



14th Consecutive Year



THE INTERNATIONAL RPAS POLICY FORUM

REMOTELY PILOTED AIRCRAFT SYSTEMS

**Planète Equinoxe
18-20 rue du Col. Pierre Avia, 75015 Paris, France
5-7 June 2012**

CONFERENCE PROGRAMME

Including Speaker Bio Data & Abstracts

ORGANIZED BY



**BLYENBURGH & CO, FRANCE
FOR & ON BEHALF OF UVS INTERNATIONAL**

DAY 1 - TUESDAY 5 JUNE 2012

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- 02 09.20-09.37 EC UAS Panel: Conclusions & Way forward
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Dag Paulsen, ProxDynamics, Norway
- 11 14.51-15.08 Development of an all weather multi-functional RPAS for the Ministry of Extraordinary Affairs
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Michqael Thoss, microdrones, Germany (in coordination with Thyssengas, Germany)
- 13 16.37-16.54 Light RPAS for industrial site inspection
Paolo Marras, Aermatica, Italy (in coordination with ENEL, Italy)
- 14 16.54-17.11 Application: Intensive use of RPAS in the protection and maintenance of pipelines
Nikos Bogonikolos, Aratos Technologies, Greece
- 15 17.11-17.28 India: RPAS opportunities for non-military applications
V.S. Srinivasan, Nova Integrated Systems Ltd, India
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- 17 09.17-09.27 French regulatory situation for civil RPAS
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LtCol Christophe Vivier, DSAÉ, France
- 19 09.34-09.51 Russian Federation: The national regulatory situation
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- 20 11.00-11.17 EUROCAE WG73: Programme update
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- 21 11.17-11.34 RTCA SC203: Situational update
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- 22 11.34-11.51 Status update on ASTM efforts on development of standards for small UAS
Theodore Wierzbanski, AeroVironment, USA (on behalf of ASTM Committee F38)
- 23 11.51-12.08 WG on Light RPAS: Introduction & Objectives
Ron van de Leijgraaf, Ministry of Infrastructure and the Environment, The Netherlands (on behalf of EUROCAE WG 93)
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Col Gilles Rendreau, French Army 61st Artillery Rgt, France
- 26 14.34-14.51 Non-military RPAS: The privacy issues
Peter La Franchi, LFRG Ltd, Australia
- 27 14.51-15.08 KZO - 3 Years of service in theatre, programme update and sharing the experience
Bjoern Symank, Rheinmetall DE, Germany
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André Clot, European Unmanned Systems Centre, UK
- 30 16.54-17.11 ASTRAEA - Final year programme update
Jeremy Howitt, QinetiQ, UK (on behalf of the ASTRAEA Consortium)
- 31 17.11-17.28 ULTRA: Introducing UAS into European airspace
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- 33 09.17-09.34 From ICAO to EASA
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- 34 09.34-09.51 JARUS: A situational update
Alistair Maxwell, JARUS - Joint Authorities for Rulemaking on Unmanned Systems, International
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Mike Lissone, EUROCONTROL, Belgium
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Masaaki Nakadate, Japan Aerospace Exploration Agency (JAXA), Japan
- 37 11.34-11.51 A vision on urban UAS infrastructures and related technologies, code of behaviour & Responsibility enforcement
Catherine Fargeon, Ministry of Defence, CGArm, France
- 38 11.51-12.08 Concept development of a Sense and Avoid system for RPAS operations in domestic US Airspace
Kyle R. Noth, Mitre Corporation, USA
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Stephen May, General Atomics Aeronautical Systems, USA
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Neil Hunter, Schiebel Aircraft, Austria
- 41 14.34-14.51 Patroller : Update and new capabilities
Olivier Reichert, Sagem Défense & Sécurité, France
- 42 14.51-15.08 RELIFO: Automatic system for detection of obstacles and hotspots in the overhead powerline
Juan Larrauri, Deusto University, Spain
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- 44 16.37-16.54 Does smaller mean better? The future of the mini RPAS market
Meir Moalem, MultiModis M.M.Ltd., Israel
- 45 16.54-17.11 AETOS: Automated autopilot & geointing payload
Vassilis Foteinopoulos, Aerofilms, Greece
- 46 17.11-17.28 The development of a multi-spectral sensor for the inspection of electrical power lines
Roel Stolper, CSIR, South Africa
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- Aermatica, Italy (in coordination with Enel, Italy)
- Aerofilms, Greece
- AeroVironment, USA (on behalf of ATSM F38)
- Aratos Technologies, Greece
- ASTM Committee F38, USA (represented by AeroVironment, USA)
- ASTRAEA Consortium, UK (represented by QinetiQ, UK)
- AVINOR, Norway (on behalf of EUROCAE WG73 on UAS)
- CAA, UK (on behalf of JARUS)
- CSIR, South Africa
- Deusto University, Spain
- DGAC (CAA), France
- DSAE - French State Aviation Safety Agency, France
- EASA - European Aviation Safety Agency, Europe (2 presentations)
- ECAC - European Civil Aviation Conference, Europe
- EDA - European Defence Agency, Europe
- EUROCAE WG73 on UAS (represented by AVINOR, Norway)
- EUROCONTROL, Belgium (2 presentations)
- European Commission, DG Enterprise, Europe
- European Commission, DG Mobility & Transport, Europe
- European Unmanned Systems Centre, UK
- European Working Group on Light RPAS (represented by Ministry of Infrastructure and the Environment, The Netherlands)
- FAA - Federal Aviation Administration, UAS Integration Office, USA
- French Army, 61st Artillery Regiment, France
- FRONTEX, Europe
- General Atomics Aeronautical Systems, USA
- ICAO - International Civil Aviation Organization, International
- INDRA, Spain (on behalf of the ULTRA Consortium)
- JARUS - Joint Authorities for Rulemaking on Unmanned Systems
- JAXA - Japan Aerospace Exploration Agency, Japan
- LFRG Ltd, Australia
- Market Info Group, USA (India office)
- microdrones, Germany (in coordination with Thyssengas, Germany)
- Ministry of Defence, Conseil Général de l'Armement, France
- Ministry of Infrastructure and the Environment, The Netherlands (on behalf of the European Working Group on Light RPAS)
- Mitre Corporation, USA
- MultiModis M.M.Ltd., Israel
- NASA - National Aeronautical and Space Administration, Dryden Flight Research Centre (DFRC), USA
- Nova Integrated Systems Ltd, India
- Padina Group, USA (on behalf of RTCA SC203)
- ProxDynamics, Norway
- QinetiQ, UK (on behalf of the ASTRAEA Consortium)
- Rheinmetall Defence Electronics, Germany
- Royal Army - Royal Artillery, 32 Regiment, UK
- RTCA SC203, USA (represented by The Padina Group, USA)
- Sagem Défense & Sécurité, France
- Schiebel Aircraft, Austria
- SESAR Joint Undertaking (JU), Europe
- TsAGI, Russian Federation
- ULTRA Consortium, Europe (represented by Indra, Spain)
- Zhukovsky National Aerospace University "KhAI", Ukraine

00 08.50-09.00 **Welcome & Opening Remarks****Session 1 - RPAS Policy**01 09.00-09.20 **ICAO UAS Study Group: Current Status & The way ahead**
Leslie Cary, ICAO - International Civil Aviation Organization

Bio Data Leslie Cary is a Technical Officer in the Air Traffic Management Section of the Air Navigation Bureau at the International Civil Aviation Organization (ICAO) and is Secretary of the ICAO Unmanned Aircraft Systems Study Group. As Secretary, she is responsible for coordinating all developments related to unmanned aircraft systems within the ICAO framework. This includes working with Technical Panels, Study Groups and relevant external bodies on development of guidance material and, eventually, the full range of Standards and Recommended Practices which will establish the basis for global interoperability and harmonization of UAS. Prior to joining ICAO in mid 2006, Ms. Cary was with the U.S. Federal Aviation Administration (FAA). She spent 14 years as an air traffic controller at Anchorage Air Route Traffic Control Center and 6 years at FAA headquarters facilitating implementation of various international ATM and CNS initiatives.

Abstract The presentation will provide an overview of ICAO's role in the development of aviation standards, including those applicable to remotely piloted aircraft systems (RPAS); the mandate of the ICAO UAS Study Group; and expectations for development of Standards and guidance material. Most significantly, recently adopted Standards related to RPAS operations will be discussed and their relevance for subsequent provisions.

On-going aspects of the UAS Study Group which will be described include:

- Concept for airworthiness;
- Approval of RPA Systems;
- Operator certification;
- Licensing and competencies;
- Terminology;
- Special authorizations; and
- RPAS Manual development.

02 09.20-09.37 **The UAS Panel. Final report from the European Commission**
Matthew Baldwin, European Commission, DG Mobility & Transport (MOVE), Europe

Bio Data Matthew Baldwin is currently Director for Air Aviation and International Transport Policy in DG MOVE at the European Commission in Brussels. He is responsible for:

- coordination of international transport policy;
- the EU's international aviation negotiations;
- aviation single market;
- developing the Single European Sky reforms for Europe's air traffic control system;
- air safety issues;
- aviation and the environment;
- airports and infrastructure.

He leads a closely integrated team of 100 staff. Before joining DG MOVE, he was a trade negotiator. He was most recently Director in DG Trade in charge of market access and industry matters, but before that, he was deputy chief of staff for five years in Commissioner Lamy's cabinet, covering all trade issues, notably the launch of the Doha Round and China's accession to the WTO. He was also Head of Unit for market access and subsequently Head of Unit for WTO matters in DG Trade. From 2007-10, he served in President Barroso's cabinet as advisor for all issues relating to trade, energy, development and climate change. Before joining the Commission in 1999, he worked for the British Government in a variety of posts in London, Brussels and Washington (where he was seconded to the European Commission's Delegation). He worked on a range of issues such as US trade policy, competition, the Single Market, and energy. He was born in 1963 in the UK and was educated at Oxford and Harvard Universities. He is married to Emanuela Silvestri with two sons, Lorenzo and Federico.

Abstract On 1st July 2010, the European Commission and the European Defence Agency jointly organized a High Level Conference on UAS. About 450 participants from all over the world discussed issues such as how UAS can support European policies, the different uses of UAS, and institutional and infrastructure measures to allow UAS to fly in non-segregated airspace. The conclusions of that important event clearly indicated the need for an EU lead initiatives aimed at supporting the industrial and customer aspirations to develop a robust European UAS market. After this successful event, the European Commission felt the need to take stock of all the elements collected, while looking ahead to understand whether an overarching initiative, led by the European Commission, was effectively required. It was immediately clear that the many initiatives undertaken in Europe in support of the UAS sector were fragmented, and that there was no coherent approach toward a common EU objective. Moreover, the need to clearly identify which obstacles are hampering a full exploitation of civil UAS, and how to remove them, was considered an important prerequisite for any further actions. To this end, on 23 June 2011, at the Paris International Air Show, the European Commission launched a new initiative aimed at providing the Commission with the necessary background information to prepare a strategy paper for the future of UAS in the European Union. This initiative called «UAS panel» was composed of five thematic workshops, the last one held in February 2012.

The conclusions of this complex exercise are still being drafted. They will be presented together with some thoughts from the European Commission on the way ahead.

03 09.37-09.54 EUROCONTROL's view of the future
Luc Tytgat, EUROCONTROL, Belgium



Bio Data Luc Tytgat joined EUROCONTROL as Director of the Single Sky Directorate on 16 March 2011, after having worked for twenty years in the field of air transport in the European Commission and ten years in the Belgian Air Force. Luc Tytgat began his career in aviation in 1976 when he joined the Belgian Military Academy to study aeronautical engineering. After graduating in 1981, he worked in various areas in the Belgian Air Force, ranging from jet maintenance to electronic warfare. In 1990, he obtained a Master's Degree in Public Management and moved over to the European Commission to join the Cabinet of Karel Van Miert, dealing at that time with state aid, the international market, industry policy and air transport. For the next ten years, he worked on air transport matters in different parts of the Commission - Research and Innovation; Enterprise and Industry; Transport and Energy. At the beginning of his time there, he was deeply involved in harmonisation matters - air traffic control equipment and navigation infrastructure, laying the foundations for work on the Single European Sky that he was to lead later. He devoted seven years to space issues, managing the Galileo programme and coordinating negotiations between Europe and the United States and Europe and Russia. He was also instrumental in developing the European Union's first space policy. In 2006, he became Head of the Single Sky Unit at the European Commission. He was responsible for the implementation of the Single European Sky second legislative package and helped set up the SESAR Joint Undertaking. He was directly involved in extending the European Aviation Safety Agency's competencies and implementing the Framework Agreement with EUROCONTROL. Once the regulatory groundwork of the Single European Sky had been laid, the appeal of being able to help actually implement the programme was irresistible and so he moved over to EUROCONTROL to do this in March 2011.

Abstract This presentation will provide an overview of EUROCONTROL's approach toward UAS integration. The overall approach towards integration is that UAS will have to fit into the ATM system and not that the ATM system needs to adapt to enable UAS integrate safely. Just like manned aviation UAS will have to prove to be as safe as or safer than present manned operations. UAS operations will also have to be as close as manned aviation certainly for ATC as it will not be possible for them to effectively handle many different types of UAS with different operational characteristics. The exploitation of the existing operational experience in the European Armed Forces will provide benefits of a common civilian/ military approach. The common UAS Air Traffic Insertion Initiative is expected to deliver the impetus for structural and regulatory improvements to the benefit of the Civil and Military domain. UAS will help Europe reach smart, sustainable and inclusive growth, delivering vital capabilities for our civil/military end-users. Through the identification of suitable airspace, without segregating, first integration experiences will contribute toward paving the way for safe UAS insertion. The stepped approach will also allow for suitable technology to be developed to support further integration, using Military experiences gained so far. It is the European vision to allow any certified UAS access to all airspace classes if suitable equipped.

09.54-10.10 Panel Discussion
10.10-11.00 Refreshment Break

Session 2 - RPAS Policy

04 11.00-11.17 EASA's vision of the future
Yves Morier, EASA - European Aviation Safety Agency, Europe



Bio Data Yves Morier graduated from the French Civil Aviation Academy (ENAC: Ecole nationale de l'aviation civile) in 1978 as an Air Transport Engineer. After his military service, he became deputy-head of regional office of the French Civil Aviation Authority (DGAC) from 1979 to 1985 and then joined the airworthiness, operations and licencing rulemaking office from 1985 to 1991. He was Regulations Director of the JAA between 1991 and 2004. He joined EASA in 2004 as Head of the Department product safety in the Rulemaking Directorate and moved to his present functions in 2010. Yves Morier was born in 1956, he is married and has two daughters.

Abstract The presentation will start by briefly presenting EASA as it stands today and then, based on a possible picture of the future, provide some indications on EASA's safety strategy in particular in relation to RPAS.

05 11.17-11.34 ECAC and RPAS
Peter Kirk, ECAC - European Civil Aviation Conference, Europe



Bio Data Peter Kirk joined the European Civil Aviation Conference in June 2008, as Deputy Executive Secretary responsible in particular for environmental, safety and air traffic management. Peter Kirk joined the European Civil Aviation Conference in June 2008, as Deputy Executive Secretary responsible in particular for environmental, safety and air traffic management issues. Peter worked for the UK Department for Transport, from which he is seconded to ECAC, in a variety of positions from 1983. These included work on rail investment, shipping legislation, and policy issues connected with the construction of the undersea rail tunnels between the UK and France. But Peter's career with the Department was otherwise spent largely in aviation-related posts. He was at various times responsible for policy in relation to the UK's London airports; the examination of options for additional runway capacity to serve SE England; and for leading the UK's engagement with the World Health Organisation and UNECE on the health impacts of aviation and other transport modes. As UK transport policy attaché in Washington DC, while on secondment to the UK Foreign Service, Peter worked between 1992-97 on a range of issues connected with the UK/US aviation relationship. On

his return to his home Department in 1997 Peter led reviews of UK transport safety regulation and inland water safety, and served as Private Secretary to successive Ministers of Transport. In 2002 he was seconded to an independent review of UK airport security commissioned by the UK Government, and later appointed UK Assistant Director of Aviation Security, responsible in particular for the UK's international aviation security policy, in which capacity he served on the ICAO Aviation Security Panel.

Abstract

What does ECAC bring to the Remotely Piloted Aircraft Systems party? The answer lies in its unique status as Europe's largest and longest-standing international aviation body, whose 44 Member States have enabled it for more than half a century to bring a uniquely pan-European perspective to all issues affecting aviation in the region. ECAC is fully supportive of the current initiatives aimed at establishing the conditions in Europe under which Remotely Piloted Aircraft Systems can flourish and be integrated into the existing arrangements. The safe operation of RPAS in non-segregated airspace is a challenging objective only achievable through the application of innovative technologies and systems, and the design and implementation of a sound regulatory framework. ECAC's Directors General have a real and immediate interest in promoting the establishment of a successful RPAS sector in Europe, underpinned by uniform regulation harmonised across all 44 ECAC Member States. ECAC therefore participates in the work of the UAS Panel established by the European Commission to prepare an EU strategy for RPAS, ensuring that this work is visible to its non-EU Member States so that they too have the opportunity to feed into the development of that strategy. The sooner that Europe has established common rules, standards, procedures and practices for RPAS, and the wider the scope of their adoption, the stronger it will be in the global market for RPAS applications. ECAC is committed to the establishment of a vibrant and competitive RPAS sector in Europe, and to ensuring that all ECAC Member States can both contribute to achieving that goal and enjoy the economic and societal benefits that doing so will undoubtedly deliver.

06 11.34-11.51

RPAS Integration into European airspace

José Antonio Calvo, SESAR Joint Undertaking, Europe



Bio Data

Jose Antonio Calvo graduated as an Aeronautical Engineer from the Polytechnics University of Madrid, Spain. Prior to joining the SESAR Joint Undertaking, J.A. Calvo worked at the Spanish Civil Aviation Authority for fourteen years holding different managerial positions in the field of Air Navigation. His last position was Deputy General Subdirector for Air Navigation. In these positions he had a long experience of work with the Military, being chairman of the Spanish Civil-Military joint Rulemaking standing committee since 1998

J.A. Calvo worked extensively in the construction of the Single European Sky. He was appointed Vice Chairman of Eurocontrol's Safety Regulation Commission in 2008 after having held this position already between 2000 and 2003. He also took part in the first High Level Group for the constitution of the Single European Sky chairing one of its Sub-Groups, and held the representation of the Spanish Civil Aviation Authority in the Single Sky Committee since its origin.

Before this, he worked as aeronautical engineer in the Spanish National Institute for Aerospace Technology (INTA), in the regional airline Binter, and in Airbus Industries in Toulouse and Filton.

Since 1 June 2009, J.A. Calvo holds the Chief Regulatory Affairs position at the SJU. In this position, he mainly ensures the link between national or supranational aviation Authorities and the SJU. This activity covers the management of the regulatory and standardization roadmaps, as well as the involvement of the Authorities in the review of SESAR deliverables. At the national level, this relates to national regulatory authorities and national supervisory authorities both civil and military, and at the international level, the European Commission in its role as regulator; Eurocontrol in their work in support to regulation, the European Aviation Safety Agency and ICAO. He is also involved since 2012 in the EUROCAE Council. J.A. Calvo is the focal point for the UAS activity at the SJU.

Abstract

The SJU is in charge of the development phase of the SESAR programme aiming at the modernisation of the European Air Traffic Management system. As such, it is one of the European Entities involved in the integration of RPAS into European airspace. The full integration of RPAS into the current European airspace is already a challenge that requires the joint effort of regulators, industry and operators. A first critical step to successfully ensure this integration is to have a clear view on the usage of airspace by UAS, hence the need for a UAS concept of operations. We need this concept of operation for all possible types of use: "public" use, military as well as non-military, and a "civil" use covering the rest, whether commercial, corporate, or any other. This concept of operations should also regard at all types of UAS: the big ones but also the small UAS under 150Kgr.

Building on this concept of operations, it will be possible to establish the requirements for the UAS to operate in non-segregated European airspace. These steps would very well provide for an integration of UAS in today's airspace: the role of the SJU is to ensure that this integration will not be compromised by the foreseeable evolution of the ATM system. In the future European airspace, the difference between conventional aircraft and UAS regarding its operations, might not be as significant as today. The fact that the UAS is an upcoming category of airspace user has to be considered carefully in the context of the development of the future ATM system. But the UAS community could also take advantage at some of the technological and operational developments of SESAR to facilitate their integration in the common airspace.

07 11.51-12.08

UAS: The strategic approach of the European Defence Agency

Giampaolo Lillo, European Defence Agency, Europe



Bio Data

Brigadier General of the Army Corps of Engineers Giampaolo LILLO began his officer career at the Scuola di Applicazione di Torino where he attended the Army Corps of Engineers course. After his Aeronautical Engineer diploma at the Politecnico of Turin he joined a two years post graduate course for specialisation on armament for Military Engineers of the Army in Turin and Rome, the IT Army War College in Civitavecchia and the national Joint War College in Rome, the 103° Senior Course of NATO Defence College and the SERA Course organized by the French Ministry of Defence and the "High level course for Security and Defence" held

by the European Security and Defence College in Brussels. He started his career as Chief of the Test and Study Section of the Land ammunition military factory in Baiano di Spoleto and after that he moved to Portogruaro (Venice) where he was Technical Supervisor of the two main weapon systems of the 3rd Missile Brigade, the Lance Missile weapons System and the surveillance UAV "Drone AN USD 501". Later in Rome, he was Director of the Land Artillery missile Section of the General Directorate of Land Armament of the Ministry of Defence, where, as IT MLRS program Manager and FIROS 30 Project Manager, he was in charge of the establishment of the European production line of the MLRS rocket systems and of the qualification program of the FIROS 30 rockets. During the same time he also covered several other national and international tasks such as National Representative at the Western Armament Group (WEAG) CEPA 13 Steering Committee (R&T in the field of energetic materials), at NAMSA in the field of integrated logistics and as associate professor in Missile technology at the post graduate Specialisation course for Military Engineers of the Army. Afterward in Paris, Brigadier General LILLO was involved in the development program of the anti-aircraft weapon system FSAF in the French-Italian program office as responsible of Missile and Launchers Division for Italy. Back in Rome, at the Research and Technology Department (5^o Reparto) of General Secretariat and National Armament Directorate of IT MOD, he had been in charge of research strategy and Defence technology research planning and management by covering a number of tasks in the past eleven years such as, R&T Strategy Office Chief, Deputy Chief Department, Chief Department and R&T Director, covering also a number of international positions in the R&T field such as NATO RT Board Member and LoI Group of Research Director Member. Included in his responsibility was also the Military Patents and IPR Service of IT MOD which is in charge of verifying all the national patents productions for Defence purposes. Brigadier General LILLO is also member of the Security Program Committee of the 7th Framework Program for EU Research on behalf of the IT Ministry of Education, University and Research where he is in charge of the interministerial coordination on the subject of Research for Security. Lastly he is member of the Ministerial Commission for the supervision of management of the National Aerospace Research Program (PRORA) and of the National Centre for Aerospace Research (CIRA) and Member of the professional Engineers association of Rome. Brigadier General LILLO is Officer of the Order of Merit of the Italian Republic, he is married and has two daughters. Since December 2011 he has been appointed EDA Armaments Director.

Abstract

The military domain has large experience in operating UAS and was first assessing the demand for Air traffic insertion in order to enhance effectiveness and safety. EDA is committed by ministerial decision to identify necessary actions and to initiate activities in this field. The presentation describes the principles and the rationale of EDA's contribution at present and in the future.

12.08-12.30 Panel Discussion
12.30-14.00 Open Bar & Lunch Buffet

Session 3 - Programme Status

08 14.00-14.17

RPAS Potential for border surveillance - Challenges of Introducing RPAS technology in an operational context
Zdravko Kolev, FRONTEX, Europe



Bio Data

Zdravko Kolev is a research officer at Frontex Research and Development Unit of the FRONTEX agency. He joined the agency in August 2007 as seconded national expert from Bulgarian Border Police with rank Border police inspector. His experience includes fifteen years service in various positions at the Bulgarian Air Defence, NAVY and Border Police. His background has always been connected with operational assessment of technologies relevant to border security and border surveillance tools. He has a Master of Science in engineering in radar technology from Bulgarian Military Air-Defence University.

Abstract

In recent years the potential of RPA technology for civilian and law enforcement use has been recognized in areas such as environmental monitoring (monitoring of fires, floods); wildlife monitoring (monitoring of endangered species such as whales); agriculture (surveying crops), as well as traffic control and border surveillance. Up to now there is limited experience with the actual deployment of Remotely Piloted Aircraft System (RPAS) in support of border surveillance. This technology is of particular interest of Frontex and EU Member states for improving the capacity to detect and track small and unseaworthy vessels, which are being used on a regular basis for irregular migration and cross-border crime (e.g. drug smuggling). The use of such vessels has multiplied the death toll of migrants drowning when trying to reach EU shores. For border surveillance operations RPAS technology might offer great potential by improving the aerial surveillance capacity resulting in more lives saved. However, to realise its potential and in order for end-users to consider the use of remotely piloted aircraft, the critical issue of operating RPAS in normal airspace urgently needs to be resolved. Overall, RPAS still need to prove both their safety and their cost-effectiveness in order to be considered a relevant surveillance asset.

09 14.17-14.34

The Australian federal unmanned systems & RPA market in Dollar terms : 2000-2020
Peter La Franchi, LFRG Ltd, Australia



Bio Data

Peter La Franchi is the editor in chief and head of research at LFRG Pty Ltd, a newly established analysis firm focused on the defence, aerospace and remote sensing sectors. He has specific responsibility for a new international unmanned systems business journal being launched in mid-2012. This paper is directly based on research undertaken in Australia between 2008 and 2011 as part of a book Mr La Franchi is writing on the business of unmanned air systems. Mr La Franchi has been published extensively in the international defence and aerospace media and was the first ever unmanned aviation editor of Flight International magazine. He has 20 years of journalistic experience, specialising in the unmanned air systems sector since 2001. Mr La Franchi was first introduced to RPA in his role as a policy advisor and public spokesman for the Australian Minister for Defence for the period August 1990 to May 1993, this period including the First Gulf War of 1991.

Abstract Since 2000 the Australian Federal Government has awarded contracts worth over A\$1 billion for acquisition, sustainment and development of unmanned systems capabilities. The bulk of these outlays have met Defence requirements, but with significant expenditure also seen by a variety of other Federal agencies such as the Australian Customs Service and the Australian Federal Police. Tens of millions have likewise been spent in support of research and development activity by Australian companies and tertiary institutions. This surprising and largely hidden level of Federal spending mirrors the rise of the global market for unmanned systems over the past decade and comes ahead of an anticipated A\$1.5 billion dollar spend on new operational RPA capabilities for the Australian Defence Forces between 2011 and 2021. Based on an extensive analysis of Federal government contracting records since 2000 this paper for the first time details actual Australian unmanned system expenditure for the decade to 2011 by individual systems acquisitions and sustainment outlays; user organisation; prime contractors and support suppliers; and underlying research and development expenditures. Specific cost-breakdown case studies will be given for the Australian army's Elbit Skylark and AAI Shadow 200B and air force IAI Heron systems. Using historical data as guidance the analysis indicates the overall Australian Federal market for all classes of unmanned systems between 2012 and 2022 will exceed A\$3 billion, with RPAS dominating.

**10 14.34-14.51 Nano RPAS: A new reality
Dag Paulsen, ProxDynamics, Norway**



Bio Data Nano systems are about to become a new reality. These extremely small and light systems create a new area within the RPAS market, and will challenge the way air operations are regulated. Prox Dynamics is now fielding the PD-100 Black Hornet Personal Reconnaissance System as the world's first operational Nano system. The presentation discusses our views on the technological challenges of Nano systems, their market potential and what we consider is key to realizing this potential. The main challenges were how to meet the tight weight and size requirements, and being able to implement an autopilot that provided the required level of autonomy and simplicity to the user. The result is a complete stand-alone Nano system comprising two 16 gram helicopters which provides motion imagery and still images from deployed ranges of up to 1 km. The most obvious benefit of a Nano system is their extremely small size and low weight. This provides a system which is easy to deploy, and which offers an operational flexibility not found in larger systems. We believe this is an attractive proposition to both military and civilian customers. Safety analyses shows that aircraft weighing less than 50-60 grams achieve the required level of safety simply due to its very low kinetic energy. Some military aviation authorities have therefore decided to exempt Nano systems from all safety related regulations, allowing rapid introduction of Nano systems without sacrificing safety. This sets an example to the national CAA's that will contribute to the growth and success of this new market area.

Abstract The speaker is one of the founders of Prox Dynamics and is currently in charge of the company's customer projects. Dag Henning was born in 1961 and grew up close to Oslo in Norway, is married and the father of four children. His background is from the Norwegian Air Force where he served as an F-16 pilot for more than ten years. He held several positions during his service, and was involved in the development of an advanced weapon system for the F-16 in addition to a number of other projects. He attended the Air Force Staff School in 1993, and served three years at the Norwegian Defence Research Establishment as a military advisor. He joined the Scandinavian Airlines in 1996 and has been copilotting the MD-80, the Boeing B-767 and the Boeing B-737 which he is currently flying part time. Prior to joining Prox Dynamics his work in SAS includes duties as simulator Instructor, Chief Pilot and Chief of Staff to the COO in SAS Norway.

**11 14.51-15.08 Development of an all weather multi-functional RPAS for the Ministry of Extraordinary Affairs
Oleksii Korniev, N. E. Zhukovsky National Aerospace University "KhAI", Ukraine**



Bio Data Education: 1993-1999 - N. E. Zhukovsky National Aerospace University "Kharkiv Aviation Institute" Specialist's degree majoring in "Aircrafts and helicopters" qualification: Mechanic engineer, specialization: aero-, hydrodynamic. Since 1999 he has worked at the Interindustry research and development institute dealing with Issues of physical simulation of flight modes for aircrafts, N. E. Zhukovsky National Aerospace University, "KhAI"

Job Title: Designer, Junior research fellow of Research department. 2007-2012 - ADCOM Systems, UAE Job Title: Designer of Design department. his duties include:

- Preliminary design of aircraft (RPAS);
- Aerodynamic experimental and computational research; - Production maintenance;
- Fabrication of structure, systems, shop auxiliaries etc.; - Testing.

He is the designer and coauthor of several unmanned systems.

Abstract The experience of local military conflicts for the last decade points on extraordinary effectiveness of automatic and remotely piloted aviation complexes (ARPAC). In peaceful time there are many fields of human activity connected with monotonous, routine work and risk for the life, also during prevention and liquidation of consequences of natural calamity or techno-gene catastrophes. Having many advantages automatic and remotely piloted aviation complex becomes alternative for piloted vehicle in the circle of problems connected with high probability of loss of the crew or economically inexpedient using of piloted vehicle. That's way the expediency of introduction of ARPAC in the field of national economy is obvious. Holding this tendency the R&D work in the field of aerodynamics and design of different types of unmanned systems is carried out in Interindustry Research and development institute dealing with Issues of physical simulation of flight modes for aircrafts together with Aerodynamic laboratory of N. E. Zhukovsky National Aerospace University, "KhAI". One of such work was the R&D of ARPAC with basic carrier platform of untraditional design "tandem wing". This type of carrier is perspective because enough static and improved dynamic stability with System of direct control of lifting and side forces give to the carrier the series of qualitative advantages in tactical and flying properties in comparison with apparatus of the other design in application for: a) Informational support, search and rescue service; b) High quality mapping; c) Precise delivery of cargoes, recovery aids, medicaments, provisions; d) Forest fire guard; e) Coast guard; f) Active effect on meteorological conditions over local zones.

15.08-15.25 Panel Discussion
15.25-16.20 Refreshment Break

Session 4 - Non-Military Applications

- 12 16.20-16.37 **Aerial inspection of gas transmission pipelines by RPA**
Michael Thoss, microdrones, Germany (in coordination with Thyssengas, Germany)



Bio Data Michael Thoss is a communication expert with a strong background in Information Technology.. He holds his degree as a information scientist in the field of application development. Before joining microdrones he worked in the company Dr. Merten + Steinke as Key Account for Porsche Asia Pacific (PAP). At microdrones Michael Thoss is responsible for the field of Marketing as well as national- and EU projects. He attends all meetings of the German UAV-DACH working group "air law".

Abstract Thyssengas has initiated a project to monitor high pressure gas pipelines with low-weight, autonomous flying RPAs in the air. This technique will either replace or be in addition to existing air monitoring by helicopter. These RPAs which operate more or less independently are known as Quadrocopters. They come equipped with optical devices which enable the rapid detection of dangerous interference to the gas pipeline. The first objective of this project is the analysis and pattern recognition of possible threats to the gas pipe (such as heavy construction equipment). Furthermore, the system can be used to survey and map newly built or modified pipes. Compared to conventional monitoring by helicopter, drones have the advantages of high environmental compatibility and low noise, as they emit no CO2 and are extremely quiet when flying. Furthermore, they provide the necessary security in a cost-effective way.

- 12 16.37-16.54 **Light RPAs for industrial site inspection**
Paolo Marras, Aermatica, Italy (in coordination with Enel, Italy)



Bio Data Paolo Marras has a degree in informatics engineering from Politecnico of Milan, Italy. He is cofounder, president and chief technical officer of Aermatica. He was the creator of a ASI (Italian Space Agency)-founded project related to an autonomous and intelligent mobile robot, and, as design team leader, he has been involved in several international projects in aerospace and telecommunication fields (Eurofighter aircraft and EH101 helicopter safety critical equipments, NASA-MRO mission Sharad radar ground segment, ESA-Mars Express mission MARSIS radar payload). He is the system designer & project manager of Aermatica Unmanned Aircraft Systems. His key expertise is in technical & company management, design of complex aerospace systems, development of design processes & procedures, design of safety critical hardware & software, airworthiness, and UAS. He is co-founder of UAS Italy, the Italian national UAS association.

Abstract Enel, the main Italian electric utility and one of the most important in the world, started a study for remote monitoring of its own power plants through small RPA. The possibility to satisfy those needs is partially a matter of mere technology; on the contrary the introduction of the use of small RPA in professional industrial contexts strictly requires an aeronautical approach. Aermatica, the only Italian company with a permit to fly from the Italian Civil Aviation Authority for small RPA, is performing an experiment in an Enel power plant, getting all the relevant authorizations from the Civil Aviation Authority, to acquire data that represents the "proof of safety" of that application. The whole process has been defined, combining aeronautical rules with general safety rules on industrial working places, writing procedures, getting permit to fly, coordinating with plant safety responsible and, finally, performing flight tests in the target environment. This is the only process capable to demonstrate how RPA can be useful in such a context strictly following safety constraints and therefore enabling the commercial use in the industrial applicative market.

- 13 16.54-17.11 **Application: Intensive use of RPAS in the protection and maintenance of pipelines**
Nikos Bogonikolos, Aratos Technologies, Greece



Bio Data Dr. Nikos Bogonikolos has been an entrepreneur at the forefront of research and development for over 20 years. A former Captain in the Hellenic armed forces, Dr. Bogonikolos has lead several innovations in field of information technology, often, founding companies to promote them. He has provided expert services to the European Commission, European Parliament and Union of Industrial and Employers' Confederations of Europe (UNICE) in the field of Entrepreneurial assistance, Innovation, Research and Technological Development, Training and in Relations with Third Countries. Dr. Bogonikolos has registered several patents Dr Bogonikolos is a frequent author in technical journals. Socially aware, Dr. bogonikolos regularly contributes and leads several charities in his native Greece as well as internationally. Dr. Bogonikolos is currently owner and president of Aratos Technologies S.A.

Abstract Today pipeline are a common means for distributing resources such as Oil, and natural gas, to remote areas. These extend to a significant number of kilometers, crossing countries or even half an entire continent at times; they cross over urban and populated as well as remote areas, covered by thick vegetation or desert landscapes. Additionally, a pipeline route can be found underground and/or underwater. This makes them difficult and expensive to maintain and protect. Pipelines are threatened by both Natural, and Human-generated threats. The threats can be broadly categorized as follows: 1) Natural erosion and wear -Leading to Leakage; 2) Politically-motivated Sabotage (Terrorism); 3) Theft of the payload (i.e. Oil or Gas), or of the pipeline equipment itself. The revenues lost through these threats is often dramatic, due to the current, and rising cost of Fossil fuels - leading governments and private business to search for solutions.. This presentation will demonstrate how UAS (esp. Low-altitude , long range MAV's), can be used to effectively deal with All three types of threats. It is based on the experience of Aratos Technologies S.A. in planning and deploying such systems throughout the world. It will also explore the financial and political implications of losses through the above threats.

Bio Data Sqn Ldr VS Srinivasan retired from the Flying(Pilot) branch of the Indian Air Force on 31st March 2010, after a challenging tenure of 11 years and 3 months. Born on 27th March 1976, Srinivasan is an alumnus of the prestigious National Defence Academy. His passion for flying saw him change his branch from Army to Air Force in his 5th semester and he graduated Second in the Order of Merit in December 1997. He completed his flying training at Air Force Academy, Hyderabad and a year later he was commissioned into the Fighter Stream of the Indian Air Force, but it was in the Helicopter stream that he subsequently did most of his 1500 hours of manned flying. In 2005, he was among the select few chosen to form a new Squadron of IAF UAVs at Awantipur near Srinagar and thus began his association with Unmanned Aviation. An Internal Pilot and Mission Commander on the Searcher Mk-II and Heron UAVs in the IAF, Srinivasan was actively engaged in flying UAVs in various terrains in support of a variety of roles like surveillance, counter-terrorism, intelligence gathering, and flying in support of special forces operations. Till date he has flown almost 650 hours on the IAI-made Searcher Mk-II and Heron UAVs. He is among a very small group of pilots who can claim to have the unique experience of having flown fighter aircraft, helicopters and UAVs. After leaving the IAF, he has since joined NOVA Integrated Systems Limited, a TATA Group enterprise dealing in Defence Systems like UAVs, Missiles, Radars, Electro-optic systems etc. In his present role as Head- UAV Flight Operations based at New Delhi, Srinivasan is in charge of all matters pertaining to UAV Flight Operations by the company.

Abstract Historically, UAVs have been mainly employed by defence forces across the world for national security roles. India mirrors the world order when it comes to users of UAVs. Over the next few years, Unmanned Aviation is likely to grow by leaps and bounds in India. In India, UAV applications in non-military roles would primarily be focused on commercial and security ventures. While counter-insurgency, coastal surveillance, EEZ monitoring, homeland security and disaster relief monitoring are seen to be the primary areas of UAV applications, commercial ventures like oil pipelines monitoring, powerlines survey, Digital Elevation Mapping and agricultural survey are a few areas that could generate potential UAV business. The advantages that UAVs provide can be mainly associated with reduction in time and cost factors, as also increased surveillance footprint. However, before UAV take to the civil skies in India, the regulations have to be in place to ensure smooth and efficient conduct of UAV operations. Air traffic management, segregation of airspaces, sense and avoid capabilities, collision avoidance methodology etc. are some of the issues which need to be addressed forthwith, so that India does not lose out on the capabilities presented by UAVs to the industry.

17.28-17.48 **Panel Discussion**

17.48-19.30 **Conference Cocktail & Awards Ceremony**

DAY 2 - Wednesday 6 June 2012

Session 5 - Regulatory Activities

16 09.00-09.17 **Update to the FAA UAS Integration into the National Airspace System - Current UAS Operations in the National Airspace System and the Research and Development Horizon**
Rick Prosek, Federal Aviation Administration (FAA) - Unmanned Aircraft Systems Integration Office, USA



Bio Data Richard J. Prosek has served as the manager of the FAA's Unmanned Aircraft Program Office (UA PO), AFS-407, since January 2010. His past FAA experience includes: acting Deputy Division Manager for the Flight Technologies and Procedures Division, Chairman of the ICAO Operations Panel and duty as the Designated Federal Official for the All Weather Operations Harmonization Working Group. Mr. Prosek has 43 years of aviation experience, including 33 years of commissioned service in the U.S. Air Force/Air National Guard, where he flew fighter and DV Airlift missions. Additionally, he is a retired airline captain with 20+ years experience at Part 121 Air Carriers. Mr. Prosek has a Bachelor of Science degree in Electrical Engineering from the University of Illinois at Urbana-Champaign and an MBA from the University of Nevada at Las Vegas.

Abstract Many changes are underway in the United States in the area of unmanned aircraft systems (UAS). A recent reorganization in the FAA has placed all of the UAS activity under a single executive charged with being the focal point for all matters pertaining to UAS. The FAA is unique in that it has both the regulator and the air navigation service provider within a single organization. The presentation will delineate the changes that have occurred in the organizational structure of the FAA. Another major change regarding UAS in the United States is the FAA Modernization and Reform Act of 2012 passed by Congress and signed into law by the President on February 14, 2012. The presentation will delineate the multiple UAS facets included in this legislation which includes six specific sections dealing with UAS. The presentation will provide an overview of the tasking that has been given to the Administrator of the FAA. Of particular note, this tasking includes the establishment of six UAS test sites within the United States for the purpose of accelerating the integration of UAS into the National Airspace System. The presentation will provide an overview of the purpose and methodology to be used in establishing these sites, along with the planned timetable for selection and implementation. The United States has three pillars at the core of its plans for integration of UAS into the National Airspace System (NAS). These include a Concept of Operations (ConOps), a Civil UAS NAS Integration Roadmap and a Research, Development and Demonstration Roadmap. This presentation will highlight the time table for publication of these documents as well as an explanation of the interaction between the three products. Additionally, the current activities in two areas: "accommodation" work for allowing UAS access to the NAS today and the "integration" work to allow for routine access to the NAS will be highlighted.

17 09.17-09.27 French regulatory situation for civil RPAS
Claude Mas, Direction Générale de l'aviation civile (DGAC) (national aviation authority), France



Bio Data Claude Mas graduated from an aeronautics engineering school. He has more than twenty years of experience in the aeronautic field, including seven years in the area of certification or qualification of software for civil or military applications, five years of certification of large aircraft, five years assigned in an international cooperation office on a military program. He is currently working in the rulemaking unit of the civil aviation safety directorate, in charge of airworthiness aspects either under national responsibility, or under interface with the rulemaking process of the European Aviation Safety Agency.

Abstract The DGAC presentation aims at explaining the regulatory context of remotely piloted aircraft in France. In the civil area, unmanned aircraft were historically model aircraft. This is a leisure activity that is practised in dedicated places with a controlled environment in order to avoid injuries to people. A wide range of ideas is rising with use of remotely piloted aircraft for aerial work purposes, most of times commercially. This is a completely new situation different from flying model aircraft. The DGAC has just issued a new regulation that deals with these new activities and develops the requirements in the areas of airworthiness, pilots' skills, operators' responsibility, and airspace usage (published in the "Journal officiel de la République française" on 10 May 2012). The presentation will focus on this regulation's objectives, its applicability and will explain how to prepare for the future of more complex RPA operations.

18 09.27-09.34 French regulatory situation for State aircraft (RPA)
LtCol Christophe Vivier, DSAÉ (French State Aviation Safety Authority), France



Bio Data Lieutenant Colonel Christophe VIVIER was born in Montpellier. He started his career in the French Air Force as air controller; he later qualified as fighter pilot and obtained his wings in 1994. He flew the Jaguar at Saint-Dizier air base, then converted to the Mirage F1 at Colmar air base and was commander of "Alsace" squadron. From 2008 to 2011, Lieutenant Colonel Christophe VIVIER was at the head of Drachenbronn Control and Reporting Centre. As such, he was responsible for the control of state aircraft, the production of the general air picture and air policing over the North East of France. Posted to the DSAÉ (State Aviation Safety Authority) in 2011, he is now in charge of the UAS branch. He regularly contributes to FABEC and UAS working groups. Lieutenant Colonel Christophe VIVIER was a Jaguar and Mirage F1 instructor. He has logged 2800 flying hours and performed 120 war missions (Iraq, Bosnia, Kosovo, Africa). He is married and has five daughters.

Abstract Since the beginning of the nineties, French forces have flown different categories of UAS and have indeed gained experience in this domain. Military and State aviation does not have to comply with civil regulation, yet it must have due regard for the safety of civil aircraft (Chicago convention) and, as far as practicable, for the objectives of European regulation EC 216/2008. The safety of third parties and of property on the ground is also a priority objective for state aviation. State regulation must therefore find the right balance between the respect of constraints mentioned above and the use of state UAS by different state operating authorities for public security and national sovereignty missions. France will have its complete state regulation package ready by the end of 2012 that will cover personnel licences, air traffic integration and airworthiness. With the "state UAS airworthiness order" France already has, it can certify state UAS based on a responsible dialogue between the Procurement Agency (DGA), the concerned Operating Authority and the contractor. Concerning air traffic integration, the relationship and cooperation between the French CAA and the DSAÉ are outstanding and vital to develop and consolidate state regulation. Since the "sense and avoid" technology will not be successfully complete before 2020/2025, the only solution will be to implement smart segregation over the ten to fifteen following years. The key to integrating UAS is therefore full cooperation between the French CAA and the DSAÉ. For this reason, the DSAÉ regulation processes are conducted hand in hand with the CAA.

19 09.34-09.51 Russian Federation: The national regulatory situation
Vladimir Shibaev, TsAGI, Russian Federation



Bio Data Dr Vladimir Shibaev, MRAS, Director of the Aviation Certification Centre (ACC), Central Aerohydrodynamic Institute, TsAGI, Russia, was born 1951. Dr Vladimir Shibaev graduated from Moscow Institute for Physics and Technology (State University), Department of Aeromechanics and Aircraft and continued his postgraduate education at the same University. In 1983 he was awarded a PhD for 'Stall and spin flight simulation of modern aircraft with fly-by-wire control system'. As a Lecturer Vladimir gave courses in flight dynamics and flight simulators at Moscow Aviation Institute (MAI) and at the test pilot school. In 1994 he was elected a Corresponding Member of the International Engineering Academy. Since 1977 he has been a member of the Central Aerohydrodynamics Institute (TsAGI). Vladimir is the author of 17 patents and over 110 publications and proceedings in the mentioned subject areas.

Abstract Within 2010 only, the number of UAS types developed in Russia has increased from 65 to 216. UAS cardinally changed our ideas about aviation in general and the tactics of aviation application for both military and civil purposes. But any case the FLIGHT SAFETY OF UNMANNED AIRCRAFT SYSTEMS IN NON-SEGREGATED AIRSPACE must be arranged the same as in the civil aviation. Moreover, taking into account that all the UAS are unmanned aircraft, no one can ignore the ICAO requirements (Annex 2 "Rules of the Air" of The Convention on International Civil Aviation) for the Airworthiness Certification. On the other hand, these requirements may differ from the similar requirements to manned aircraft, because there are no crew and (so far!) passengers on board. Therefore, attention must be paid in the first place not to the crew safety, but to other persons (and objects), on the ground. Strictly speaking, both ICAO (letter AN 13/1.8-11/55 of 07.14.2011) and the Ministry of Transportation of the Russian Federation are concerned with it. It should be noted here that TsAGI was charged to develop the airworthiness requirements for unmanned aircraft, harmonized with the international and other foreign standards. This

fact takes into account, firstly, a long-term TsAGI experience in the field of expert examination of manned aerial vehicles for their compliance to airworthiness requirements; and, secondly, the fact that TsAGI has experimental facilities and qualified specialists in the reliability and safety of different-purpose aircraft; therefore, TsAGI carries out investigations in aerodynamics, strength, dynamics, and control systems of both manned and unmanned aircraft, as well as UAS in the whole ; and these investigations are required for the expert' report of unmanned aircraft compliance to airworthiness standards, being elaborated at present, and UAS certification. That is why one of the objectives of the Aviation Certification Centre of TsAGI is to develop domestic standards and requirements for UAS, consistent with international standards and best foreign analogues. The following documents, both Russian and foreign, are taken as the basis for this elaboration. The requirements to UAS depending on the kinetic energy of their collision with the earth surface have been assessed (The level of kinetic energy of 95 kJ at the moment of UAV col-lision with the earth surface is critical in terms of damage).

09.51-10.06 **Panel Discussion**
10.06-11.00 **Refreshment Break**

Session 6 - Standards Development

20 11.00-11.17 **EUROCAE WG73: Programme update**
Tore Kallevig, AVINOR, Norway (on behalf of EUROCAE WG73 on UAS)



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 a new and independent WG93 on Lightweight RPAS was to be stood up by EUROCAE to take on the VLOS operations standardization activities.

21 11.17-11.34 **RTCA SC203: Situational update**
John Walker, The Padina Group, USA (on behalf of RTCA SC203)



Bio Data John Walker has over 45 years of aviation experience in a career rich in air traffic control, airspace management, flight navigation development and airport development skills. John's aviation career includes 32 years with the Federal Aviation Administration (FAA) where his last assignment was served as Program Director of Airspace Management. In this position John was responsible for the management of all civil airspace within the United States of America. He is also responsible for initiating the FAA's National Airspace Redesign program which will modernize the use of airspace within the United States. Prior to his assignment in Washington, DC, John was the Air Traffic Division Manager for the FAA's Eastern Region Air Traffic Division in New York City. He was responsible for all air traffic movements within a seven state area of the Northeast United States. He has extensive experience in working with aviation user groups, commercial airlines, labor unions, national, state and locally elected officials and citizen groups. Since retiring from the FAA in 2001, John has led a successful aviation consulting firm, JSWalkerGroup/Aviation Solutions, Inc. - which was formed to further John's vision and passion for modernizing global airspace use. John believes that our global airspace is one of the last great, untapped resources remaining in the world today. John also supported the internationally recognized performance based navigation company Naverus, as the General Manager for Global Development. John is a co-founder of The Padina Group, which was established in 2006. The Padina Group is uniquely positioned in providing senior executive consulting services to government agencies, industry and academia worldwide to assist clients in either entering the aviation marketplace or sustaining and strengthening existing positions. The Padina Group includes a team of highly qualified, value-added partners who share a common vision of global aviation transformation to meet customer needs for both strategic and tactical planning. In addition to being on the UVS International Board of Directors, John also serves as Co-Chairman of RTCA Special Committee 203, which is dedicated in developing recommended Unmanned Aircraft Systems (UAS) standards

for the Federal Aviation Administration. John resides in Lancaster County, Pennsylvania, USA with his wife Darlene and two children, Elisabeth, age 15 and Andrew, age 13.

Abstract

Establishing harmonized standards for Unmanned Aircraft Systems that will ensure routine access to global airspace is of great importance for the safe integration with manned aircraft. RTCA Special Committee 203 is committed to this goal and has established a close working relationship with other standards organizations including EUROCAE and the ICAO UAS Study Group. This presentation will describe how RTCA continues to establish a methodical process in developing Minimum Aviation System Performance Standards (MASPS) for Unmanned Aircraft Systems.

22 11.34-11.51

Status update on ASTM efforts on development of standards for small UAS

Theodore Wierzbowski, AeroVironment, USA (on behalf of ASTM Committee F38)

Bio Data

Ted Wierzbowski is a retired USAF Colonel and an experimental test pilot. He has been deeply involved in advanced aircraft development since the early 80s when he was the first Air Force test pilot/project manager for the X-29 program. During that time he also was the fighter branch chief at the Air Force Flight Test Center and helped create and then manage a new organization responsible for all one-of-a-kind and research Air Force Flight Test Center aircraft programs. After leaving the X-29 program Ted moved on to the X-30/NASP program where he served in many senior level positions over a period of seven years. Ted retired from the Air Force in 1994 and went to work at AV where he has since managed many advanced technology electric vehicle, distributed energy, and unmanned aircraft systems (UAS) programs. He is now AV's Director of UAS Airspace Integration and is responsible for AV's interaction with the FAA and other government agencies on UAS issues. He recently was the President of UNITE (UAV National Industry Team) and the Industry Co-Chair of the FAA's Small UAS Aviation Rulemaking Committee. He is currently the Chair of the ASTM F-38 UAS Standards Committee and a member of both EUROCAE WG-73 and the newly formed FAA UAS ARC. Ted graduated from the Air Force Academy in 1968 and also has a M.S. in Systems Management from USC. He is a graduate of the USAF Test Pilot School and the Defense Systems Management College as well as a member of Society of Experimental Test Pilots and a senior member of AIAA.



Abstract

In 2003, ASTM International established committee F38 on Unmanned Aircraft Systems (UAS). 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 UAS. 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 for UAS, 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 (MOA) 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 (sUAS) to routinely fly in U.S. civil airspace for compensation or hire. The presentation will first cover how F38 is organized and structured. It will then cover the current status of the standards that are being developed in support of the pending new U.S. sUAS rule as well as other country's sUAS regulatory efforts. It will end with specifics on how interested entities in the international community can participate in the development of ASTM standards.

23 11.51-12.08

WG on Light RPAS: Introduction & Objectives

Ron van de Leijgraaf, Ministry of Infrastructure and the Environment, The Netherlands (on behalf of EUROCAE WG 93)

Bio Data

Ron moved from the Dutch Civil Aviation Authorities to the Ministry of Infrastructure and the Environment in early 2012, in order to be able to continue his work on the development and international harmonisation of UAS regulations. His primary activity at the Ministry is working on UAS regulations. This means that he will continue his international activities regarding establishing the international harmonisation on airworthiness regulation with other national aviation authorities, EASA and EUROCONTROL. For this harmonisation, Ron created the authorities coordination group JARUS. This group will cooperate with the EUROCAE WG73 and WG93, by providing draft regulation to this group for consultation with industry and stakeholders. Ron is a member of EUROCAE Working Group 73 and chairman of EUROCAE Working Group 93. Furthermore he is the 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 specialisation. Before joining the Dutch CAA, he worked, amongst others, at the Dutch National Aerospace Laboratory (NLR). Here he worked on the development of flight test instrumentation systems and research on navigation systems and avionics for future ATM applications.



Abstract

In December 2011, the Secretary General of EUROCAE took the decision to create a working group to deal specifically with Light Remotely Piloted Aircraft Systems (RPAS). Consequently, this activity has now shifted from WG73 SG4 to the new WG93 on Lightweight RPAS. The EUROCAE Council agreed with this decision and a small team worked on the Terms of Reference of WG93, which have subsequently been approved by the EUROCAE Council. In May 2012, the kick-off meeting of this new working group was held. The scope of the WG93 activities is to develop standards and recommendations for guidance material for the safe operation of Lightweight RPAS, sequenced in order of priority for the Light RPAS community, and the output is primarily directed towards National Aviation Authorities. The objectives of the working group are to define and describe the current and near future Visual Line of Sight (VLOS) operations and current Beyond Visual Line of Sight (BVLOS) operations that are on-going or being planned by the existing Lightweight RPAS user community. These operational scenarios, which are initially focused on VLOS operations, will be described using a structured method. The final documents to be provided by the group will address operational considerations for VLOS operations of RPAS and an overview of BVLOS operations. It will make recommendations that the responsible national

authorities can use to establish a common European regulatory baseline and policies for visual line of sight operations. As a next step, the group will work on various different regulatory proposals, a.o. for flight crew licensing, operator approval, organisational approvals, UAS classification and communication needs. It is the intention to have proposals for all these areas available for small RPAS regulation within the next two years.

12.08-12.30 Discussion Panel
12.30-14.00 Open Bar & Lunch Buffet

Session 7 - Operational Experience

24 14.00-14.17 Operational experience & Lessons learned
LtCol Craig Palmer, Royal Army - 32 Regiment, UK

Bio Data
Abstract

25 14.17-14.34 Operational experience & Lessons learned
Col Gilles Randreau, French Army - 61st Artillery Regiment, France

Bio Data
Abstract

26 14.34-14.51 Non-military RPAS: The privacy issue
Peter La Franchi, LFRG Ltd, Australia



Bio Data Peter La Franchi is an internationally respected unmanned systems sector analyst and former unmanned aviation editor of Flight International magazine. He is currently based in Australia while writing a book on the business of unmanned air systems. Peter's interest in privacy law stems from working as a specialist researcher in the former Australian Human Rights and Equal Opportunity Commission during 1988-1989, a time when Australia brought its first national privacy laws into being. Peter was a policy advisor and public spokesman for the Australian Minister for Defence for the period August 1990 to May 1993. With 20 years of journalistic experience, he has specialised in the unmanned air systems sector since 2001. Effective 9 January 2012 Peter is the editor in chief and head of research at LFRG, a specialist analysis firm focussed on the defence, aerospace and remote sensing sectors.

Abstract The rapid progression towards opening of airspace to civil RPAS operations offers to open the door to a lucrative commercial future for a long waiting industry, however a final set of hurdles is now looming in the form of growing concerns about privacy law implications in most western nations. This paper argues that the rise of the privacy debate surrounding RPAS should be seen as part of a wider community debate about privacy laws as a whole, with many matters becoming confused and conflated because of those origins and associations. However, this paper also accepts that there are valid privacy matters that need attention by the RPAS community and proposes a model framework for a practical approach that maximises commercial opportunities whilst still ensuring the legal rights of the common man. The paper looks in detail at the privacy challenges facing civil RPAS operations in the context of US constitutional law, US Supreme Court judgements, European Union laws and policies and Australian law. The key question of who should be responsible for compliance with national and international privacy law obligations will be explored in the context of whether this function should be taken on by airspace regulators as an additional overhead or is best addressed, as is the case with other social policy matters, as a wider function of government

27 14.51-15.08 KZO - 3 Years of service in theatre, programme update and sharing the experience
Bjoern Symank, Rheinmetall Defence Electronics, Germany



Bio Data Bjoern Symank is a former German Army Aviation Captain who entered service in 1997 and went through several operational deployments as a transport helicopter pilot. During that time he also realised several software projects for the Armed Forces. In 2008, he learned the peculiarities of the German procurement system as an IT officer in the Army Aviation's Combat Development Division. He completed his service by the end of 2010 and joined Rheinmetall's Airborne Systems Division as the responsible sales manager for tactical unmanned aerial systems. In addition to his national and international sales projects with the system KZO, he is engaged in several R&D projects. Bjoern Symank is a graduated business engineer and scientific assistant in industrial psychology. Bjoern is married and has two wonderful, sometimes challenging daughters.

Abstract The unmanned reconnaissance system KZO has been in service with the German Armed Forces since 2006. From 2009 onwards the system has been deployed to Afghanistan. Under harsh environmental conditions like the everywhere dust, icing and strong winds, daily missions had to be carried out. Some of the system's unique features (e.g. containerised maintenance, rocket-assisted take-off, jamming-resistant datalink) have been seen with scepticism in the past, yet they have proven to be a guarantee for a reliable daily service. To share the experiences made, this presentation will give an update of the programme. This includes system upgrades during operation, lessons learned during operation and pros and cons of the systems unique features, leading to conclusions for future unmanned aerial systems from the company's point of view.

15.08-15.25 Panel Discussion
15.25-16.20 Refreshment Break

Session 8 - Regulatory Related Activities

28 16.20-16.37 United States Unmanned Aircraft System Executive Committee: Progress & activities Jeffrey Bauer, NASA Dryden Flight Research Center, USA



Bio Data

Jeffery E. Bauer is NASA's liaison for Unmanned Aircraft System airspace integration activities. He serves on the Unmanned Aircraft Systems (UAS) Executive Committee Senior Steering Group. Mr. Bauer has over 20 years experience in flight research with UAS during which he acquired a thorough understanding of the issues confronting the UAS industry with respect to routine access to non-segregated airspace. From 2004 through 2006, Mr. Bauer was the government project manager for the joint government – industry Access 5 project. Access 5 was focused on systematically addressing and resolving all relevant technology, policy, regulatory and infrastructure issues related to the safe, routine and reliable operation of high-altitude, long-endurance UAS in the U.S. National Airspace System. The effort was a collaborative activity with six UAS manufacturers, NASA, the departments of defense, homeland security, commerce and the Federal Aviation Administration as well as the international community. Previously, Mr. Bauer managed the collaborative government-industry Environmental Research Aircraft and Sensor Technology, or ERAST, project. ERAST helped developed high altitude long endurance UAS prototypes for potential science and commercial applications, with several establishing world records for altitude and duration. His work experience also includes the X-29 forward-swept wing technology demonstrator, X-31 research aircraft that investigated thrust vectoring coupled with advanced flight control systems, and the X-43A, a hypersonic flight experiment to validate the performance of scramjet propulsion. He earned Bachelor of Science and Master of Science degrees in Aeronautical and Astronautical Engineering from Purdue University, West Lafayette, Ind. He began his career at NASA Dryden as a cooperative education intern in 1983 prior to his graduation from Purdue. Mr. Bauer received a NASA Leadership Medal in 2007 for his work with UAS and in 2006 the Catherine Fargeon Award presented by Unmanned Vehicle Systems International for his contribution to the ability of unmanned aircraft systems to fly in unrestricted airspace. He is a regular contributor to Unmanned Vehicle Systems Yearbook.

Abstract

The United States Unmanned Aircraft System (UAS) Executive Committee (ExCom) was established in October of 2010 with the following mission statement: "The mission of this multi-agency UAS ExCom is to enable increased and ultimately routine access, of Federal UAS engaged in public aircraft operations into the NAS (National airspace system) to support operational, training, developmental, and research requirements of the FAA (Federal Aviation Administration), DoD (Department of Defense), DHS (Department of Homeland Security), and NASA (National Aeronautics and Space Administration)." This presentation will outline the formation of the committee, its goals, successes, and current undertakings. Specific current activities of interest include plans to validate operational procedures and other requirements that would facilitate greater access of multiple manned and unmanned or multiple unmanned aircraft simultaneous operations in Class D airspace, routine access for ExCom agency small UAS at specific locations, as well as more routine access in remote areas. The UAS ExCom has been valuable in prioritizing common requirements and addressing federal policy and procedures that serve toward facilitating greater and more routine UAS access to the National Airspace System (NAS) without compromising safety.

29 16.37-16.54 Qualified Entities - A flexible approach to regulatory implementation André Clot, European Unmanned Systems Centre, UK



Bio Data

André Johan Clot, has an extensive and varied background in Aviation covering the last 30 years. Commissioned in the RAF in 1979 as a pilot he later moved onto work with safety critical systems for the next 5 years with the MoD and then the UK Civil Aviation Authority. Culminating in the role of head of engineering operational strategy and operations within the UK National Air Traffic Services Limited (NATS), he helped build the UK systems approach to ATM through many research, development and operational implementation projects over a ten year period. In 1998 he left to start the UK UAVS Association and formed EuroUSC in 2003. Andre was a member of the six strong Joint JAA/Eurocontrol Task Force Steering Committee and now represents EuroUSC and UAVS on the EUROCAE WG73 – Small RPA Expert Group. He continues to be an ardent supporter of the emerging and potent Light UAS industry. Over the last 7 years he has focussed on developing the airworthiness and UAS pilot qualifications that now form part of the accepted Light UAS Scheme. The CAA approved EuroUSC in January 2010, under the EASA Approval of Organisations, as the Qualified Entity for Light UAS airworthiness and operational assessment in the UK.

Abstract

The EuroUSC™ Light UAS Scheme™ has been in existence for nearly 5 years and since the organisation gained its Qualified Entity status in 2009, it has developed into a model of flexibility and pragmatism whilst improving significantly the safety of UAS/RPAS operations for aircraft with a MTOM of less than 150 kg. Targeted at improving the operations within Manufacturers, Distributors, Research & Development and Training organisations, the recent use of the Basic National UAS Certificate (BNUC™) and the Accredited Organisation Programme by companies in their tender evaluation criteria, has heralded a new surge in confidence by insurers, customers and regulators. In the past, the trend was to accept the word of the organisation delivering the UAS/RPAS product or service as most regulatory authorities do not have the mechanisms to suitably assess both aircraft systems and pilots with a wide range of types and competences. However through the use of Qualified Entities and drawing on the extensive experience in the manned world through innovative implementation concepts, National Authorities can significantly improve safety and reduce Governmental cost whilst delivering the necessary credibility for the industry to grow effectively.

30 16.54-17.11 ASTRAEA Programme Update - Opening the Airspace for UAS
Jeremy Howitt, QinetiQ, UK (on behalf of the ASTRAEA Consortium)



Bio Data

Jeremy Howitt graduated from the University of Bath in 1988 with a Bachelor of Engineering degree, specialising in Microprocessor Systems and Digital Control. He is currently the Director for UAS Future Business & Strategy within the Air Division at QinetiQ Boscombe Down and Farnborough and a Royal Academy of Engineering Visiting Design Professor at the University of Leicester. Since joining QinetiQ, Jeremy has worked on a number of guidance, navigation and control programmes. He has conducted many flight test and simulation experiments and has authored over 50 technical papers. Jeremy spent six months working for the US Army Aeroflightdynamics Directorate at the NASA Ames Research Center in 1998. He was the recipient of the Royal Aeronautical Society Alan Marsh Award in July 2000 and is a previous Chairman of the Handling Qualities Technical Committee of the American Helicopter Society. Jeremy was the Technical Manager for the Joint Strike Fighter STOVLR Risk Reduction programme using the QinetiQ fly-by-wire Harrier test aircraft. The QinetiQ team was awarded a Royal Aeronautical Society Gold Medal in 2009 for developing novel flight control and shipboard integration technologies for exploitation in both JSF and the Queen Elizabeth Class Aircraft Carriers. More recently Jeremy has taken on a broader role within the Air Division co-ordinating the strategy and delivery of new business in Unmanned Air Systems, including a role as a member of the Steering Board and Industry Executive for the ASTRAEA consortium.

Abstract

The ASTRAEA (Autonomous Systems Technology Related Airborne Evaluation & Assessment) programme aims to enable routine operation of Unmanned Air Systems (UAS) in civil airspace. UAS challenge the key regulatory assumptions that have existed for the last century by removing the pilot and operating the aircraft autonomously with human supervision from the ground. The ASTRAEA hypothesis is this challenge can only be satisfied by innovation in key technology areas of sense and avoid, autonomy, communications, operations and human/system interaction. ASTRAEA set out to prove this hypothesis via a series of technology and regulatory themes. The presentation will provide an update on the proof-of-concept demonstrations and the process of 'Virtual Certification' with the CAA to ensure that appropriate requirements can be derived and certifiable systems can be developed. The presentation will also address how the knowledge and experience gathered through the ASTRAEA programme is being disseminated to the benefit of the wider UAS community.

31 17.11-17.28 ULTRA: Introducing UAS into European airspace
Pablo Gonzalez, INDRA, Spain (on behalf of the ULTRA Consortium)



Bio Data

Director of Unmanned Systems at Indra since 2007; his business unit is currently developing and operating several kinds of UAS and terrestrial and naval robotic systems (UGV, UUV and SUV), including in particular the PASI tactical system deployed in Afghanistan by the Spanish Army since 2008.

His previous experience was mainly in the space field. From 2000 to 2007 he was managing the European Programs of Indra Espacio, working for customers as the European Space Agency (ESA), EUMETSAT and EUTELSAT. Within the Spanish Administration, he was member of the Spanish Delegation to ESA from 1995 to 2000 and Head of the ESA Programmes Department in CDTI (Spanish Ministry of Industry and Research) from 1997 to 2000. From 1990 to 1995 he worked in the company GMV as project engineer and project manager, mainly in areas related with GNSS and satellite mission planning (ESA and Defense Programs). He served as second lieutenant in the Spanish Air Force from 1989 to 1990, working as Flight Test Engineer in the Spanish Air Force Flight Test Centre in Torrejón Air Base. He obtained a Master degree in aeronautical engineering from the Polytechnic University of Madrid (UPM) in 1989; during the university period, he worked in aerodynamic research with different grants at NASA (Lewis and Langley Research Centers) and INTA (Torrejón Air Base). He lectured Mathematics in the Aeronautical Engineering School (UPM) from 1997 to 1999.

Abstract

The ULTRA Project ("Unmanned Aerial Systems in European Airspace") is a Coordination and Support Actions (CSA), which addresses "Assessment of the potential insertion of unmanned aerial systems in the air transport system", defined by the European Commission. The ULTRA Consortium is led by INDRA (SP) and includes partners as A2TEC (IT), AST Legal (IT), Blyenburgh & Co (FR), Boeing Research & Technology Europe (SP), Cranfield Aerospace (UK), DFS (GE), Honeywell (CZ), Integra (DK), NLR (NL), ONERA, (FR) and Thales Alenia Space (FR). The overall objective of ULTRA is to develop a civil UAS Master Plan that will contribute to break this vicious circle in order to: a) Unlock the true potential of the UAS market by addressing civil applications that are not systematically addressed today; and b) Ensure that European industry plays a leading role at an international level in the development of UAS solutions. The civil UAS Master Plan will build upon all relevant prior work (including the recommendations of the EU UAS Panel), and will leverage existing regulations and infrastructures in order to enable deployment of specific civil UAS applications within the next 5 years. The Master Plan will also highlight regulations and infrastructures that need to be developed in order to completely unlock the civil UAS market within the next 10-15 years, and will articulate the impact of a civil UAS market on European industry and quality of life. The ULTRA end deliverable will be a coordinated, step-by-step and pragmatic plan to civil UAS insertion. For each step, the impact on European industry and quality of life will be quantified, and the regulatory and technology needs, and social acceptance actions will be highlighted.

17.28-17.48 Panel Discussion

17.48-19.30 Conference Cocktail & Awards Ceremony

Session 9 - RPAS Policy

32 09.00-09.17 The development of civil applications for UAS: The European Commission's perspective
Antti Peltomäki, European Commission, DG Enterprise, Europe



Bio Data

Mr Antti Peltomäki is Deputy Director-General of the Enterprise and Industry Directorate-General since February 2012. In this function, Mr. Peltomäki is responsible for regulatory policy including internal market and standardisation, industrial innovation and mobility industries, chemicals, metals, mechanical, electrical and construction industries as well as raw materials. Before that, Mr Peltomäki was Deputy Director-General in the Information Society and Media Directorate General where he was firstly responsible for research cooperation in the context of the seventh research framework (2007-2013) and thereafter for regulatory policy in the telecommunications, media and internet fields. Mr Peltomäki has also worked as Head of the Commission's representation in Helsinki in 2006 – 2007.

Abstract

Prior to joining the Commission in 2006, Mr Peltomäki worked for almost ten years in the office of the Prime Minister of Finland, initially as State Under-Secretary, then State Secretary for EU affairs. A lawyer by training, Mr Peltomäki began his career as a coordinator of international research and training courses at the Helsinki University of Technology. UAS are emerging technologies with an important potential for civil applications. They present new opportunities to support growth and create jobs in Europe. The services of the European Commission have looked into the issues at stake in this new market through a broad consultation process which culminated in 5 public workshops of the EC UAS Panel organised between June 2011 and February 2012. This consultation allowed to gather the views and contributions of all concerned stakeholders (aviation rulemaking bodies, industries, civil society, etc), to identify the barriers hampering the development of the civil UAS market and the role and responsibilities of the different stakeholders involved. Mr Peltomäki will report on the main conclusions drawn by the services of the European Commission at the end of this consultation process.

33 09.17-09.34 From ICAO to EASA
Filippo Tomasello, EASA - European Aviation Safety Agency, Europe



Bio Data

Filippo Tomasello was flight test engineer in the Italian Air Force until 1984. Subsequently in ENAV he was responsible for R&D and for a number of projects for Air Traffic Management and Air Navigation Services. Member of the ICAO FANS Committee, he then chaired the ADS Panel and the Mobile Communications Panel for about 5 years. Joined EUROCONTROL in 2000 as manager for Northern Europe. In 2005 joined the European Commission, working on accident investigation, data collection and extension of the competences of the European Aviation Safety Agency (EASA) to ATM, ANS and aerodromes. In 2007 entered EASA as rulemaking official. EASA designated him in different ICAO groups, including the Study Group on UAS.

Abstract

The ICAO approach to UAS was slow, but sound: first agree that UAS are aircraft; then airworthiness and FCL; insertion into airspace cannot be tackled, if the other 'tiles' of the mosaic are missing). This approach was communicated by Circular 328 in 2011. If UAS are aircraft ... their accidents have to be investigated (Amendment Annex 13 in 2010) and then the Chicago Convention applies: Art 8, 31 & 32. Amendment to accommodate international RPAS operations in Annex 2 was adopted by the ICAO Council on 07 March 2012, to become applicable in November of same year. Article 2 of Basic Regulation mandates EASA to take into account ICAO provisions when proposing common rules applicable to aviation safety in the European Union. The ICAO Annexes are in fact acts of international law addressed to States and not to citizens. They require transposition in the legal order of the ICAO Contracting States. In the EU the transposition is mainly developed through EASA, supported as appropriate by technical bodies like JARUS, Eurocae and EUROCONTROL. Once the measures are adopted by the European Commission, they have immediate force of law towards all the citizens and legal persons in the EU. Main topics to tackle, in EASA but also for developing the ICAO UAS Manual, are:

- Separate certification of RPA and RPAS;
- Oversight of the SATCOM C2 service provider;
- 'new' issues (not just transposition of existing SARPs) possibly included in the ICAO Manual, i.e.g.: C2, D&A; handover, VLOS, etc...
- Scope of rules to cover all "professional" (commercial & corporate) operators of RPAS (fixed or rotary wing);
- "Total system" approach to legitimate apportioning safety requirements for D&A throughout the aviation system (not just the RPAS).

34 09.34-09.51 JARUS: A situational update
Alistair Maxwell, JARUS - Joint Authorities for Rulemaking on Unmanned Systems, International



Bio Data

Alistair Maxwell started his aviation career as an apprentice for British Aerospace and following completion of a HND in aeronautical engineering was appointed an Aerodynamicist. Following a short period of Study at Cranfield College he took up a post as a Performance Engineer before becoming a CAA Surveyor in 1983 and Head of Technical Airworthiness Requirements in 1985. During his time in Requirements and Policy he oversaw the development and publication of numerous British Civil Airworthiness Requirements (BCARs) and provided CAA input to Joint Airworthiness Requirements (JARs), including being an active member and later Chairman of the JAR-23 Study Group. In 1999 a move to Projects Department as a Design Liaison Surveyor (DLS) provided a change in direction focussing on compliance with certification standards as a Project Certification Manager (PCM)

for a wide range of aircraft. DLS duties also involved the oversight and audit of a range of approved companies. A later move to Strategy and Policy in 2009 and appointment as Initial Airworthiness Policy Manager has provided an opportunity to apply past experience gained in the development and application of Airworthiness Standards. Alistair has been involved with Unmanned Aircraft Systems for a number of years firstly as a PCM attending meetings at which standards are developed but also as a PCM for national projects such as the BAE Systems Herti.

Abstract 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 in six different working groups:

1. Operations and FCL
2. Organisational approvals
3. Airworthiness
4. Detect and avoid
5. Command, control and communications
6. System safety ('1309')

The output of the group will consist of draft regulatory proposals 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 regulations with a number of non-European Union countries such as the Australia, Brazil, Canada, Russia, South Africa and the US. Once the group has reached agreement on these draft regulations, they will be provided to EUROCAE WG-73, WG-93 and RTCA SC203, where consultation with industry and other stakeholders will take place. In the past year, the group has redefined its terms of reference, to incorporate the growing membership and to define more working groups drafting regulations. During the presentation a short overview of the new organisational structure of the group and the work schedule to define a harmonised set of requirements will be presented.

09.51-10.06 **Panel Discussion**
10.06-11.00 **Refreshment Break**

Session 10 - RPAS Policy & Related Issues

35 11.00-11.17 **RPAS integration into the European Airspace**
Mike Lissone, EUROCONTROL, Belgium

Bio Data Mike Lissone has an extensive operational ATM background covering more than 20 years of ATC experience. Until 1999, Mike Lissone was an Air Traffic Control Officer for the Royal Netherlands Air force specialized in ACC and APP. After the Air force he worked as a senior ATM expert for a UK based Consultancy Company where he has been involved in several studies investigating Sense and Avoid requirements for UAS. Mike Lissone has been working for EUROCONTROL since 2001 as a senior Navigation expert for the Navigation and Airspace Unit. He has been leading several projects supporting States in optimising their Terminal Airspace operations. Mike is currently the EUROCONTROL Focal Point for UAS.

Abstract This presentation will provide an overview on EUROCONTROL's UAS ATM Integration activity to date. It is the vision of EUROCONTROL to ensure safe integration of this new airspace user ensuring no additional burden on ATC and no negative impact on present day operations. The presentation describes the initial assessment done with the JAA in 2002 and the work that has been done in support of the organization of EUROCAE WG73. Further information is provided towards EUROCONTROLs work with standardization and regulatory entities. Special attention will be given to the airspace assessment that is underway. The assessment will identify in what areas UAS integration will have less or no impact on present ATM operations. It is expected that this could enable early UAS integration. It is also foreseen to identify minimum performance requirements for UAS operation within non-segregated airspace under IFR conditions.

The UAS Integration work program for 2012 is also presented. Guidance material for Airports will be finalized and the regulatory gap analysis should be finished in the 3rd quarter of this year. The presentation also addresses the support given to the EUROCONTROL member States regarding early integration efforts, like Switzerland and the support that is provided to industry.



36 11.17-11.34 **RPA Safety Requirements for flights over populated areas - With an emphasis on airworthiness**
Masaaki Nakadate, Japan Aerospace Exploration Agency (JAXA), Japan

Bio Data Masaaki Nakadate graduated from the Faculty of Engineering and the Graduate School of Engineering at the University of Tokyo with a BS and MS in aeronautics. After two years of R&D on stratospheric platform airship as an invited researcher from industry, he joined JAXA (then NAL, National Aerospace laboratory of Japan) in 2002 as a research manager in charge of Japan's stratospheric platform (SPF) airship R&D. He successfully lead flight testing of a 68 m long unmanned airship, or low altitude station-keeping flight test vehicle, up to an altitude of 4,000 m under an experimental certificate by the Japan Civil Aviation Bureau (JCAB). After Japan's SPF R&D project having been discontinued, he has been leading R&D on smaller and low altitude UAS in general and airship type in special. Before joining JAXA he had 24 year industry experience, development of T-4 jet trainer for the Japan Self-Defense Forces, R&D on the still-born 7J7 jet transport with Boeing, and R&D on helicopter aerodynamics/dynamics. He successfully carried out flight testing of a new bearingless rotor system on a Bell 412 (manned) helicopter under an experimental certificate. He is now a senior staff for airship technology and unmanned aircraft safety technology at JAXA's Aviation Program Group. His current areas of interest include UA safety issues, airworthiness in special.

Abstract UA safety requirements have been revised to realize flights of a small UA for disaster monitoring missions in development at JAXA. JAXA first issued division level requirements and realized flights of a multipurpose UA for meteorological missions back in 2005, revised and raised them to agency level in 2009. They, however, were applicable only to flights over



unpopulated areas, and the safety on the ground below was, as in a rocket launching, to be guaranteed by preventing UA's from flying out of the restricted airspace for testing and making them crash, without fail, onto safe and unpopulated areas. Accordingly, the existing requirements had to be made major revisions to realize flights over populated areas. The sample safety checklist in the FAA Order 8130.34 was used as a reminder of items in the revision. Existing requirements were checked item by item, and revised or added where they were insufficient or nonexistent. The revision was made under a general policy "to make requirements as specific and quantitative as possible." FAR Part 23-like requirements including the "UAV Systems Airworthiness Requirements (USAR)" were referred to, to make them "specific and/or quantitative," and simplified methods of substantiating strength were proposed in consideration for projects that can ill afford budgets and personnel. The revision, applicable to UA's under 150 kg gross weight and to flights "over other than congested areas," went through consultations among Japanese UA industries and JAXA's division level reviews, and is waiting for agency level approval. Items to be presented include reliability issues.

37 11.34-11.51 A vision on urban UAS infrastructures and related technologies, code of behaviour & Responsibility enforcement
Catherine Fargeon, Ministry of Defence, Conseil Général de l'Armement (CGArm), France



Bio Data Education: Aeronautical and Space Engineer, Dr – Eng (PhD in Automation and Systems), MBA, CHEAr (mid-career strategy school), former private pilot and international radio operator.
 Career positions: Former FR MoD Research Division Manager « Automation, Robotics and Perception »; then Technical Leader « UAS - Unmanned Aerial Systems »; then Air Procurement ETAP Programme Manager, complete set of R&T programmes for manned or unmanned combat aircraft involving 6 LoI nations, 49 research institutions and companies; then Deputy Director for International Cooperation Strategy; currently, Vice-president studies section, animating high level task forces reporting to minister. Her other activities include: European Commission evaluator, SME innovation Agency start-up evaluator specialist, co-founder profit and non-profit entities, engineering schools professor.
 Publications: > 120 lectures, 30 interviews - press and TV – 4 books, about 50 thesis follow-up; Co- author of reports to Prime minister (Dual use), to minister of Defence (Human training, Neurosciences, Biotechnologies and Nanotechnologies, Laser, UAS, Robots, Internet security), and to minister of Economy (Oséo Impact of funding on research SMEs); currently working on 'white papers' concerning Ethics of 'unmanned armed systems and distant kill', 'Neurosciences' for Defence and new armaments.

Abstract Wide civilian UAS deployment appears to be "stuck" on various regulatory issues related to flight safety, air integration, and frequencies/bandwidth allocations. A reason, among others, at the root of the current situation, is the tactic to not disturb the existing aircraft regulations and infrastructures in view of getting a small seat where we are not well greeted. Nowadays, the equation is slowly, but inexorably, shifting, because aircraft are looking more and more like UAS, collision avoidance systems are on the way, and traffic jamming is there to push towards more automation. So, it is time to change tactics and to open the door to a new vision for air system infrastructures; this effort is meant to get rid of these cumbersome regulation drawbacks in an efficient manner. This presentation exemplifies this vision in the field of small UAS to facilitate intra-urban applications.

38 11.51-12.08 Concept development of a Sense and Avoid system for RPAS operations in domestic US Airspace
Kyle R. Noth, Mitre Corporation, USA



Bio Data Kyle Noth is a Senior Multi-Disciplinary Systems Engineer at The MITRE Corporation's Command and Control (C2C) Center. Previous research interests include advanced vehicle concept development, air transportation operations research, and agent based modeling and simulation approaches for evaluating the impact of advanced vehicle and technology concepts on the National Airspace System. In addition, he has participated in several international unmanned aircraft system design competitions. In his current role, he is doing research and development for the Department of Defense on a "Sense and Avoid" capability for UAS. This work will enable routine UAS access to the domestic US airspace. He holds a B.S. and M.S. degree in Aeronautical and Astronautical Engineering from Purdue University.

Abstract Known best for their role in overseas contingency operations, remotely piloted aircraft (RPA), are also capable of a wide range of tasks in civilian managed airspace, such as border patrol and disaster relief. Despite the potential benefits of expanding RPA operations in the National Airspace System, their uniqueness is currently limiting their operations. FAA regulations require that aircraft be able to "see and avoid" other aircraft. Without a pilot on board, RPA need to rely on alternative means to see and avoid other traffic. MITRE is teaming with the Air Force to develop a quick-to-implement, low-cost solution: the Ground Based Sense and Avoid System, or GBSAA. Currently, RPA operations require ground observers or chase aircraft to keep an eye out for "non-cooperative aircraft," such as ultra-lights, gliders, and hot air balloons that are not equipped with transponders and thus difficult to track by air traffic control. This restriction incurs additional resource and manpower cost and imposes operational restrictions. GBSAA leverages existing ground radar systems to provide RPA operators with the sense and avoid capability necessary to operate safely in civil airspace. Using the ground radar data, GBSAA establishes a Dynamic Protection Zone around a RPA. When an aircraft enters the Dynamic Protection Zone, visual and aural alerts notify the operator, enabling the operator to perform an avoidance maneuver to maintain safe separation. With ground radar systems already strategically placed throughout the national airspace system, GBSAA can be implemented quickly and efficiently and will allow for a significant reduction of operational limitations. This will pave the way for safe RPA operations in the domestic US airspace.

12.08-12.30 Panel Discussion
12.30-14.00 Open Bar & Lunch Buffet

39 14.00-14.17 **Predator aircraft series status report: Military & civilian missions**
 Stephen May, General Atomics Aeronautical Systems, USA



Bio Data

Steve May is currently Manager of International Strategic Development for General Atomics Aeronautical Systems, Inc. (GA-ASI), in San Diego, Calif., USA. In this position, Mr. May is responsible for promoting opportunities for the company's full line of unmanned aircraft systems, tactical reconnaissance radars, and sensor systems to customers in Europe. He has worked in business/strategic development for GA-ASI since 2001. In this role, Mr. May served as a member of the U.S. Air Force Scientific Advisory Board for the Unmanned Aerial Vehicles in Perspective Study that was completed in July 2003. He also served as a UAV Subject Matter Expert assisting the NATO Air Group 7 Program Support Team that drafted the NATO MALE and HALE UAV Staff Requirements in 2005. He is currently on the Board of Directors for UVS International. Mr. May retired from the U.S. Army as a Lieutenant Colonel. He is a graduate of the U.S. Military Academy and spent two-and-a-half years leading combat units in Vietnam. He holds a Master's in Business Administration from Long Island University and Masters of Science degrees in Physics and Nuclear Engineering from MIT.

Abstract

The deployment of NATO forces in Afghanistan has increased interest in ISTAR assets, particularly long endurance Unmanned Aircraft Systems (UAS) capable of carrying simultaneous mixed payloads and which are supporting NATO ground forces 24/7. Less known are the many civil uses of UAS. The General Atomics Aeronautical Systems, Inc (GA-ASI) fleet of UAS has now accumulated more than 1,700,000 flight hours; approximately 90% of them in actual operations. GA-SI unmanned aircraft are currently flying 30,000 hours/month. In 1994, GA-ASI first flew the Predator for the U.S. Department of Defense. Since then, Predator has become the most widely-known "brand" of UAS and includes MQ-1B and RQ- 1B Predator, MQ-1C Gray Eagle, Predator B/MQ-9 Reaper, and now, Predator C Avenger. The GA-ASI UAS will be briefly described. Each of the different aircraft will also be characterized. Emphasis will be placed on Predator B military and civil (maritime, disaster relief, specialized payloads) missions. Predator B utilizes a turboprop engine and is designed with multiple system redundancies to make unmanned aircraft airworthiness certification finally feasible. Predator B was operationally deployed in 2006. In addition to its use by the USAF as MQ-9 Reaper; the United States Department of Homeland Security uses its own Predator B fleet to perform border reconnaissance missions, now including maritime and coastal patrols, as well as disaster relief missions. NASA also uses its Predator B to demonstrate its ability to carry specialized payloads. The United Kingdom RAF and the Italian Air Force have also acquired Predator B/ MQ-9. Procurement of Predator B/MQ-9 is being actively pursued by additional NATO nations.

40 14.17-14.34 **The Camcopter S-VTOL UAS**
 Neil Hunter, Schiebel Aircraft, Austria



Bio Data

Since leaving the Royal Navy in 2006 after a 23 year career, Neil Hunter worked with Thales Aerospace in the UK, responsible for leading on all worldwide future UAV opportunities for nearly 2 years before joining Schiebel in Austria in Sep 08. He joined the Royal Navy in 1984 and enjoyed a successful career as both an Executive/Seaman officer and as a Helicopter Pilot. He flew operational tours on both the Lynx and the Sea King helicopters. He flew over 300 hours during the first Gulf War and his claim to fame was being in the first allied helicopter to land in liberated Kuwait in 1991. During his tenure as Senior Pilot of the Sea King training squadron he was one of 3 crews involved in the rescue of 14 Spanish seamen adrift in life rafts in a severe storm in the Atlantic in Feb 99; the biggest UK peacetime rescue at that time which earned him a Queen s Commendation for Bravery in the Air. Away from the air, he commanded the Minehunter HMS Cromer from 95 97 which included the class s first deployment to Canada and the USA. Ashore he enjoyed appointments in charge of the University Royal Naval Units from the Naval College at Dartmouth, a personnel appointment in the Fleet HQ in Portsmouth and a year in Toronto, Canada undertaking Staff Course. His last appointment in uniform took him into procurement for the first time where he was responsible for all UK tactical and operational level UAVs with the main focus of his work being in bringing Watchkeeper into service. Neil Hunter is married with 4 children, ranging from 19 years to 1 years old and hobbies include playing and watching as many sports as possible. He is a keen skier and an accomplished sailor with Royal Yachting Association instructor and examiner qualifications.

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 harbors. 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 Maritime developments: Lightweight maritime radars; Anti-piracy operations; Harbor security

41 14.34-14.51 **Patroller : Update and new capabilities**
 Olivier Reichert, Sagem Défense & Sécurité, France



Bio Data

Olivier Reichert graduated from the French Engineer School "Ecole Nationale Supérieure des Télécommunications de Paris" and owns a MBA from the University of Hartford, Connecticut. He joined SAGEM in 1988. After several years as an engineer and project manager in Missile guidance and navigation, he moved to the Business development area. Olivier has 10 years of experience in UAV systems. From 2000 to 2004 he was the Program Manager of the French SDTI tactical UAV system up to its delivery to the French Army. Olivier is today Program Manager in the

UAV Systems Programs Directorate, where he is in charge of the Business Development and the R&D projects and programs.

Abstract The Patroller is a dual-use medium-altitude long-endurance surveillance UAS. Its innovative concept is based on the transformation of an existing manned EASA-certified aircraft into a UAS. The Patroller leverages on technologies already developed by Sagem for the Sperwer Mk.II tactical drone, and field experience of 8 years of operations of Sagem UAS in Afghanistan. Designed for a wide range of defence and homeland security long-endurance surveillance missions, it keeps operating costs under control. It also benefits from a dual-mode UAV / OPA design (Unmanned Air Vehicle / Optionally Piloted Aircraft) and features a modular architecture allowing the easy integration of a large range of mission payload. This paper presents an update of the Patroller technical and operational capabilities. It particularly describes the integration of new payload that extends the scope of applications and missions proposed by the Patroller.

42 14.51-15.08 RELIFO: Automatic system for detection of obstacles & hotspots in the overhead powerline
Juan Larrauri, Deusto University, Spain



Bio Data Juan I. Larrauri is professor in the Faculty of Engineering at the Deusto University in Bilbao. (SPAIN). He is teacher in the issues «Industrial Automation» and «Artificial Vision» as well as responsible of the Artificial Vision Laboratory. In addition, he is researcher member at the DeustoTech Technological Center. Since 2007, we are developing a project on UAVs in the field of civil applications. Our project is focused on the overhead power line inspection. The project has been founded by The Spanish Centre for Industrial Technological Development (CDTI) and The IBERDROLA Electricity Company.

Abstract In this paper, we present new automatic system in real time for overhead power line inspection by Unmanned Aerial Vehicle (UAV). The main contribution is of the design, development and implementation of new algorithms of artificial vision for surveillance of electrical infrastructures without the operator intervention from ground station or Company control center. The video signal generated by the HD camera and IR Camera installed in the UAV is transmitted from the UAV to the ground control where is transformed in frames. These images are synchronized with the telemetry data sent from the autopilot in order to be processed by the proposed algorithms of artificial vision. In the ground station, the HD images and telemetry data are processed in a computer in order to identify areas and measure distances from power lines to the surrounding vegetation y/o buildings. Simultaneously, other computer in the station ground analyzes the images captured by the infrared camera in order to detect bad conductivity and hotspots in the power lines, transformers and electrical substations. Reports are generated online and are sent via SMS and email.

15.08-15.25 Panel Discussion
15.25-16.20 Refreshment Break

Session 12 - Future Vision & Related Sensors

43 16.20-16.37 RPAS - Flying high over commercial aerospace
Debajit Sarkar, Market Info Group, USA (India office)



Bio Data Debajit Sarkar has over 8 years experience as a consultant, programmer and business analyst with a diverse background in program and project management, strategic management planning and policy analysis in the Defense sector. He researches Smart Weapons and UAVs and closely monitors the emergence of Artificial Intelligence in the Defense sector. His work has allowed him to investigate how Embedded Systems can be better utilized for Home Automation. He has presented algorithms which compute optimal policies for these timed domains. Mr. Sarkar holds a Bachelors in Commerce (Honours) and a Post Graduation in Computer Application and has worked as a Business Analyst with Deloitte and Touche and as a Senior Project Leader for Kantar Group. Currently he works as an Independent Consultant specializing in Smart Weapons and UAV research. In this capacity he successfully delivers business development strategies in the Defense sector and help achieve growth objectives for business enterprises, on a consulting and contract basis. His value proposition is to provide winning client solutions using consultative, and facilitating skills

Abstract Commercial UAS capabilities will literally start out small. UAS flying for months above the jet stream have the potential to develop a new communication and sensing infrastructure. This will be an advanced version of roads, canals, air mail, telephone, satellite, etc. Infrastructures that were all sustained with government agreements until private players developed the commercial market. The Emerging Capabilities of Persistent UAS are Significant Profit making capability is determined by cost per flight hour. Persistent UAS will have a great advantage. Their cost per hour will possibly be around 1/7 th of conventional UAS with comparable capabilities. A Heavier-than-Air or fixed wing persistent UAS will support small payloads like electronics. Lighter-than-Air persistent UAS airships will support large, lightweight payloads like antennas and cameras. Almost all of the commercial profit is to be made with very persistent (at least a month), very high altitude (above 18km), very large UAS Most of their money will be made with communication payloads, such as direct broadcast entertainment and internet access. Persistent platforms will soon provide localized space-like utilities at far lower cost. Mature economies will not function efficiently without such services and developing economies will grow to be equally dependent.

44 16.37-16.54 Does smaller mean better? The future of the mini RPAS market
Meir Moalem, MultiModis M.M.Ltd., Israel



Bio Data Meir Moalem, Born 1968 in Israel, has graduated his B.Sc. in Physics and computer sciences in Ben Gurion University, Israel (with honors) in 1998, and graduated in 2006 his M.A. in the Diplomacy and National Security executive program,

Tel Aviv University, Israel (with honors). Currently he is working on his PhD in national security and space programs in Tel Aviv University, Israel. Mr. Moalem has retired from the IAF as a Lt.Col. (Ret.) in 2011 after years of service, many of them within the UAV & Space Systems department, having an extensive experience in RPAS and space systems R&D. One of the projects he was leading during his service is the MEIDEX mission on board the STS-107 Columbia space shuttle flight in 2003. Mr. Moalem has also received the Israel National Defense award in 2009. In 2011, Mr. Moalem is the founder and CEO of MultiModis M.M.Ltd, a strategic technology consulting company for the aerospace market and industry. MultiModis services include: Project management and control; Proposal evaluation and assessment (both technology and overall program); Customer requirements specification; Project contractual documents (SOW, Technical specification) overall management and control; Negotiations; Creating and controlling work plan; Creating, managing and controlling of risk management programs; Strategic consulting for decision making in high uncertainties conditions; Market analysis; Technological market analysis; "Red Team" services.

Abstract

The world of RPAS is changing rapidly. New technologies and capabilities are emerging every day, making it very difficult for the industry to keep up, to adjust to this ever changing environment, these new demands, and to maintain a solid business development plan. Questions such as: Military or civilian? Smaller or bigger? Electric or fuel propulsion? And more are concerning aerospace entrepreneurs around the world. One of the surprising (or not?) new directions is the mini-RPA market which has seen a major change in the last years. The last years have been especially significant for the market with the advance in payload miniaturization, efficient electric engines and a beginning of a paradigm change have all contributed to the increase, not to say the boost, in this specific market. There are many industries, many small RPA companies, and, many customers. MultiModis is conducting a study, with the goal of giving answer to some of the following questions: What are the reasons for this change? Is there a "business future" for small RPAS or is it just a trend? If there is a future, is it on the military or commercial market? What is the next trend? Is it time for RPASS (system of systems)? As for the industry – how can it prepare itself to these changes and make the most of them? The presentation gives a strategic "bird-eye" review and status of current market and future trends in technology, products, services and business climate. In my presentation, I will argue that mini RPAS market is still far from its full potential, that the changes in technology, politics, geo-strategic and geo-economic environment are encouraging this market, and that there is a win-win situation for industry/military/commercial players.

45 16.54-17.11 AETOS: Automated autopilot & geointing payload Vassilis Foteinopoulos, Aerofilms, Greece

Bio Data 1

Vassileios Foteinopoulos graduated from the Surveyor Engineering Department, National Technical University of Athens in 1995 and during his undergraduate studies he was honoured from Academy of Athens, Eugenidios Foundation and IKY, and got his Master in Science degree in Photogrammetry from University College London 1996. Mr. Fotinopoulos combines the knowledge of a surveyor engineer with the skills of an experienced and highly qualified UAV operator. His work has been acknowledged from many important world-leading companies and the planning authorities of Greece. As a true pioneer in the area of UAVs and aerial mapping, georeferencing and surveillance missions he has published some of his works in world-wide conferences. Until now more than 10 publications have been presented in scientific conferences like ISPRS 1996 and 2004, and Mr. Foteinopoulos has also presented technology innovations in the area of UAVs at Greece's Government Authorities Symposia.

Bio Data 2

Konstantinos Alexis graduated from the Electrical and Computer Engineering Department, University of Patras in 2007 and he is currently a PhD Candidate in the area of Autonomous Control of Unmanned Aerial Systems. The research area of Mr. Alexis includes Unmanned Aerial Vehicles design and autonomous control, state estimation systems, environmental Proposal EPSS ID COMAV perception, optimal – predictive and robust control, dynamic and Mixed-Integer Linear Programming. His world has seen extended publication in more than 15 IEEE and IFAC conferences so far and scientific Journals. An autonomous innovatively controlled Quadrotor Rotorcraft has been developed by Mr. Alexis as a part of his PhD studies. Additionally, Mr. Alexis works on other aerial platforms including Tilt-Rotors and Coaxial helicopters. Moreover, Mr. Alexis has proposed new strategies for decentralized area monitoring and he is currently in the development of an Autonomous Stabilized Pan-Tilt Georeferencing System. Mr. Alexis is also a reviewer in many world-wide IEEE and IFAC conferences. Mr. Alexis years is experienced in the finest of the programming languages and techniques including C/C++, Embedded C, Python, LabVIEW, MATLAB and Computation Fluid Dynamics software including ANSYS, Solidworks and openFOAM.

Abstract

This paper presents the describe the functions and the possibilities of a newly developed payload with main task the continuous Geo-Referencing of Video Flow From Small Low-Cost Civilian UAVs. The method of geo-referencing the video data acquired by a small civilian use UAV, which is specifically designed as an economical, moderately functional, small airborne platform intended to meet the requirement for fast-response to time-critical events in many small private sectors or government agencies for small areas of interest. The developed mathematical model for geo-locating video data can simultaneously solve the video camera's interior orientation parameter (IOP) (including lens distortion), and the exterior orientation parameters (EOPs) of each video frame. First experimental results collected by the UAV at the established control field will be analyzed. It also measures an unknown target in order to estimate the target coordinates and then track and follow the unknown target continuously. The results are mainly promising for inspection and surveillance missions, but not adequate for airborne mapping systems because the boresight matrix was usually assumed to be a constant over an entire mission in a traditional airborne mapping system. With a newly developed method, each video is geo-orthorectified and then mosaicked together to produce a 2-D planimetric mapping. Productivity and cost related issues are also discussed when the payload comes to mass production. Mission case studies are also presented.



46 17.11-17.28 The development of a multi-spectral sensor for the inspection of electrical power lines
Roel Stolper, CSIR, South Africa



Bio Data

Roel Stolper is the CSIR's research group leader for its electro-optics group. He has a keen interest in infrared and ultraviolet radiometry: the quantification of infrared and ultraviolet radiation; biophotonics: the application of light and its interaction with biological tissue in the medical field, especially as it applies to fluorescencecopy for TB diagnoses; and multi-spectral imaging. The topic of his presentation touches on this last interest. It concerns the development and application of multi-spectral imaging sensors applied at an unmanned airborne vehicle for the inspection of South African transmission lines. Stolper has offered several international training seminars in Asia, Australia and Europe. These were specifically on multi-spectral imaging and gas detection technology for the high voltage industry for the inspection of insulators, transmission line conductors and associated hardware. His work on the use of Terahertz technology for non-destructive testing of polymeric insulators has been published in the publication Insulators News Marketing Report Crete 2009. He holds more than 15 publications on the topic of corona detection&localisation for effective line maintenance. He holds a BTech in electrical engineering from the Tshwane University of Technology.

Abstract

Conventional power line inspection from ground level can be described as a one dimensional inspection method as only components that are visible from the ground are inspected. Many parts of the components self with potential failures are obscured by themselves and the structure. An aerial inspection method is ideal as the line components can be inspected from all angles of interest. Many electrical companies use helicopters equipped with cameras and line inspectors to verify the line integrity. The cost of hiring a helicopter with its pilot is exorbitant. The deployment of an autonomously flying airborne platform equipped with multi-spectral sensors brings down the line inspection cost. In terms of the required flight inspection modes the ability of a rotary-winged unmanned aerial system (R-UAS) to hover makes it most suitable. This presentation describes the development of the required multi-spectral sensor for effective line inspection and partly the development of rotary-winged unmanned aircraft system and the results achieved.

17.28-17.48 Panel Discussion

17.48-17.55 Closing Remarks & End of Conference