is finalizing the development of an operational UAS MALE System, called the VANT Re Falcao. The Falcao has maximum take-off weight of 700 kg and pay-load of 150kg, can reach 2500km with SATCOM Link, with an endurance of 15 hours and ceiling of 15.000 feet. Integrating state-of-the-art NGCS, Falcao UAS is the only in its class capable to carry E/O Sensor Turret and a Radar, together with the SATCOM Link in the same mission configuration. Therefore Falcao UAS is the only Tactical UAS capable to be employed in missions such as maritime and border surveillance, drugs traffic combat, protection against environment crimes, surveillance of great events such as World Cup 2014 and Olympic Games 2016, as well as in searching and rescue missions in areas affected by calamities. With the Falcao UAS strategic missions can be performed with the costs associated to Tactical UAS. Furthermore, the know how obtained in its UAS development history, qualifies Avibras to develop and manufacture the different configurations of UAS, covering the needs of Army and Home Land Security, from micro UAS to attend the infantry, as well as strategic UAS for the surveillance of natural resources.

**19 11.20-11.40 Development and testing of rotary wing mini UAS**
**26 October Senthil Kumar, Anna University - Madras Institute of Technology, India**

**Bio data:**

Dr.K. Senthil Kumar is currently working as Assistant Professor in Avionics, Department of Aerospace Engineering, Madras Institute of Technology (MIT), Anna University, Chennai, India. He is a graduate (1999) from the University of Madras in Electrical & Electronics Engineering. He did his M.E (2002) in Avionics Engineering and PhD in the field of UAS from MIT, Anna University, Chennai, India. He is a member of many professional societies like Aeronautical Society of India, Astronautical Society of India, Systems Society of India and American Institute of Aeronautics and Astronautics (AIAA). His fields of interest are Design and Development of Unmanned Aircraft Systems, Avionics Systems and Aerospace Guidance and Control. His other interests include developing innovative ideas for model aircraft prototypes in the laboratory. He has published many research papers in the National and International level programs relevant to avionics and aircraft systems. He has also attended many training programs and conferences in India and abroad. He is actively associated with several sponsored funded projects catering to the needs of Indian defence research establishments. He has visualised and developed the UAS flight control laboratory at MIT for the benefit of research

students and Post-Graduate students. He has organised MIT-UAS students' team in the year 2007 to participate in various Aerial robotic competitions incorporating latest technologies. He has been a source of motivation for students in developing state-of-the-art technologies in the field of avionics and flight control systems. Recently, his UAS team called "Dhaksha" became the only Indian team to have been shortlisted for Australian International UAV outback Rescue Challenge 2012 competition.

**Abstract:**
The presentation describes the University's accomplishments in developing, designing and testing a rotary wing Mini UAS for entry into various international aerial robotics UAS competitions (including for the 2012 UAS Challenge Outback Rescue Competition). The Dhaksha UAS incorporates autonomous navigation, imaging, target detection and tracking features. The developed system consists of a custom-built rotary wing unmanned aircraft with on-board navigation, guidance and control systems (NGC) and a ground control station (GCS), for mission planning, remote access, manual overrides and imagery related computations. The last essential part of the overall UAS is the ground control station. Its main responsibility is to realize effective communications between the avionic system and the ground users and pilots. To fulfill this aim, the ground station is developed to have the following fundamental capabilities: (i) displaying and monitoring the in-flight status, (ii) displaying images captured by the onboard system,(iii) generating and updating flight trajectories, (iv) sending control commands to the avionic system, (v) facilitating the ground piloted control or automatic control, especially in unexpected situations, such as emergency landing and cruise, and (vi) logging in-flight data. The mission is to fulfill the competition requirements by using a UAS capable of providing a complete solution for the stated problem.

**20 11.40-12.00 Cassidian Tactical UAS programmes**
**26 October Luis Muñoz Miller, EADS-CASA, Cassidian, Spain**

**Bio data:**

After graduating in 2001 with a Bachelor of Science in Electrical Engineering from Suffolk University in Boston Massachusetts, Luis Muñoz started his professional career at EADS Military Air Systems in Munich Germany as a Software Engineer within the Eurofighter program. After three years as a Software Integration Specialist in avionics and armament, he was transferred in 2004 to the Spanish branch of EADS Military Air Systems, in Getafe Spain, where he continued to be involved in the Eurofighter program as an Avionics Specialist for the Eurofighter production and prototype aircraft of EADS-CASA. After seven years of working experience as an engineer, in February 2007, Luis was then transferred to the Military Air Systems, Sales and Marketing department of EADS-CASA as a product marketing manager for Unmanned Aircraft Systems, providing marketing support to the sales representatives for the Spanish Army, Air Force, Navy and Department of Defense. In January 2008 he was additionally appointed as Export Sales representative for Latin America. Luis Muñoz is currently Cassidian's Technical Sales representative for Unmanned Aircraft Systems in Spain and Latin America.

**Abstract:**
The tactical segment for Unmanned Aircraft System is the most competitive in today's market, as it's the most demanding with a wider range of requirements and solutions, going from mini to large endurance systems, passing through vertical take-off systems (VTOL). Today's focus for tactical UAS is set on defense solutions, i.e. Afghanistan, but the future integration of these systems within non-segregated airspace will provide coverage for the necessities within the civil market, such as drug trafficking, border control, humanitarian operations, etc. This presentation will give an overview of Cassidian's developments within its tactical UAS programmes: Atlante (long endurance system), ALCA (medium VTOL) and Tracker (mini UAS), illustrating Cassidian's solutions to requirements and growth potential capabilities.

12.00-12.15 Panel discussion: Questions & Answers
12.15-14.00 Open Bar & Lunch

## Session 7 - Operational Experience & Lessons Learned

**21 14.00-14.20 Camcopter® S-100 VTOL UAS**
**26 October Phil Hoole, Schiebel Elektronische Geraete, Austria**

**Bio data:**

Phil is part of the Schiebel team in Vienna, Austria, where he is responsible for the Global Sales and Business Development of the Schiebel Camcopter S-100 and Schiebel Mine Detection equipment. He joined Schiebel from Thales Aerospace where he spent 3 ½ years as the Business Development Manager responsible for ISTAR products suitable for UAS, light to medium weight fixed-wing aircraft and all rotary-wing aircraft. He worked with the Watchkeeper team and also on a development programme for a futuristic UAV utilizing some radical technologies. This followed a full career as a Royal Air Force Aircrew Officer, where Phil amassed some 6000 flying hours on a variety of surveillance aircraft including the Nimrod, the E-3D AWACS and finishing his flying career on the Sentinel R of ASTOR system. He spent almost 4 years in Dallas, Texas during the design and build of the ASTOR and went on to finish his flying career on No. 5 (AC) Squadron at RAF Waddington. Away from work, Phil is an avid rugby league fan - though rather more as a spectator than as a player these days - and his other hobbies include light aircraft, travel and Jaguar cars.

**Abstract:**
This presentation will focus on the Schiebel Camcopter® S-100 UAS and the flexible capabilities it offers. The Camcopter® is a 200 kg VTOL system with proven capabilities in both the land and maritime domains. It has users around the world from military, police and other government departments and is seeing a growing interest from the civilian market where its robust and dependable abilities see it monitoring electrical power lines, pipe lines, oil rigs and harbours. By offering a spectrum of new technology in its sensor / payload suite to customers, the Camcopter® S-100 UAS's utility continues to grow, providing a hugely flexible capability from what is, a uniquely capable platform. Accordingly, this presentation will highlight some of the recent advancements and ongoing developments that serve to make the Camcopter® S-100 UAS such a widely appealing package. In particular it will highlight: civilian applications and opportunities (electrical power line surveillance, pipe line surveillance, agricultural surveillance, disaster and humanitarian support) and maritime developments (lightweight maritime radars, anti-piracy operations, harbour security).

**22 14.20-14.40 Small UAS for wildlife monitoring**
**26 October Mara Mulero Pazmany, Doñana Biological Station, Council for Scientific Research, Spain**

**Bio data:**

Mara Mulero Pazmany has a degree in biology, specializing in zoology from the University Complutense, Madrid, Spain, in 2003 and obtained a Masters in Business Administration, International Business, from the University Pablo de Olavide, Seville, Spain in 2009.
Mara Mulero's main professional experience focuses on Conservation Biology. She has worked on different projects in the field of research and management of animal species in danger of extinction, such as the Spanish Imperial Eagle conservation project (EGMASA, Andalusian Government), the effects of habitat fragmentation on bird's ecology in steppe areas (Spanish Society of Ornithology) and intertidal ecology (MIGRES Foundation). Over the last years she has focused her work on the evaluation and development of new methodologies for the study of the natural environment through the use of aerospace technology. She started working with Small UAS through the SADCON project, where it was attempted to use them for remote monitoring of two different species of birds of prey: Iberian Imperial Eagle and Ospreys. Nowadays, she is working on the AEROMAB project (Aerospace Technologies applied to Biodiversity Conservation), which is funded by the Andalusian government. AEROMAB specifically aims to investigate the use of UAS for monitoring and census of wildlife, and for evaluating the environmental impact of infrastructures, like electric lines, on animal populations. Since October 2010, she is also involved with the PLANET project, (PLAtform for the deployment and operation of heterogeneous NETworked cooperating objects) which addresses the use of cooperating objects (including Small UAS) for different biological

applications in natural environments, like pollution events monitoring and animal tracking.

**Abstract:**
This presentation describes different surveys conducted in the Aeromab project for monitoring wildlife using small UAS in Doñana National Park, South of Spain. It describes the equipment used for these applications, (mainly low-cost UAS adapted for each mission), the methodology used in different types of flight and the qualification and the training of the staff employed in different tasks. We explain the rationale, objectives and results of each survey conducted:
- Quasi-real time replica of a Lesser Kestrel´s (*Falco naumanni*) flight: The track obtained from animals equipped with data loggers was replicated with a Small UAS in order to characterize the foraging habits of this bird of prey which have some important implications to preserve the species.
- Black Ibis (*Plegadis falcinellus*) and slender-billed gull (*Larus genei*) colony monitoring: nests´ mapping in inaccessible areas.
- Habitat characterization of Baillon´s crake (*Porzana pusilla*): spatial analysis of the habitat preferences of this cryptic species.
- Monitoring massive bird death events: collaboration with the forest service of the Doñana National Park for the location of dead animals.
- A guide for evaluating the environmental impact of the Small UAS on wildlife: responses observed by mammals and aquatic birds to Small UAS over-flights, and recommendations concerning altitude & flight direction in order to minimize the impact of Small UAS in areas of high environmental value.

Other applications in conservation: Detection of invasive vegetation species in marshlands: water fern (*Azolla filiculoides)*

**23 14.40-15.00 Sustaining ScanEagle's half-million flight hours - The future of unmanned missions**
**26 October Juan R. Gomez, Insitu, Inc., USA**

**Bio data:**

Juan Gomez is Insitu's International Business Development Executive, with focus on Europe and South America. Mr. Gomez is a performance-driven leader with more than 10 years of senior-level, global experience creating and executing value-based management and marketing propositions. Before joining Insitu in November 2010, Mr. Gomez spearheaded a joint-venture partnership in Brazil that turned a profit within five months and generated multi-million dollar revenue its first year. As Vice President, General Manager, and Business Development Director of Lightship Latin America, a division of The Lightship Group, Mr. Gomez successfully opened the division 40 percent under budget and 33 percent ahead of schedule and managed a $5 million budget. Mr. Gomez began his 15-year career with The Lightship Group as an aircraft engineer before becoming General Manager of the Rio de Janeiro, Brazil office, where he found common ground to ease tensions between American and Brazilian partners. As Project Manager for the Telford, United Kingdom office, he worked extensively with military bases and NATO to ensure regulatory compliance in Belgium, Holland and Kosovo while managing a humanitarian mission to deactivate mines throughout the Balkans using an airship equipped with a DERA Radar. In 2002, Mr. Gomez served as Project Manager for the "Eyes in the Skies" initiative from the State Government of Rio de Janeiro. This initiative implemented a C4I Center utilizing various static and mobile sensors to aid in Public Safety. Mr. Gomez earned a BS in Aviation Maintenance Management from Embry-Riddle Aeronautical University. He enjoys climbing mountains and playing soccer and golf.

**Abstract:**
Accumulating flight hours faster than any other mid-endurance unmanned aircraft system - more than 15,000 combat flight hours per month - Insitu's ScanEagle UAS is also the most employable, with a mission-readiness record exceeding 98 percent. For seven uninterrupted years, Insitu's field service representatives (FSRs) have provided ISR services to the war fighter. FSRs know the combat mission and know how to setup operations to achieve the mission. They know how to respond to the unexpected. And they're equally adept at operating unmanned systems in controlled airspace. FSRs draw from their experiences in theatre to operate UAS safely and effectively in domestic airspace for public safety and scientific purposes, including marine mammal tracking, disaster relief, pipeline monitoring and education. This paper discusses how a services model has enabled Insitu to build a massive, highly trained force of

UAS operators who will help commercial and government entities alike to realize the full potential of this developing technology while ensuring safe integration of UAS into domestic airspace. It will show how mobile training units, custom training curriculum, flight safety programs, time-critical issue resolution and accurate forecasting make unmanned systems safe and reliable, while building industry best practices. This paper also discusses how Insitu's newest UAS, Integrator, enables new missions. Fielded in 2010, Integrator is a 75-pound aircraft that can carry half its weight in payload.

**24 26 October** **15.00-15.20 Benefits of owning a high performance unmanned target drone**
**Johan van Tonder, Denel Dynamics, South Africa**

**Bio data:**

Johan van Tonder holds an Electrical Engineering degree from the University of Pretoria, South Africa and is a certified Project Management Professional with the Project Management Institute. He has taken part in several missile development projects at Denel Dynamics between 1970 and 1988. Prior to re-joining Denel in 2005, he managed a company specialising in the development and supply of safety and environmental remote monitoring systems for underground mining. Mr. van Tonder is currently Product Manager of the SKUA target system at Denel Dynamics UAS.

**Abstract:**
This presentation looks at the capabilities of South Africa's Skua, a high performance target drone, and specifically considers the benefits derived by using such a target system during a missile life cycle from development, through qualification to commissioning and on-going training. The Skua was developed by Denel for the South African Air Force in the 1980's to support domestic missile development programmes. The presentation will illustrate how Skua has contributed to the successful development of missile systems, how it has assisted several nations with operational evaluation of new and existing missile capabilities and how Skua contributed to the security of the 2010 Soccer World Cup in South Africa.

15.20-15.40 Panel discussion: Questions & Answers
15.40-16.25 Refreshment Break

## Session 8 - Surveillance, Inspection & Monitoring

**25 26 October** **16.25-16.45 Project management strategies for developing a Small UAS for aerial inspection of power lines**
**Geraldo José Adabo, ITA - Instituto Tecnológico de Aeronáutica, Brazil**

**Bio data:**

Geraldo José Adabo received the B.Sc. degree in Electrical Engineering from the Universidade de São Paulo (USP), São Carlos, Brazil, in 1981, and the M.Sc. degree in Electronics Engineering from the Instituto de Pesquisas Espaciais (INPE), São José dos Campos, Brazil, in 1985. Since 1987, he has been a lecturer with the Division of Electronics Engineering, ITA. His current research interests are satellite power supply, aircraft electrical systems, communication circuits, RF/Photonics and unmanned aerial vehicles and systems. He has been the technical coordinator of ITA/CHESF UAS Project.

**Abstract:**
Having one of the largest aerial power lines structures of the world with length of as much as 95.000 km, there is a large demand for aerial inspection of these structures in Brazil. In this context, a R&D Project for a small unmanned aircraft system to be used for inspection of overhead power lines is being executed by ITA (Technological Institute of Aeronautics) working in partnership with CHESF (Hydro Electric Company of São Francisco) since 2010. CHESF has high voltage transmission lines with a total length around 18,000 km, which must be aerially inspected, even in the remote areas. Aerial inspection of electric power transmission lines is typically performed using human-piloted helicopters, a procedure that is both expensive and prone to accidents. This presentation is concerned with the management strategies used for developing the UAS including the partnership agreement composition, the

roles of the partners engaged in the project and the development models designed to achieve the objectives of the project. Some issues under consideration during the project development are UAS airworthiness, communication range, flight autonomy, reliability assessment, personnel, and equipment safety. Studies have been done considering the regulation constraints applied to the small UAS (less than 150 kg) for segregated airspace operation, as is the case in this application. The first official mission flight of the system is scheduled for 2012.

**26 16.45-17.05 26 October** **Experience in the development and use of UAS technologies for electric power grid monitoring**
**Antônio Hamilton Magalhaes, FITec (Fundação para Inovações Tecnológicas), Brazil**

**Bio data:**

Antônio Hamilton Magalhães, Master's degree in Electric Engineering by Universidade Federal de Minas Gerais - UFMG, Postgraduate (strict sensu) in Automation and Control by UFMG; Bachelor's degree in Physics by UFMG, Electronics Technician by Centro Federal de Educação Tecnológica de Minas Gerais - CEFET- MG. More than 26 year working on the development of analog and digital electronic circuits, products based on microprocessors, microcontrollers, FPGA/EPLD, digital signal processing, and embedded systems applied to telecommunications, industrial automation and electric power grid monitoring. Worked as project coordinator at CEL-Criações Eletrônicas, Audiolab, Lucent Technologies and FITec. Worked as hardware development manager at Lucent Technologies and FITec. Works as technical consultant at FITec - Fundação para Inovações Tecnológica. Works as teacher of disciplines telecomunication, digital electronics and microprocessors disciplines at Pontifícia Universidade de Minas Gerais - Pucminas.

**Abstract:**
Electricity utility companies need to frequently inspect their electric grid infrastructure. Due to the extensive size of the grid, the use of UAS technologies for this purpose seems to be suitable and cost effective. Considering these reasons, CEMIG (Companhia Energética de Minas Gerais) and FITec (Fundação para Inovações Tecnológicas) have been working, since 2004, on the development of UAS to support the job of utilities operational teams.
The initial goal was to verify the cost effectiveness and the technical viability regarding the use of UAS for this purpose. In this case, the project included the integration of commercial parts (e.g airframe, navigation and control system, photographic camera,..) to make a prototype to obtain photographs of the electric grid infrastructural devices. The initial goal was achieved successfully, then CEMIG and FITec started the development of their own UAS platform to meet specific application requirements concerning electric power grid and related operational issues. The platform includes airframe, navigation and control system, mission planning application software, hardware and firmware for payload control. The project also includes a launch and recovery system suitable for all-terrain operation without being runway dependant. This paper presents the project results and the new perspectives on electricity grid monitoring.

**27 17.05-17.25 26 October** **SARVant - A new multi-processor UAS Architecture using model driven development**
**Kalinka Castelo Branco, University of Sao Paulo, Institute of Mathematics & Computer Science, Brazil**

**Bio data:**

Kalinka Regina Lucas Jaquie Castelo Branco has a degree in Technology in Data Processing from the Foundation Paulista of Technology and Education (1995), a Master in Computer Science from the University of São Paulo (1999) and a Ph.D. in Computer Science from the University of São Paulo (2004). She is currently an Assistant Professor at the Institute of Mathematics and Computer Science - ICMC - USP, working in the department of Computer Systems. She has experience in Computer Science, with emphasis on Embedded Systems, Distributed Computing Systems and Parallel Computer, working mainly in the following areas: distributed systems, computer networks, security, performance evaluation and processes scheduling. She is a member of the Brazilian Computer Society.

**Abstract:**
This paper presents technical details of the development of SARVant, a small-unmanned aircraft (120 kg take-off weight) designed to carry a dual-band Synthetic Aperture Radar used for image applications over large geographic

areas. Organized as a redundant computer network, the SARVant architecture can have multiple units providing the same functionality in a redundant way. For example, multiple flight controllers can provide similar data to multiple control-surface controllers that evaluate the correct value to use. SARVant architecture presents some new features. The first new feature is the MOSA concept (Mission Oriented Sensor Array), the corresponding interface (SSI - Smart Sensor Interface) and protocol (SSP - Smart Sensor Protocol), which provide plug-and-play capability to ease the utilization of a range of payloads. The second new feature is IFA (In-Flight-Awareness). The key idea is to provide the aircraft with sensors and heuristics to replace the capabilities of the missing on-board human pilot. To support the redundancy that composes the UAS control software architecture model driven development was used. Several artifacts developed for a previous project, Tiriba, were adapted and reused. The first flights of the aircraft are due to start in the next few months. Autonomous flights are scheduled to start in the second half of 2011.

**28 17.25-17.45 Lighter-than-Air UAS technology for civil & military applications in Latin America**
**26October - Adrian Pena Cervantes, ImpactoAereo, Mexico**
**- Capitan Victor Enriquez, Ecuadorian Air Force, Ecuador**

**Bio data [Adrian Pena Cervantes]:**

Adrian Peña has an extensive background in avionics, telemetry, automation & control design. Since 2005 he has participated in Mexico in various projects involving the development of small UAS airships, as well as other Light UAS platforms. He has received training in South Korea, Japan, Spain, and other countries. He has participated in R&D projects with UAS community in other Latin America countries and Europe since 2009. His experience in the unmanned lighter than air vehicles & other UAS ranges from payload applications, sensors and GNC (Guidance, Navigation & Control) design to ground control station design and data link connectivity. As an active member of AUVSI, the International Airship Association and as UAS researcher he has made efforts with the aerospace industry and academy research centres in Mexico and Latin America to promote light UAS use by government & non-government organisations.

**Bio data [Capitan Victor Enriquez]:**

Captain Victor Enriquez Champutiz currently works as GNC researcher in the High Altitude Platform project at the Research and Development Center of the Ecuadorian Air force (CIDFAE). He holds an engineering degree in Electronics and Instrumentation from the Polytechnic School of the Ecuadorian Army and has held various positions with the Ecuadorian Air Force before joining the CIDFAE's research team. His research activities in the field of lighter than air UAS include the design and development of guidance, navigation and control systems for small unmanned airships, as well as test and evaluation of autopilot systems for LTA UAS and other unmanned aircraft.

**Abstract:**
Lighter-than-air (LtA) Unmanned Aircraft Systems have become an important part of the airship market worldwide. In recent years, developments by military and civilian organizations in Europe, USA and Asia have lead investigators and researchers in Latin America to propose the use of LtA equipment in diverse applications by government and military sectors, proposing a new alternative in the communications and surveillance/reconnaissance market. This paper gives a survey on the actual LtA-UAS market worldwide and offers a status report for the on-going LtA UAS programs in Latin America. It also provides a report of the author's experiences in recent research and development activities relative to LtA UAS equipment for diverse applications in the Latin American region.

17.45-18.00 Panel discussion: Questions & Answers

## DAY 3 - THURSDAY 27 OCTOBER 2011

### Session 9 - Operational Experience & Lessons Learned

**29 09.00-09.20 27 October**

**Operational experience & lessons learned with Small UAS (Iraq & Afghanistan) & Using Small UAS for security applications in a civil environment & supplying non-military aerial flight services.**
**Ian Glenn, ING Engineering, Canada**

**Bio data:**

Ian Glenn has been a leader in the unmanned systems field since 1996 when he assumed responsibility for the Canadian Army's UAV program. In 2000, Ian founded ING Engineering, Canada's Robotics Aviation Company, and serves as Chairman and CEO. With ING's unprecedented delivery of over 30,000 hours of Unmanned Aircraft System (UAS) Services in Afghanistan with the Canadian Army for both their Small and Mini-UAV requirements over the past three years, ING Engineering now provides services across a full range of commercial and civil applications. ING addresses the aerial and underwater sensor needs of sectors as diverse as law enforcement, forestry, mining, and oil and gas with world-leading solutions that are effective, affordable, safe and environmentally sound. Ian is also Founding President of Unmanned Systems Canada. He currently also serves on the Board of UVS International. Ian served as a Canadian Army officer for over 22 years before realizing his entrepreneurial aspirations. His education includes a Masters of Science in Electrical Engineering (USNPGS) concentrated on digital signal processing, electro-magnetics and data fusion, as well as a Mechanical Engineering degree (RMC), graduate studies in tank design in the UK, and the Canadian Army Command and Staff College. In 2008, he received the prestigious *Catherine Fargeon* Award for his contributions to the global UVS Community, as well as, the UVS Canada 2008 Individual Achievement Award. Ian is passionate about the opportunities to grow the Unmanned Systems market in Canada and internationally. As he found in Afghanistan, saving lives with unmanned systems is more than a job!

**Abstract:**

ING Engineering's experiences over the past three years in Afghanistan and with the civil and commercial market in Canada provide a unique view into the future of the unmanned systems sector in Canada and globally. Ian Glenn, Chairman and CEO of ING Engineering, will provide an overview of Canada's ScanEagle experience where ING delivered 30,000 hours of UAV ISR support directly to Canadian troops on the ground - flying more during this deployment than all other UAS programs in Canada combined. Based on this success in combat operations, where they delivered an unprecedented mission availability of over 99%, ING's team is now involved in delivering UAS services in the civil sectors ranging from oil and gas and critical infrastructure to law enforcement to environmental monitoring. Along the way, they are working with Transport Canada to redefine what is possible when manned and unmanned systems share the same sky.

**30 09.20-09.40 27 October**

**Use of UAS to improve surveillance efficiency of critical infrastructures (oil and gas pipelines)**
**Philippe Roy, ATE Aerospace, France**

**Bio data:**

Philippe Roy is Vice-President of ATE-AeroSurveillance with a focus on business and product development strategy. He has over 25 years of worldwide experience in the defence and aerospace electronics industry. He has direct experience in UAS payload and avionics development and a broad range of embedded computing technologies. Prior to working for ATE, Mr. Roy has held several technical and business management positions at Mercury Computer Systems, Kinetic Systems and Digital Equipment Corporation. He holds an electrical engineering degree from the Poitiers University and graduated from the Executive Management Program at Ivey School of Business in London, Ontario, Canada. He is the primary inventor and co-author of a US patent on methods, apparatus and systems for enhanced synthetic vision and multi-sensor data fusion to improve operational capabilities of unmanned aircraft systems He also holds an FAA commercial pilot license for multi-engine aircraft with instrument privileges.

**Abstract:**
The use of Unmanned Aircraft Systems to monitor oil and gas infrastructure is not new, although it is not yet a widely accepted surveillance solution. Most of the UAS systems currently in use for military or civilian applications are based on architectures designed to acquire data from a sensor suite and transmit that data to the ground via several types of data-links. These architectures are increasingly limited because of the growing imbalance between sensor data rates and data-link capabilities. This paper will focus on how the use of airborne sensor computing architecture can improve the results of UAS based surveillance systems. Whatever the missions are, UAS can be substantially more effective that their manned aircraft counterparts especially when they integrate intelligent on board systems. The paper will show application examples and results from real tests conducted over actual infrastructures.

**31 09.40-10.00 Small UAS for precision agriculture**
**27 October - Juan Sainz, IDETEC Unmanned Systems, Chile**
**- Stanley C. Best, Ministry of Agriculture, National Agriculture Research Institute, Chile & Eco-certification and Precision Agriculture Platform INIA - PROCISUR (Including Argentina, Uruguay, Brazil, Paraguay and Bolivia)**

**Bio data [Juan Sainz]:**

Juan Sainz is Bachelor of Sciences in Engineering & Industrial Civil Engineer, from the University of Chile. He is Project Manager at IDETEC Unmanned Systems for the Stardust I and II small UAS. He has high teamwork and leadership skills, adaptability to face new circumstances and challenges. He is a qualified external and internal UAS pilot for surveillance missions, meteorological surveys, flight testing (UAS Development Program), including night missions. He has conducted several mission at high altitudes in the Chilean desert (Atacama's Desert). He has knowledge of normal and emergency procedures, FAA regulations and UAS maintenance (piston and electric engines). He is a private pilot with more than 600 hours of flight time, RC pilot for more than 20 years (airplanes and helicopters).

**Bio data [Stanley C. Best]:**

Stanley C. Best is an Agronomist (1994) - University of Concepcion, Chile, and has a MSc in Agricultural Engineering (1997) from the University of Concepcion, Chile, as well as PhD in Bio Resources and Agricultural Engineering (2001) from Colorado State University, USA.
Since 2002, he has been the Chilean Director of Eco-certification and Precision Agriculture Platform INIA - PROCISUR (including Argentina, Uruguay, Brazil, Paraguay and Bolivia). Since 2001: National Research Director of Precision Agriculture Program, National Agriculture Research Institute, actually with projects in Viticulture and Fruit Trees. He is an ember in Scientific and Journal Committee; Member of the scientific committee of the 7th Symposium of Information & Technologies for Sustainable Fruit & Vegetable production. Montpellier, France 2005; Director of the steering committee & member of the scientific committee of the 8th Symposium of Information & Technologies for Sustainable Fruit & Vegetable production (www.frutic09.org), Concepción - Chile, 2009; Member of the scientific committee of the 7th World Congress of Computers in Agriculture & Natural Resources, Reno, USA, 2009; Member of the scientific committee of the International Conference of Agricultural Engineering, XXXVII Congresso Brasileiro de Engenharia Agrícola; Member of the scientific committee of the 4th Asian Conference on Precision Agriculture, Hokkaido, Japan in July 5-7, 2011; International Commission of Agricultural Engineering (CIGR), Section III & VII Board Member; Journal of Information Technology in Agriculture (JITAg) Editorial Board.

**Abstract:**
Small aerial system is a new and important tool to support precision agriculture processes. Using multispectral images, taken from small unmanned vehicles, is possible to detect problems in crops, like irrigation, fertilization and diseases in early stages of appearance. The complete system to support precision agriculture not only consists in the aerial vehicle and ad-hoc payload. Also, it's required GIS platform and agriculture focused software. It's important to consider user-friendly computer systems and high definition aerial images, like the ICAS (INIA Canopy Analysis System). The advantage in the use of SUAS for precision agriculture has been tested and proven by the INIA (Instituto de Investigaciones Agropecuarias) in Chile. Principal advantages of the system are: High precision IMU+GPS information, High quality multispectral images and Flexible operation. Complete system proposed by INIA include: Small UAS Stardust equipped

with Tetracam ADC Lite, Ensomosaic UAS GIS and ICAS. Presentation will include early results of the system, including images with NDVI (Normalized Difference Vegetation Index) and related information.

10.00-10.15 Panel discussion: Questions & Answers
10.15-11.00 Refreshment Break

## Session 10 - UAS Sub-System Development

**32 11.00-11.20 Aerial supervision mission control system**
**Rafael De Goes, eSysTech, Brazil**

**Bio data:**

Rafael De Goes is co-founder of eSysTech - Embedded Systems Technologies, and works as Industrial Director & Engineering Manager of Aerial Supervision Products. Has experience in ARM based Hardware & Software Development. He graduated (MSc) as Electronic Engineer from Universidade Tecnológica Federal do Paraná (UTFPR-PR), Brazil and obtained a degree in Industrial Informatics and Optics in 2002. He is also a Microsoft Certified Professional and Instructor at eSysTech trainings.

**Abstract:**
Aerial supervision missions are intensely evolving as a consequence of technology developments and increasing needs in both military and civil areas. The development of new UAS´s and their use in new areas are requiring supervision systems as a fundamental payload to carry out the intended missions. Aerial supervision has as basic component one or more sensors able to provide aerial images of the landscape and targets in the ground. Therefore it provides strategic information that cannot be provided by other systems. Aerial images, in different formats, have a great value in a number of missions like reconnaissance, surveillance of pipelines, and search and rescue. Aerial supervision mainly differs from satellite images in that the former may be obtained in real time, near the target, and from different perspectives. Aerial supervision systems may include sophisticated sensors allowing capturing high quality stabilized images and controlling the parameters of the image sensor (i.e. orientation, zoom, iris, and so forth). These sensors mounted in the aircraft are remotely controlled by means of a ground station to accomplish the goals of the supervision mission. Usually this comprises real time transmission of images from the aircraft to the ground, besides data about flight and the aircraft position and conditions. Modern aerial supervision systems make available new functionalities aiming at providing better planning and control of the mission, better support to the operators, more accurate information, and better debriefing functions. Integration of the supervision system with other information and decision units is also demanded.

**33 11.20-11.40 A practical implementation of a detect & avoid system**
**Michael Naderhirn, AeroSpy, Austria**

**Bio data:**

Naderhirn Michael graduated from the Johannes Kepler University of Linz (JKU) with a Master in Mechatronics (2002) and PhD in Mechatronics from JKU and MIT in 2011. Scientific research was done for Universidad of Piura, Peru, JKU Linz, Institute for Design and Control of Mechatronical Systems, Austrian Ministry of Defence, and UCLA, Los Angeles, USA. In 2005, he participated in the DARPA Grand Challenge with the Golemgroup working on Navigation. 2006 Michael Naderhirn established AeroSpy Sense & Avoid Technology GmbH working on Unmanned Aerial Vehicles (UAS) and Unmanned Ground Vehicles (UGV).

**Abstract:**
Over the past few years AeroSpy has developed a prototype for a Sense and Avoid system which is able to identify cooperative and non-cooperative intruders and safely avoid them. The system is presented to work as a pilot assistant system. Several environment sensors including ADS-B In, FLARM, and EO sensors are introduced by defining there basic requirements based on mathematical considerations and available published requirements. To integrate different environment sensors a sensor fusion algorithm with open software architecture is implemented with

the capability to track and classify the cooperative and non-cooperative traffic. The sensor fusion algorithm also predicts future states of the incoming traffic. Based on this setup a layered control strategy is proposed which first warns the pilot of possible collision second recommends the pilot a self separation procedure to de-conflict the UAS with the intruder aircraft and third initiates a collision avoidance manoeuvre in order to prevent a collision between the UAS and the intruder aircraft. The self separation strategy implements a «sensitive» separation planner which separates the UAS from incoming traffic based on predicted traffic information from the sensor fusion algorithm. The collision avoidance strategy implements a reactive collision avoidance algorithm which is activated if the self separation strategy fails and so has the highest security importance. We finally show some results from flight tests done with the Austrian Armed Forces and also flight tests done with a motor touring glider in which the Sense and Avoid system is installed and different intruder aircraft.

**34 11.40-12.00 The VideoScout programme**
**Jeffrey Goldfinger, L-3 Com, USA**

**Bio data:**

Jeff Goldnger retired from the United States Navy upon completion of twenty years of service as a Naval Flight Officer. During his military career, he accumulated over 1500 flight hours in various carrier-based tactical aircraft. Additionally, he was a qualified Pioneer UAS internal pilot and served as the Officer-in-Charge of a shipboard Pioneer detachment during a deployment to the Indian Ocean and the Arabian Gulf. Since retiring, Jeff has remained active in the unmanned aircraft community providing consulting and flight operation services to both U.S. government and industry customers. He has a Bachelor of Science degree in Computer Science and is currently a Director of Business Development at L-3 Communications, Interstate Electronics division. Jeff is also serving his 2nd year of a two-year term as Chairman of ASTM International's Committee F38 on UAS Standards.

**Abstract:**
As most of you already know, nearly all unmanned aerial systems have the capability of transmitting their video sensor data to remote terminals anywhere within the footprint of the platform's data link. There were two problems in the past with these remote video terminals. First, they normally only worked within the family of systems from a particular manufacturer. Second, they were only capable of viewing the video in real time and did not provide ability for storing, exploiting or disseminating. For the past five years, L-3 Interstate Electronics Corporation has been developing a commercial family of products called VideoScout that provides users with the ability to store, retrieve, clip, edit, manipulate, enhance and re-transmit video and still frame images along with all of the sensor metadata to include date, time, platform location, sensor type and target location. Furthermore, it is capable of receiving this sensor and platform data from all currently fielded Marine Corp UAS, as well as some manned aircraft sensor data. In 2011, the U.S. Marine Corps designated the VideoScout family as their sole Remote Video Viewing Terminal (RVVT) Programme of Record. This presentation will provide a brief history of the programme, a description of the capabilities, the Concept of Operations among our Navy and Marine Corps customers and future development.

12.00-12.15 Panel discussion: Questions & Answers
12.15-14.00 Lunch & Exhibition

## Session 11 - UAS Development

**35 14.00-14.20 The development of aerial platforms for the urban theatre**
**Sven Schmid, Santos Lab, Brazil**

**Bio data:**

Sven Schmid studied aerospace engineering at the University of Stuttgart in Germany where he graduated in 2004. He majored in fluid dynamics and structural mechanics. From 2004 to 2010 he completed his PhD thesis within the SOFIA project (Stratospheric Observatory for Infrared Astronomy) at the University of Stuttgart in Germany and the American space agency NASA in California, USA. Since April 2010 he has been working as a system engineer at Santos Lab in Rio de Janeiro. His responsibilities comprise: aerodynamic wing design, system integration, and autopilot programming.

**Abstract:**
The Carcará UAS is not only the first UAS in operation in the Brazilian military but is also a platform developed for the hardships of urban operation. From its inception the Carcará system has been conceptualized for a use in the cluttered urban scenario of Rio de Janeiro. With that challenge in sight, the Santos Lab team had to develop a fixed wing platform that could be deployed from a construction crowded scenario and quickly assume operating altitude. In addition to that, the Carcará system has to fly in a highly turbulent environment due to its proximity to the mountains that are common in the Rio de Janeiro landscape. As the system finishes the mission it has to land on a tight spot. That is why the Carcará system comes with a patented advanced deep stall landing mode, allowing the platform to descend in a virtually vertical slope. In order for it to land safely over an obstacle crowded space, the platform was developed out of expanded polypropylene foam, a material that gives the system an unparalleled ruggedness, leaving it ready for redeployment in 5 minutes.

**36 14.20-14.40 Development of a UAS for long endurance beyond line-of-sight operations**
**Ole Vidar Homleid, Robot Aviation, Norway**

**Bio data:**

Ole Vidar Homleid has an MSc in new renewable energy and environmental physics. from University of Oslo/Norwegian Institute of Technology, (Graduate Centre UNIK, Oslo 1994) and the University of Aas, Norway Environment and Bio-sciences (UMB, Aas1996). Since 2000 he is a Manager at Multiconsult AS (a Norwegian consulting and engineering company), responsible for establishing Planning and Energy departments at the Stavanger and Skien offices, and for developing the segment of new renewable energy and airport planning. He has a broad background and experience managing and organizing international multi-discipline technology projects. Mr. Homleid is a member of the Board of Directors of UVS International since 2009. He has a long experience and in depth knowledge of unmanned aircraft systems, developing technology and solutions for different applications. He has a broad knowledge and understanding of the UAS system and operations. Mr. Homleid is one of the founders and chairman of the Board of Robot Aviation, an independent Norwegian technology company founded in February 2008. The company objectives are to provide UAS solutions that meet a wide range of customer needs. Robot Aviation specializes in aircraft design and development, production, and operations of autonomous multi-sensor carrying aircrafts for both civilian and military markets. Mr. Homleid established UAS Norway in 2008, The Norwegian Federation of UAS developers and operators. Elected chairman from 2009 until 2011, UAS Norway is non-profit and independent, open to all private and public businesses and organisations related to unmanned aircraft. Mr. Homleid has also established UAS Nordic Conference, the leading UAS conference in Scandinavia. He represents UAS Norway in the International Coordination Council (ICC) of UVS International. Mr. Homleid is a glider pilot and the president of the national Norwegian Vintage Glider Club in Norway.

**Abstract:**
Robot Aviation is a Norwegian system and service provider of UAS for the civilian and military market. The company is designing and manufacturing integrated systems and solutions with a high focus on quality according to expected rules and regulations. The systems and operations are certified according to existing standards for manned aircrafts and UAS. Robot Aviation has experience in performing modern conceptual UAS design and has a strong background in complete UAS aircraft design and analysis. Advanced technology and composite materials are used to achieve an aerodynamically and structurally efficient airframe, to enable a high degree of fuel efficiency and long range endurance. Robot Aviation has in the past 3 years developed an UAS, Aerobot Canard under 150 kg using modern technology and according to regulations based on the Joint Aviation Requirements, JAR-22: sailplanes and powered sailplanes. The goal has been to develop the airframe with respect to the same requirements for equivalent manned aircraft and with the same level of security, both technically and operationally. First flight is scheduled for summer 2011 with a comprehensive test program. Beyond Line-of-Sight Operations (BLOS) will be demonstrated based on applications to the Civil Aviation Authority, Norway. Robot Aviation is in the process of establishing a service organisation with certified pilots and a quality system to perform UAS operations globally. The pilots are trained and certified according to the regulations applicable for BLOS missions. The presentation will focus on the work performed, system design and operational requirements in order to implement BLOS operations.

**37 14.40-15.00 Flexible VTOL solutions - How to accommodate multi-mission and growth capability in today's ever changing mission environment**
**Niklas Nyroth, CybAero, Sweden**

**Bio data:**

Niklas Nyroth is a highly experienced, global subject matter expert of UAS. He has been active for twenty years with management, development, integration, testing, fielding and sales of cutting edge unmanned military technology, with a constant focus on Unmanned Aerial Systems he worked with systems ranging from minis to MALE, and holds several patents in relation to unmanned system design.

**Abstract:**

CybAero will present how the APID-60 VTOL UAS provides flexible solutions to accommodate multi-mission and growth capability to its diverse groups of users, consisting of both military and civilian operators in today's ever-changing mission environment. The presentation covers the mature methods and technologies used to provide fully autonomous operations to moving decks during day and night missions that the APID-60 VTOL UAS is highly suitable for. The importance of multi-mission and growth capability in today's ever-changing mission environment by the use of:

- State of the art EO/IR day and night sensors
- Sophisticated software applications enabling unique capabilities
- Electronic Warfare support
- Automatic Identification System solutions for harbour and coastal areas

The presentation will focus on how to provide decision makers with complete situational awareness. CybAero's experience to achieve this aim by use of multiple payload solutions, coupled with powerful software solutions and a highly flexible platform the 180 kg APID-60 VTOL UAS. Examples of unique capabilities it has offered to both the military and civilian user will be presented. In particular it will highlight: The APID-60 recent achievements in highly diverse environments stressing the importance for multi mission capability in a modern VTOL UAS. Our presentation will detail many of the real life experiences we have gathered.

**38 15.00-15.20 UAS research & development at the Technology Center of the Brazilian Army**
**Ademir Rodrigues Pereira, Brazilian Army - Technology Center of the Army, Brazil**

**Bio data:**

Ademir Rodrigues Pereira is a graduate in electrical engineering from Instituto Militar de Engenharia (IME), Rio de Janeiro (1996). He obtained MSc degree in science also by IME in the area of automatic control systems (2002) and the degree of DSc by the Department of Electrical Engineering/Federal University of Rio de Janeiro (UFRJ) in mobile robotics (2011).

**Abstract:**

This work provides an overview of the Unmanned Aerial Vehicles (UAS) research and development performed at the Technology Center of the Army (in Portuguese: Centro Tecnológico do Exército - CTEx), in order to attend Brazilian Army's operational needs. First of all, aspects of the national UAS development are compared with the acquisition of this product in the foreign market. Then, a brief history of the development of UAS systems in CTEx is presented. After that, UAS projects in progress are shown. Finally, future perspectives of R&D and operational employment are outlined.

15.20-15.40 Panel discussion: Questions & Answers
15.40-16.25 Refreshment Break & Exhibition

## Session 12 - UAS Sub-System Development

**39 16.25-16.45 DPA-VANT Project - Automatic take-off and landing system development**
**Flavio Araripe d'Oliveira, Departamento de Ciência e Tecnologia Aeroespacial - Instituto de Aeronáutica e Espaço, Brazil**

**Bio data:**

Flavio Araripe d'Oliveira obtained his degree in Aeronautical Engineering from ITA in 1977, with the Awards: Engineering Institute, Neiva and Aerotec. He has a Masters Degree in Management of Science and Technology, from ITA in 1997. He works at the Institute of Aeronautics and Space (IAE), Department of Aerospace Science and Technology (DCTA), since 1978, mainly in Aeronautical Design, Analysis of Military Aircraft, and UAS Development. He was manager of several projects, including: Urubu Glide, Flight Refueling of the Xavante Aircraft, Aerial Towed Target, Piranha Missile Installation in the Xavante Aircraft, and UAS Navigational and Control System. Carried out several missions abroad, including one-year at the Stanford Research Institute (SRI), USA, in 1981, working with aircraft conceptual design software development. He worked for over 15 years in defining requirements for new aircraft programs of the Brazilian Air Force, as AL-X, F-5 Modernization, F-X, Patrol Aircraft P-3 and Transport Aircraft CL-X. He was member of the first evaluation team of the new F-X fighter aircraft in 2002 and participated in technical visits to the five competing companies (Lockheed, Dassault, Saab, MiG and Sukhoi). The main functions carried out at DCTA: Head of the Structures Section, Head of the Aeronautical Engineering Subdivision and Head of the Aeronautical Systems Division. Awards: «Mérito Santos Dumont», «Mérito Aeronáutico (Grau Oficial) » and «Amigo da Marinha». He is currently the coordinator of the DPA-VANT Project (Automatic Take-Off and Landing System for UAS).

**Abstract:**
The aim of the DPA-VANT Project is to develop an automatic take-off and landing (ATOL) system for unmanned aircraft. The project was initiated in 2010 and will be completed in 2013. The project is a joint development of DCTA/IAE (Air Force), CTEx (Army) and IPqM (Navy). It has financial support from FINEP, an agency of the Brazilian Ministry of Science and Technology. The ATOL system will be integrated in the Navigation and Control System developed in the VANT Project, which was concluded in 2010, with 59 successful flights. The ATOL system will be based on DGPS and precision altimeter sensors. The presentation will cover: UAS past experience, ATOL advantages, requirements definition, sensor selection, take-off and landing phases and flight test planning.

**40 16.45-17.05 Selex Galileo's integrated mission system for UAS**
**Nick Meyrick & Jerry Rimmer, Selex Galileo, UK**

**Bio data (Nick Meyrick):**

Nick Meyrick served in the Royal Air Force for over 30 years, retiring in the rank of Group Captain. His flying career included operational, instructional and test and development roles as a navigator within both the Buccaneer and Tornado Strike Attack forces and he accrued some 3500 fast-jet flying hours. Nick commanded the RAF's Electronic Warfare Tactics Range in Cumbria, UK and his staff appointments ranged from Air Staff roles within the Ministry of Defence to serving with the Americans at Headquarters European Command in Germany and with the UK's Defence Science & Technology Laboratory as the Senior Military Advisor for Air and ISTAR. Nick left the Royal Air Force in 2006 working first for Cobham Aviation Services in a Business Development role within their EW training sector before moving to Selex Galileo as the Campaign Lead for Air Systems UK. He is responsible for the development of UK opportunities for products and services conceived within the Italian Air Systems Group including the very successful Falco Tactical UAS.

**Bio data (Jerry Rimmer):**
Jerry Rimmer is the Head of Strategic Campaigns for the Unmanned ISTAR Solutions Business Group (UISBG) within Selex Galileo. The UISBG is a trans-national group operating across several lines of business and was set up to develop and market a platform agnostic mission system sensor capability for the MALE UAS market. Jerry is also

the Head of Strategic Campaigns within the Radar and Advanced Targeting domain based at Edinburgh. He is responsible for leadership of Strategic Campaigns, Key Account Management and Special Project activities in alignment with company strategy. After gaining an honours degree in Electronic Engineering at Nottingham University, Jerry started a career spanning 25 years in the Royal Air Force as a fast-jet pilot. Flying training culminated in operational tours on Jaguar and Tornado aircraft. He has flown on active operations in support of the UK contribution to UN enforcement of the 'No Fly Zone' over Northern Iraq and was also selected as the Commander British Forces Reconnaissance Team to Tallil Air Base in Iraq during the conflict. Jerry has held key plans, procurement and requirement posts in the Ministry of Defence and Defence Export Sales Organisation in the UK and abroad. He left the RAF in 2003 to take the position of Chief Operating Officer for the Atlantic Group of four aviation companies at Coventry before accepting the position of Deputy Business Development Director for BAE Systems based at Rochester. He moved to Selex Galileo in November 2008.

**Abstract:**
Nick Meyrick, Campaign Lead for Air Systems UK, Selex Galileo and Jerry Rimmer, Head of Strategic Campaigns UISBG Selex Galileo, brief of current and evolving UAS capabilities within Selex Galileo including the creation of an integrated mission system for the Unmanned Aircraft Systems (UAS) ISTAR requirements. The presentation will introduce the UAS products and mission system, detailing each of the components and the capabilities that they provide to the end user. Specifically, it will draw upon SELEX Galileo's systems integration expertise, which allows for true sensor integration and data fusion. It will also expand on the key mission system principles, including:
- Flexible open architecture
- Platform agnostic
- Automated systems
To conclude, there will be an explanation on how the mission system will provide the right information to the customer, meeting specific requirements, in both the home and export markets.

**41 17.05-17.25 Command and control system for UAS**
**Benedito Carlos de Oliveira Maciel, Flight Technologies, Brazil**
**Nei Brasil, Flight Technologies, Brazil**

**Bio data [Benedito Maciel]:**

Dr. Benedito Maciel has a degree in Mechanical Engineering from the University of São Paulo - School of Engineering of São Carlos (1998), Masters in Electrical Engineering from the University of São Paulo - School of Engineering of São Carlos (2001) and Ph.D. in Aeronautical and Mechanical Engineering from Technological Institute of Aeronautics (2008). He is co-founder and partner of Flight Technologies, where he has been involved in the fields of Engineering and Research and Development of new technologies. He has experience in Electrical Engineering with emphasis in Control Systems, acting on the following topics: modeling and simulation of systems, analysis and design of control systems, parameter identification and flight tests.

**Bio data [Nei Brasil]:**

Nei Brasil is Co-Founder and President of Flight Technologies S.A.. He started as an entrepreneur in his own company, in 2005. From 2006, he lead the Unmanned Aircraft Systems development programmes at the company. He has conducted several flight testing campaigns for the Brazilian Armed Forces development programmes. Since 2009, he has been leading the company's re-structuring and leveraging it as a Command, Control and Intelligence company for the Defense and Security market.
Nei Brasil is commercial pilot and graduated in Aeronautical Sciences with honours from the Pontifícia Universidade do Rio Grande do Sul (PUCRS). He is an aeronautical accident investigator graduated from the Centro Nacional de Investigação e de Acidentes Aeronáuticos (CENIPA), and a specialist in Continued Airworthiness and Aviation Safety; he has a Masters in Aeronautical Engineering from the Instituto Tecnológico de Aeronáutica (ITA). He graduated in UAS Flight Testing from the National Test Pilot School (NTPS, Mojave, USA) and he is currently following the CEO FGV course, a

Masters in Business Administration at the Fundação Getúlio Vargas (FGV).

**Abstract:**
One of the strategic objectives advocated by the prevailing National Defence Strategy is to adjust the Armed Forces to the strategic-political size of the country through the emphasis on Intelligence and Flexibility for immediate response, by improvement of the capacity on command and control, in addition to the increase of the intelligence systems of the agencies involved with the National Defence. An effective Command and Control System is crucial to ensuring the efficient operation of Military Power in regard to response time, since mobility, speed and communication are essential in modern warfare. The development of interoperable, flexible, modular, and secure architectures based on robust and easy maintenance are key requirements for achieving the strategic objectives. Thus, the availability of Command and Control Systems with these characteristics is a necessary condition for the direction that a commander has on their forces and to fulfill the missions assigned to it. Thus, this paper proposes a Command, Control, Communication and Intelligence System for the use of Unmanned Aircraft Systems, whose goal is to maintain and operate a system for collecting, processing and sharing data and knowledge derived from intelligence remote sensing, monitoring and analysis of the electromagnetic spectrum, and information processing in order to provide support for strategic planning and operational within the Armed Forces.

| | |
|---|---|
| 17.25-17.40 | Panel discussion: Questions & Answers |
| 17.40-17.50 | Conclusion & Closing Remarks |