

Seminário Internacional de VANT - 2010

SI VANT 2010



27 a 29 de outubro de 2010
São José dos Campos - SP

Realização



**Organização Brasileira
para o Desenvolvimento
da Certificação Aeronáutica**

Apoio



Patrocínio





**GLOBAL
ACCESS
INITIATIVE**

**Federating
The
International
UAS
Community**

**National UAS Conference
Sao José dos Santos, Brazil
27 October 2010**

**UAS: THE GLOBAL PERSPECTIVE
with a Focus on Light UAS**

Peter van Blyenburgh



Presentation Overview

Federating
The
International
UAS
Community

- Introduction to UVS International
- RPA or UA?
- Terms & Definitions
- Categories & Industrial base
- UAS in service
- Military applications
- Out-of-country deployments
- Governmental non-military applications
- The current problems

28 Slides

- Addressing the problems
- EUROCAE WG73
- ICC
- JARUS
- ICAO

9 Slides

- Survey for the EC on non-military LUAS applications
- EC DG MOVE Hearing on LUAS
- The current LUAS situation
- Conclusions
- Recommendations

23 Slides

Total: 60 Slides



What is UVS International?

Federating
The
International
UAS
Community

1997

Non-profit association founded in Paris, France as Euro UVS

1999

EURO UVS is registered in Den Haag, The Netherlands

2004

Changed its name to UVS International – Global Scope

Operates: Out of offices in Paris, France

2010

263 Corporate & Institutional Members in 34 countries

111 Honorary Members - 24 countries & 7 international orgs

Nat. military & CAAs + EASA + EDA + EUROCONTROL + FAA + NATO

www.uvs-info.com

World's largest generic UAS & UGV web site



Members & Affiliations

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★ = Honorary Mbrs ■ = Corporate Mbrs

- ★ ■ Argentina
- ★ ■ Australia
- Austria
- Belarus
- ★ ■ Belgium
- ★ ■ Botswana
- Brazil
- ★ ■ Canada
- China
- ★ ■ Czech Rep.
- ★ ■ Denmark
- ★ ■ Finland
- ★ ■ France

- ★ ■ Germany
- Greece
- ★ ■ Hungary
- ★ ■ India
- Indonesia
- Israel
- ★ ■ Italy
- Japan
- Latvia
- ★ ■ Luxembourg
- ★ ■ Netherlands
- ★ ■ New Zealand
- ★ ■ Norway

- ★ ■ Portugal
- Russian Fed.
- ★ ■ Singapore
- ★ ■ Slovenia
- ★ ■ South Africa
- ★ ■ South Korea
- Spain
- ★ ■ Sweden
- ★ ■ Switzerland
- ★ ■ Turkey
- ★ ■ UK
- ★ ■ USA

**263 Members
38 Countries
10 International
Organizations**

Working Groups Instigated by UVS

- UAV DACH (WG)
- IWGLUAS
- ICC

Partner Organizations

- ADE, India
- Expo-Ecos
- European Air Sports Ass.
- Intern. Aviation Grp, China
- RCAPA, USA
- UATAR, Australia
- UAVS, UK
- UVS France, France
- AVBS, Czech Rep.
- Eurosatory (COGES), France
- Japan UAV Association
- UAS Norway, Norway
- UAV DACH, Germany (Ass.)
- Unmanned Systems Canada
- UVS Korea, S. Korea

Member

- EUROCAE WG73 (Standing adviser)
- RTCA SC 203

Participant

- ICAO UAS SG
- EC UAS Conference Org. Committee

Mutual Memberships

- ATCA, USA
- EUGIN, Belgium
- EUROCAE, France
- The European Institute, USA

Creation instigated/encouraged/supported by UVS International



Board of Directors

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12 countries represented

Peter van Blyenburgh
Blyenburgh & Co., France
President
(1st year - 7th mandate)

Jean Caron
EADS DS, France
Treasurer
(1st year - 5th mandate)

Doug Davis
NMSU-PSL, USA
Secretary
(1st year – 1st mandate)

Eduardo Carrillo
Boeing R&T Europe
Spain
(1st year – 1st mandate)

Ian Glenn
ING Engineering
Canada
(1st year – 2nd mandate)

Ole Vidar Homleid
Robot Aviation
Norway
(1st year - 1st mandate)

David Kershaw
BAE Systems
UK
(1st year – 2nd mandate)

Alexander Koldaev
Irkut Corp.
Russian Fed.
(1st year – 2nd mandate)

Simo Makipaja
Patria
Finland
(1st year – 1st mandate)

Gérard Mardiné
Sagem D & S
France
(1st year – 1st mandate)

Steve May
General Atomics
USA
(1st year – 2nd mandate)

Nick Miller
Thales Aerospace
UK
(1st year – 4th mandate)

Itai Toren
Elbit Systems
Israel
(1st year – 2nd mandate)

Robert Veenhuizen
CybAero
Sweden
(1st year – 2nd mandate)

John Walker
The Padina Group
USA
(1st year – 3rd mandate)

Observers: Gilles Fartek, Integra, Denmark
Tore Kallevig, Avinor, Norway

Mike Lissone, Eurocontrol, Belgium
Abdoulay N'Diaye, Thales, France

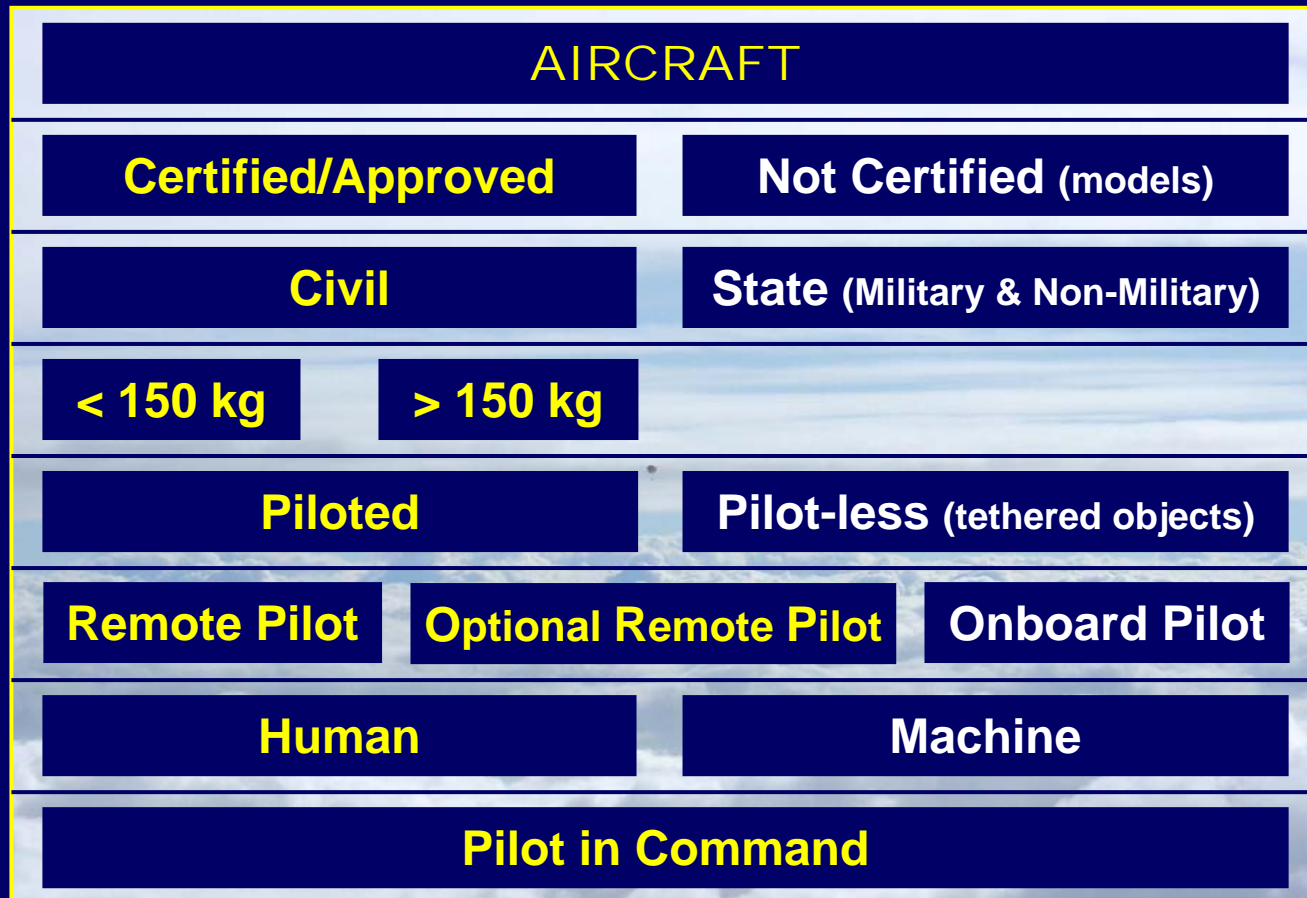


WHAT ARE WE TALKING ABOUT?

Remotely Piloted Aircraft (System) or Unmanned Aircraft (System)

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Europe



REMOTELY PILOTED AIRCRAFT

Purpose-Built Aircraft

Converted Aircraft

Civil

State (Military & Non-Military)

Europe

< 150 kg

> 150 kg

LUAS

UAS

OPA





TERMS & DEFINITIONS – 1/4

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Produced by the UVS International-instigated Interim Working Group on Light UAS (IWGLUAS)
Submitted to EUROCAE, EUROCONTROL, FAA & ICAO for consideration

Aircraft

ICAO Annex 8

Any machine that can derive support in the atmosphere from the reaction of the air other than the reaction of the air against the earth's surface.

Unmanned

No person on board capable of exercising any control over the aircraft.

Unmanned aircraft (UA)

An aircraft designed to operate with no person on board capable of exercising any control over the aircraft.

Light Unmanned Aircraft (LUA)

Unmanned aircraft with a mass of less than 150 kg.

Unmanned aircraft system (UAS)

The combination of unmanned aircraft (UA), the system elements necessary to enable the taxiing, take-off/launch, flight and recovery/landing of UA, and required to accomplish its mission objectives.

Non-Recreational Purposes

Acronyms are invariant and refer both to singular & plural.



TERMS & DEFINITIONS – 2/4

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Unmanned aircraft system (UAS)

The combination of unmanned aircraft (UA), the system elements necessary to enable the taxiing, take-off/launch, flight and recovery/landing of UA, and required to accomplish its mission objectives.

Non-Recreational Purposes

UAS system elements

- Unmanned aircraft
- Control station(s) / pilot station(s)
- Software
- Health monitoring
- Communication link (s) (command & control + data)
- Data terminal (s) (payload exploitation)
- Payload (s)
- Launch & recovery systems
- Flight termination system (s)
- Support & maintenance equipment
- Power generation, distribution & supply
- Air traffic control communications equipment (voice + data)
- Handling, storage & transport equipment
- All required documentation related to aforementioned

Acronyms are invariant and refer both to singular & plural.



TERMS & DEFINITIONS – 3/4

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UAS operator (UAS-o)

The legal entity approved for the operation of a UAS.

UAS crew (UAS-c)

All persons assigned by an Operator to fulfil specific functions relative to correct & safe UAS operation.

UAS commander (UAS-cdr)

The person who has overall authority & responsibility for the safe operation of a UAS during a specific mission. The UAS-cdr may also fulfil the UAS pilot function.

UAS pilot (UAS-p)

The person in direct control of the UA whilst the engine is running and responsible to the UAS-cdr. The UAS-p may have direct control of more than one UA.

UAS crew member (UAS-cm)

A person assigned by the UAS Operator to perform specific duties prior to UA flight, during the operation of the UAS, and after recovery or landing of the UA.

Acronyms are invariant and refer both to singular & plural.



TERMS & DEFINITIONS – 4/4

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Automatic

Execution of a predefined process that requires UAS-c initiation.

**Communication
link**

A data link to transfer voice or data between the UAS crew, air traffic control, airspace users and other data users.

Control link

A data link for up-linking command instructions and down-linking status between the UA and the control/pilot station (s).

Data link

A term referring to all interconnections to, from and within the UAS. It includes control, communication, and payload links.

Control station (CS)

A facility or device (s) from which a UA is controlled for all phases of flight. There may be more than one control station as part of a UAS.

Pilot station (PS)

**Optionally piloted
aircraft (OPA)**

Aircraft that may be operated by an onboard pilot or without an onboard pilot.

Payload

All elements of a UA that are not necessary for flight but are carried for the purpose of fulfilling specific mission objectives.



UAS CATEGORIES

		Mass	Range	Flight Alt.	Endurance	
η	Nano	< 0,025 kg	< 1 km	100 m	< 1 hour	
μ	Micro	< 5	< 10	250	1	
Mini	Mini	< 20/25/30/150♦	< 10	150 m ♦	< 2	
CR	Close Range	25-150	10 - 30	3.000	2 - 4	
SR	Short Range	50-250	30 - 70	3.000	3 - 6	
MR	Medium Range	150-500	70 - 200	5.000	6 - 10	♦
MRE	MR Endurance	500-1500	> 500	8.000	10 - 18	♦
LADP	Low Alt. Deep Penetration	250-2500	> 250	50 - 9.000	0,5 - 1	
LALE	Low Alt. Long Endurance	15-25	> 500	3.000	> 24	
MALE	Medium Alt. Long Endur.	1000-1500	> 500	5/8.000	24 - 48	♦♦
HALE	High Alt. Long Endurance	2500-5000	> 2000	20.000	24 - 48	
Strato	Stratospheric	>2500	> 2000	> 20.000	> 48	
EXO	Exo-stratospheric	TBD	TBD	> 30.500	TBD	
UCAV	Unmanned combat AV	>1000	+/- 1500	12.000	+/- 2	♦
LET	Lethal	TBD	300	4.000	3 - 4	♦
DEC	Decoys	150-500	0 - 500	50 - 5.000	< 4	♦
TGT	Aerial Targets	10-10.000	5 - 200	50 - 10.000	> 0,5	♦

♦ = According to national legal restrictions

♦ = Can currently be armed
 ♦ = Capable of carrying ordnance
 ♦ = Expendable



International UAS Activity

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2010 = 1247 Systems - 500 Producers - 54 Countries

Algeria	★			
Argentina	★	■	■	
Australia	★	■	■	
❖Austria		■	■	
Bahrain	★			
Belarus	★	■	■	
❖Belgium	★	■	■	
Botswana	★			
Brazil			■	■
❖Bulgaria	★	■	■	
Canada	★	■	■	
Chile		■	■	
China (PR)	★	■	■	
Colombia	★		■	■
❖Croatia			■	■
❖Czech Rep.	★	■	■	
Egypt	★			
Equator		■	■	
❖Finland	★	■	■	
❖France	★	■	■	

❖Germany	★	■	■	
❖Greece	★	■	■	
❖Hungary	★	■	■	
India	★	■	■	
Indonesia	★		■	■
Iran	★	■	■	
Israel	★	■	■	
❖Italy	★	■	■	
Japan	★	■	■	
Jordan	★	■	■	
Malaysia	★	■	■	
Mexico	★	■	■	
❖Netherlands	★	■	■	
New Zealand		■	■	
❖Norway		■	■	
Pakistan	★	■	■	
Philippines	★		■	
❖Poland	★	■	■	
❖Portugal			■	■
Qatar	★			

❖Romania	★	■	■	
Russia	★	■	■	
❖Serbia		■	■	
Singapore	★	■	■	
❖Slovakia		■	■	
❖Slovenia		■	■	
South Africa	★	■	■	
South Korea	★	■	■	
❖Spain	★	■	■	
Sri Lanka	★		■	■
❖Sweden	★	■	■	
❖Switzerland	★	■	■	
Syria	★			
Taiwan	★	■	■	
Thailand	★		■	■
Tunisia			■	■
Turkey	★	■	■	
UAE	★	■	■	
❖UK	★	■	■	
Ukraine	★	■	■	
USA	★	■	■	

★ = UAS in Inventory

■ = Producing Countries

■ = Ongoing R&D

■ = Future Producers?

World total 49
Europe 16

World total 44
Europe 23

World total 54
Europe 22

World total 9
Europe 2



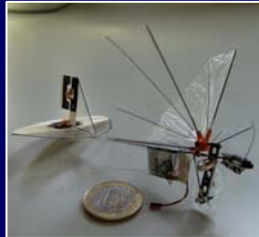
UAS Categories (I)

Non-Recreational Purposes

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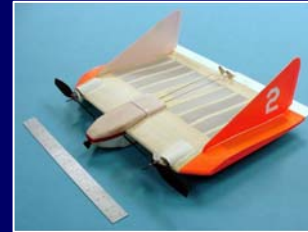
ProxDynamics, Norway
Hornet 1 – 15 grams



TU Delft, Netherlands
Delfly – 3 grams

Nano

Micro



NRL, USA
Mite



AeroVironment, USA
Wasp I



Miraterra, USA
DragonSlayer



Sirehna –DCNS), France
Elsa



SurveyCopter, France
Copter 1



EADS DS & SurveyCopter,
France - **Tracker (DRAC)**



Elbit Systems, Israel
SkyLark I

Mini



PixScene, France
Airstar



Skive Aviation, Switzerland
Skive



Gates Technologies, France
GT AirCat
(no longer in production)

Mini
(Lighter-
Than-
Air)



UAS Categories (II)

Non-Recreational Purposes

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Yamaha, Japan
RMax II



EMT, Germany
Luna



Schiebel, Austria
Camcopter



CybAero, Sweden
CR

Close
Range
(CR)

Elbit Systems
Israel
SkyLark II



Singapore Technologies, Singapore
SkyBlade II



Adv. Ceramics Research (BAE Systems), USA **Silver Fox**



ATE, South Africa
Vulture MK II



Schiebel, Austria
S-100



VTUL a PVO, Czech Rep
Sojka III



Aerovision, Spain - **Fulmar**

Short
Range
(SR)



UAS Categories (III)

Non-Recreational Purposes

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Aurora FS, USA
GoldenEye 50



BAE Systems, UK
Phoenix



Yakovlev, Russia
Pchela



Sagem, France
Crecerelle

Short
Range
(SR)



AAI Corp., USA
Shadow 200



Sagem, France
Sperwer



RUAG, Switzerland
Ranger



Northrop Grumman, USA
FireScout

Medium
Range
(MR)



EADS DS, France
Orka



Rheinmetall Defence,
Germany
KZO



IAI-Malat Div., Israel &
Northrop Grumman, USA
Hunter



Bell Helicopter, USA
Eagle Eye



UAS Categories (IV)

Non-Recreational Purposes

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U-Tacs (Thales, UK & Elbit Systems), Israel)
Watchkeeper



Sagem, France
Sperwer B



IAI-Malat Div., Israel
E-Hunter



Denel Aerospace, S.Africa
Seeker II



Selex Galileo, Italy
Falco



AAI Corp, USA
Shadow 600



EADS DS, France &
Galileo Avionica, Italy
Carapas



EADS DS, France &
EADS DE, Germany
CL289



Selex Galileo
Italy
Nibbio

Medium
Range
Endurance
(MRE)

Low Altitude
Deep
Penetration
(LADP)



UAS Categories (V)

Non-Recreational Purposes

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Boeing & In Situ Group, USA
ScanEagle



Aerosonde (AAI), Australia
Aerosonde Mk III



Boeing & In Situ, USA
Integrator

Low
Altitude
Long
Endurance
(LALE)



General Atomics AS, USA
Predator A



EADS DS, France
Eagle 1



Elbit Systems, Israel
Hermes 1500

Medium
Altitude
Long
Endurance
(MALE)



Boeing, USA
A-160 Hummingbird



Denel Aerospace, South Africa
Bateleur



IAI-Malat Div., Israel
Heron TP



UAS Categories (VI)

Non-Recreational Purposes

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Medium Altitude Long Endurance (MALE)



BAE Systems, UK
Mantis



General Atomics AS, USA
Avenger



Elbit Systems, Israel
Hermes 900



General Atomics AS, USA
Predator B



EADS Military Aircraft Systems
France + Germany + Spain
Talarion



AeroVironment, USA
Global Observer



UAS Categories (VII)

Non-Recreational Purposes

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High
Altitude
Long
Endurance
(HALE)

Stratospheric
Long
Endurance
(STRA LE)

Aurora Flight Sciences, USA
Odysseus



EuroHawk GmbH, Germany
(EADS MAS, Germany &
Northrop Grumman, USA)
EuroHawk



UAS Categories (VIII)

Non-Recreational Purposes

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BAE Systems, UK
Corax

EADS MAS, Germany

Barracuda



Saab, Sweden
Sharq



Selex Alenia, Italy
Sky-X



Dassault, France +
Euro consortium
Neuron

Boeing, USA
X-45A



Boeing, USA
X-46



Northrop Grumman, USA
X-47B



Northrop Grumman, USA
X-47A

Unmanned
Combat
Aerial
Vehicle
(UCAV)



UAS Categories (IX)

Non-Recreational Purposes

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EADS DS + Sirehna & Sinovia
(Dyn'Aero), France
MCR/Surveyor 2500



Boeing, USA
LittleBird



Aurora FS, USA - Aeronautics, Israel -
Rheinmetall Defence, Germany
(Diamond, Austria)



Irkut, Russia (Stemme, Germany)
Irkut 850

Excelnet, Malaysia
Eagle



Optionally
Piloted
Aircraft
(OPA)



Sagem D&S, France (Stemme, Germany)
Patroller



BAE Systems, UK (J&AS Aero Design, Poland)
Herti 1A



Herti 1D

Converted
Manned
Aircraft



Model Aircraft

RECREATIONAL Purposes

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Toys



Model Aircraft (<20-25 kg & >20/25 & <150kg)



Very Large Model Aircraft (> 150 kg)





Military UAS in Service in per Country (Europe & USA)

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	LUAS	UAS	Total		LUAS	UAS	Total
Albania				Lithuania			
Austria				Luxembourg			
Belgium		1	1	Malta			
Bosnia				Macedonia			
Bulgaria		1	1	Montenegro			
Croatia				Netherlands	2	2	4
Cyprus				Norway			
Czech Rep.		1	1	Poland	1	1*	2
Denmark		1†		Portugal			
Estonia				Romania		1	1
Finland	1	1	2	Serbia			
France	2	3	5	Slovakia			
Germany	1	2 + 2*	5	Slovenia	1*		1
Greece		1	1	Spain		1 + 1*	2
Hungary	1		1	Sweden		1	1
Ireland		1	1	Switzerland		1	1
Italy	1	3	4	UK	1	3 + 1*	5
Latvia				USA	18	14	32

		Europe	USA
Nr Systems	Light UAS (<150 kg)	11	18
	UAS (> 150 kg)	28	14
Total		39	32

No UAS in service
 * = On order
 † = Terminated



Military Applications

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CURRENT

**Command & Control Relay
Decoy
Battle Damage Assessment
Psychological Warfare
Reconnaissance
Surveillance
Target Designation
Treaty Monitoring
Weapons Delivery**

FUTURE

Aerial Mine Detection	Radar Saturation
Artillery Correction	Sensor Delivery
Battle Management	SIGINT
Comms & Data Relay	Urban Warfare
Digital Mapping	Offensive Missions:
Electronic Warfare	-anti-radar
Flight Path Recce	-anti-vehicle
NRBC Recce	-anti-ship
Perimeter Surveillance	-anti-structure
Radar Jamming	Maritime Surveillance

DRIVERS: **Dangerous missions -> No risk to pilot**
Lesser political risks
Information = Power & Permits Precision Strike
Cost-Effectiveness in relation to manned A/C



Out-of-Country **Military** Deployments

<u>Bosnia</u> '93-'96	
France	Crecherelle
UN	Fox AT
USA	Gnat 750
	Pioneer
	Predator
<u>Kosovo</u> '98-'99	
France	CL-289
	Crecherelle
	Hunter
Germany	CL-289
UK	Phoenix
USA	Hunter
	Pioneer
	Predator
<u>Kosovo</u> '05	
Belgium	Hunter
<u>Australia</u> '01 +++	
USA	Global Hawk
<u>Djibouti/Yemen</u> '02	
USA	Predator
<u>East Timor</u> '02	
Australia	Aerosonde III
<u>Solomon Islands</u> '03	
Australia	Aerosonde III
	Avatar

<u>Afghanistan</u> '01-now		
Australia	Scan Eagle	
Canada	Sperwer	SkyLark
	Heron	ScanEagle
France	Harfung	DRAC
	Skorpio	Sperwer
Germany	Aladin	KZO
	LUNA	
Italy	Predator A	
Netherlands	Aladin	SkyLark
	Sperwer	
U.A.E.	In-country-built UAS	
UK	Desert Hawk	
	Hermes 450	
	Herti	
	Predator B	
USA	Dragon Eye	
	Global Hawk	
	Pointer	
	Predator A & B	
	Raven	Reaper
	Shadow 200	
<u>South Korea</u> '03		
USA	Shadow 200	
<u>Angola</u> '03 - now		
IL Serv. Supplier	Aerostar	
<u>Ivory Coast</u> '04		
IL Serv. Supplier	Aerostar	
<u>Dem. Rep. of Congo</u> '06		
Belgium	Hunter	
<u>Ivory Coast</u> '06		
France	Skorpio	

<u>Iraq</u> '03 -now	
Australia	Scan Eagle
	SkyLark
Italy	Predator A
Japan	RMax
Romania	Shadow 600
UK	Desert Hawk
	Hermes 450
	Phoenix
USA	Desert Hawk
	Dragon Eye
	Global Hawk
	I.Gnat
	Hunter
<u>Haiti - USA</u>	
Global Hawk	MAV
ScanEagle	Pioneer
Seychelles	Predator A & B
	Puma
Predator A	Raven A & B
<u>Somali Coast</u>	
ScanEagle	Scan Eagle
	Shadow 200
	Silver Fox
	Snow Goose
	Tern
	Wasp
<u>Lebanon</u> '06	
France	Sperwer (NU)
<u>Kosovo</u> '07	
France	Sperwer
<u>Chad</u> '08	
France	SkyLark I
	CL289



Potential Governmental Non-Military UAS Applications

Customs Authorities

Coastal patrol
On-shore border patrol
EU maritime surveillance
EU on-shore border patrol

Civil Security

Avalanche survivor search
Coastal water surveillance
Maritime search & rescue

EU Civil Security

Maritime surveillance

Regional Fire Brigade

Forest fire surveillance

National Fire Brigade

Forest fire surveillance
Natural disaster monitoring

Civil Security & National Police

Contamination measurement
Systematic search ops
Natural disaster monitoring
Emergency medical/food supply

Police Authorities

Information gathering (in buildings)
Special ops, anti-terrorist
Urban law enforcement
Pre-intervention info gathering
Urban riot control
Perimeter defence
Hostile protest control
Criminal investigation (several days)
Surveillance of public gatherings
Road traffic surveillance
Delivery of non-lethal disabling means
Coastal border immigration control
Ship lane surveillance
Permanent police surveillance
Land border immigration control
Maritime immigration control
EU land border immigration control

Environmental

Local science missions
Atmospheric measurements
Wild game surveillance
Fishery control
Ozone measurements
Weather assessment
Crop monitoring
Sandbank shift measurement
Glacier & ice cap monitoring

Contractor Supplied

Flight Services

Training
Terrain mapping
Aerial photography
Monument inspection
Network comms relay (small theatre)
Network comms relay (large theatre)
Emergency comms network

USEP Study Results

**The seeds of a totally
new service industry**



WHAT ARE THE PROBLEMS?

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The
International
UAS
Community

**Most military UAS are still “user specific”
High development costs + low volume production =
High acquisition cost & high ownership cost**

Military UAS are too expensive to transition to non-military applications

No standards
No certification norms
Involved communities do not speak the same language

No airworthiness norm
No ATM regulations

The Critical Issues :

- Sense & Avoid
- Security
- Spectrum & Bandwidth
- Insufficient R&D funding

Flight in non-segregated airspace is impossible

Result : The markets for the following 3 sectors cannot emerge:
- non-military governmental - scientific - commercial



This Is NOT The Solution !

**Federating
The
International
UAS
Community**





WHAT SHOULD BEEN DONE ?

Federating
The
International
UAS
Community

◆ INDUSTRY SHOULD BE THE DYNAMO

- ◆ National approaches with cooperation between:
- Industry - Gvmt Authorities - Stakeholder Orgs - Academia
- ◆ National efforts [civil & military] in Europe & USA should be coordinated to form a harmonized approach (in cooperation with ICAO, EC, EASA, EDA, Eurocontrol, FAA, NATO)
- ◆ European & USA efforts to be coordinated internationally (beyond Europe & USA) with: Australia, Brazil, Canada, China, India, Japan, N.Zealand, Russia, Singapore, South Africa, South Korea, UAE
- ◆ International approaches to be harmonized at earliest possible stage
- ◆ Standards (functional requirements) to be consensually defined with implication of the national CAAs & Air Navigation Service Providers
- ◆ A common terminology in English should be defined

International Civil Aviation Organization (ICAO) should be engaged



EUROCAE WG73 on UAS



UAS MTOM > 150 kg – EASA Rules

Participation

International industry & regulatory authorities
Participation is funded by the participants

3-4 annual plenary meetings of 2 to 3 days each

Participation open to all from all countries

Activities

Coordinated with EASA & RTCA

Chair

Tore Kallevig, Avinor, Norway

Sub-Groups

- 1 UAS Operations & Sense & Avoid (>150kg)
- 2 Airworthiness & Continued Airworthiness (>150kg)
- 3 Command & Control, Communication & Spectrum
- 4 Light UAS (MTOM < 150kg) & VLOS Operations

Objective

Creation of UAS-related standards & guidance material for submission to EASA & national aviation authorities for consideration



EUROCAE WG73 on UAS



SG4 on LUAS (MTOM < 150 kg)

LUAS Responsibility : National CAAs

OBJECTIVE

Create a guidance document around which to bring the European CAAs together & propose a harmonized approach to the operation of LUAS.

A “sanitized & adapted” version of the latest update of UK CAA’s CAP722 has been reviewed & commented on by ICC participants. Consolidation of the comments has taken place.

The consolidated document has been reviewed by the members of EUROCAE WG73

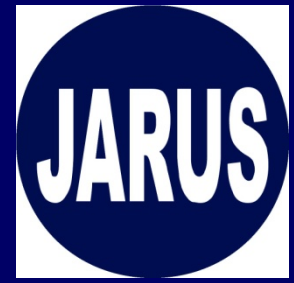
The final guidance document will be submitted to the EUROCAE Council for approval

Hereafter, the final guidance document will be made available to all European & non-European CAAs, as well as other interested parties.

NOTES

The start-up of a separate EUROCAE WG on LUAS is being considered

The “Minimal Risk” LUAS (< 2 kg) initiative has been launched



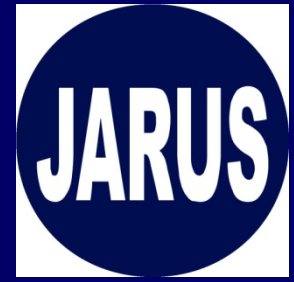
Joint Authorities for Rulemaking on UAS

International coordination group initiated & chaired by CAA The Netherlands

Objective

Definition of a common and harmonised set of airworthiness, operational and airspace requirements for Light UAS.

CAA Participants	Observers	Coordinated With	Feeds Inputs To
<ol style="list-style-type: none">1 Australia2 Austria3 Belgium4 Brazil5 Canada6 Czech Rep.7 France8 Germany9 Italy10 Malta11 Netherlands12 Norway13 South Africa14 Spain15 Switzerland16 UK	<p>EASA EUROCONTROL</p>	<p>Transport Canada FAA, USA</p>	<p>ICAO EASA Eurocontrol Eurocae WG73</p>
<h3>Deliverable</h3> <p>A single set of draft airworthiness, operational & airspace requirements, accepted by participating countries. These draft requirements will be available to industry and other UAS stakeholders for consultation.</p>			
<h3>Outreach</h3> <p>All European & non-European CAAs can join</p>			



Joint Authorities for Rulemaking on UAS

Delivered

JARUS UAS-FCL: Draft proposal for UAS Flight Crew Licence

JARUS CS-LURS: Draft proposal for technical certification requirements for Light unmanned rotorcraft (<600 kg)

JARUS System Safety Proposal CS-LURS.1309: Draft proposal for technical system safety requirements

These documents will be finalised within EUROCAE WG 73

Upcoming

JARUS UAS OPS: Draft proposal for UAS Operator requirements

JARUS CS-LUAS: Draft proposal for LUAS technical certification requirements (<150 kg) (fixed wing)



International Civil Aviation Org.



27 Jun 2005

**ICAO issues a State letter + questionnaire regarding UAS.
Sent to 43 States & 9 international organizations.**

23 & 24 May '05

- ICAO exploratory meeting on UAS;
- Invitees: States & internat. orgs having replied to State letter.

Conclusions

- ICAO to coordinate development of a strategic document to be used as the basis for development of regulations.
- Informal "core group" formed to develop guidance document.
- Request for ICAO UAS focal point to be evaluated by ICAO.

Core Group

CAA, UK	ENAC, Italy	Eurocontrol, Europe
FAA, USA	Min. of Transport, Germany	RTCA, USA
Transport Canada		UVS International

9 Jan 2007

Draft guidance document submitted to ICAO

April 2007

**Draft guidance document presented to ICAO Council
ICAO Council approves start-up of ICAO UAS Study Group**

Aug 2007

ICAO State letter announces creation of official UAS SG



International Civil Aviation Org.



ICAO UAS Study Group

Participation:

EUROPEAN COMMISSION - DG Mobility & Transport

16 STATES

CAAs of: Australia, Austria, Brazil, Canada, China, Czech Rep., France, Germany, Italy, Netherlands, Russian Fed., Singapore, South Africa, Sweden, UK, USA

9 INTERNATIONAL ORGANIZATIONS

CANSO, EASA, EUROCAE, EUROCONTROL, IAOPA, ICCAIA, IFALPA, IFATCA, UVS International

1st Deliverable In 2010

UAS Circular providing an overview of UAS activities incl. extensive background information for use by States in developing their regulatory frameworks.

The circular will also assist industry to understand what goals to aim for & what performance-based Standards And Recommended Practices (SARPs) are to be anticipated in the future.

A preliminary list of terms & explanations is included.



International Civil Aviation Org.



Global ATM Forum On Civil/Military Cooperation - ICAO HQs - 19-21 Oct '09

Historic Event

1st Civil/Military event organised by & taking place at ICAO
1st time UAS are an official agenda item at an ICAO Plenary Meeting

Participation

433 Delegates - 216 State repr. (civil & military), 46 international orgs (incl. UVS International), 38 industry repr., 28 ICAO repr., 10 ANSPs, 50 exhibitor repr.

Conclusions

- ICAO, States, Military Authorities & Partners will endeavour to work together for mutual benefit:**
- use ICAO as an open forum for civil/military cooperation, collaboration & sharing of best practices;
 - develop a new ICAO manual on civil/military cooperation;
 - disseminate ICAO State letter to advise States & international orgs of the C/M Forum and the follow-up actions;
 - Cooperation toward assuring safe & efficient integration of UAS into non-segregated airspace;
 - Cooperation on ATM security issues;
 - ICAO will propose agenda item to be included on the agenda of the 37th Session of ICAO Assembly addressing Civil/Military cooperation;
 - ICAO will ensure that momentum gained is strengthened at high levels in State administrations & international orgs;
 - Assembly working paper will propose an amendment to Assembly Resolution A36-13 Appendix O, Coordination of Civil and Military Air Traffic, aimed at strengthening States' commitments to enhance cooperation between civil & military authorities.



Survey on LUAS Applications For European Commission



Non-Military Applications for Light UAS

EC Request

In June 2009, the European Commission DG TREN requested UVS International to conduct this fast track non-funded world-wide survey

Participation

120 Organizations from 27 countries

Australia	Austria	Belgium	<u>Brazil</u>	Canada	Cyprus	Czech Rep.
France	Germany	Greece	India	Israel	Italy	Netherlands
Norway	Pakistan	Portugal	Romania	Russia	S. Africa	Spain
Sweden	Switzerland	Taiwan	Turkey	UK	USA	

16 European countries

11 non-European countries

And:

3 International associations

1 International regulatory working group (JARUS) including :

15 national CAAs + FAA + EASA + Eurocontrol

2 Multi-national working groups (INOUI & UAV-DACH)

Survey Presentation & Remittance

At the European Commission's Hearing on Light UAS in
Brussels, Belgium on 8 Oct 2009



Survey on LUAS Applications For European Commission



Non-Military Applications for Light UAS

Inputs Received from 120 Organizations

Australia	6	incl. 1 national ass. & 1 national WG
Austria	2	
Belgium	4	
Brazil	2	
Canada	6	
Cyprus	1	
Czech Rep.	3	incl. 1 national ass.
France	13	incl. 1 national ass.
Germany	5	
Greece	1	
India	2	
Israel	1	
Italy	3	
Netherlands	3	
Norway	6	incl. 1 national ass.

Quantity of Contributors per Country

Pakistan	1	
Portugal	1	
Romania	1	
Russia	1	
S. Africa	2	
Spain	10	
Sweden	3	
Switzerland	5	
Taiwan	1	
Turkey	2	
UK	11	incl. 2 national ass.
USA	18	
International Associations	3	
International Regulatory WG	1	
Multi-National WG	2	

11 Non-European countries



Survey on LUAS Applications For European Commission



Non-Military Applications for Light UAS

Breakdown of Contributors By Stakeholder Category

<u>Abbreviation</u>	<u>Stakeholder Category</u>	<u>Qty</u>
FSP	Flight Service Provider	23
FCS	Flight Service Customer	1
Gvt	Governmental Entity	13
Gvt Research	Governmental Research	5
Gvt Operator	Governmental Operator	8
Industry	Company > SME	16
Ass. Internat.	International Association	3
Ass. Nat.	National Association	6
RA	Regulatory Authority	17
RSP	Regulatory Service Provider	1
Research	Research Organization	18
SME	Small & Medium-Sized Enterprise	69
Stan. Org.	Standards Organization	1
UAS T&E	UAS Test & Evaluation	4
Uni	University	11
WG Multi-Nat.	Multi-National Working Group	2
WG Nat.	National Working Group	1

Flight Service Provider:

Non-governmental UAS operator
conducting aerial work

Industry:

Personnel: > 250

Turnover: > 50 million Euro

Operator:

Legal entity deploying the UAS

SME:

Personnel: < 250

Turnover: < 50 million Euro

Note:

Contributors can fall into more
than one stakeholder category



Survey on LUAS Applications For European Commission



Non-Military Applications for Light UAS

Inputs Received from 120 Organizations

Australia	3
Austria	3
Belgium	4
Brazil	2
Canada	6
Cyprus	1
Czech Rep.	1
France	11
Germany	9
Greece	1
India	2
Israel	1
Italy	7
Netherlands	11
Norway	5

139 Completed Application Matrixes

Pakistan	1
Portugal	1
Romania	2
Russia	2
S. Africa	5
Spain	21
Sweden	2
Switzerland	5
Taiwan	1
Turkey	3
UK	7
USA	21
International Associations	NA
International Regulatory WG	NA
Multi-National WG	1

11 Non-European countries



Survey on LUAS Applications For European Commission



Non-Military Applications for Light UAS

Types of Aircraft Involved

	<u>APPLICATIONS</u>	
	<u>Current</u>	<u>Desired</u>
Fixed Wing	57	31
Rotary Wing	49	33
- single rotor, not shrouded	13	10
- single rotor, shrouded	5	5
- bi-rotor	16	6
- tri-rotor	2	1
- quadri-rotor	12	11
- hexa-rotor	1	
Flexible Wing	7	5
Motorized Para-Foil	3	2
Lighter-than-Air	6	5

Survey on Non-Military Applications for Light UAS – The European Situation

176 Euro LUAS Producers/Developers

SMEs	117
- Producing LUAS	104
- Producing UAS	13
Gvmt Research Entities	5
- Producing LUAS	4
- Producing UAS	1
Industry	24
- Producing LUAS	12
- Producing UAS	12
National Consortia	10
- Producing LUAS	4
- Producing UAS	6
Inter-European Cooperation	12
- Producing LUAS	8
- Producing UAS	4
International Cooperation	8
- Producing LUAS	0
- Producing UAS	8

SME

Personnel: < 250

Turnover: < 50 million Euro

Industry

> 250

> 50 million Euro

313 UAS Produced/Developed

<u>Light UAS</u> (<150 kg)	252	80,5%
-SMEs	208	
-Gmvt Research Entities	7	
-Industry	21	
-National Consortia	8	
-European Cooperation	8	
-International Consortia	0	
<u>UAS</u> (>150 kg)	61	19,5%
-SMEs	17	
-Gvmt Research Entities	0	
-Industry	23	
-National Consortia	8	
-European Cooperation	4	
-International Coop.	9	

252 LUAS Referenced by MTOM

<u>MTOM</u>	<u>Qty</u>	<u>Percentage</u>
< 1,5 kg	41	16,3%
1,5 – 8 kg	69	27,4%
8 – 25 kg	64	25,4%
25 – 150 kg	78	30,1%



Survey on LUAS Applications For European Commission



Quantity of UAS & LUAS Models Produced in Europe & USA

	LUAS	UAS	Total		LUAS	UAS	Total
Austria	3	2	5	Poland	5		5
Belgium	2		2	Serbia	4		4
Bulgaria	2		2	Slovakia	1		
Croatia	1	1	2	Slovenia	3		3
Czech Rep	2	1	3	Spain	22	3	25
Finland	1		1	Sweden	4	4	8
France	51	6	57	Switzerland	15		15
Germany	29	7	36	UK	44	12	45
Greece	3	1	4	European Coop.	8	5	13
Italy	26	9	35	Internat. Coop.		9	
Netherlands	15	1	16				
Norway	14	1	15				

European Total	Light UAS	252	Total	313
	UAS	61		
USA Total	Light UAS	203	Total	341
	UAS	138		



Survey on Non-Military Applications for Light UAS (LUAS)

CURRENT Non-Military LUAS Applications - Worldwide

SCIENTIFIC & RESEARCH

Aerial photogrammetry (BE, CH, DE, NL)
Agricultural monitoring (ES, UK, US)
Arctic research (DE, NO, UK, US)
ATM Research (DE, ES)
Climate monitoring (NO)
Coastal mapping (NL)
Coastal zone studies (NL)
Crop monitoring (US)
Forestry management/research (SE)
Geophysical survey (BR)
Glacier & ice cap monitoring (DK, NO)
Iceberg monitoring (NO)
Invasive species identification/analysis (US)
Marine mammal monitoring (US)
Meteorological research (DE, NO, US)
Ocean & sea research support (NO)
Plant growth vigour mapping (US)
Salt water infiltration detection (NL)
Thermal imaging of buildings (heat wastage)
Vegetation identification (US)
Volcano monitoring (JP)
UAS sensor research (CA, (DE, ES, FR, NO, US)
Wildlife census (ES, US)

SECURITY-RELATED

Border surveillance (IL, US)
Crowd surveillance (CH, CN, FR, ZA)
(Forest) Fire fighting support (ES, HU, UK, US)
International summit surveillance (CA, FR)
Maritime & Sea lane surveillance (BE, ES)
Natural disaster site surveillance (CN, HT, IN, RU, US)
Police applications (CA, DE, FR, NL, UK, ZA)
Regional surveillance (Gaza & Occupied Territories)
Road traffic surveillance (CH)
Experimentation (AT, AU, BE, CA, CH, CN, CZ, DE, ES, FR, IT, MY, NL, NO, SG, PT, SE, SI, ZA, UK)

CONTRACTOR SUPPLIED AERIAL WORK

Advertising (lighter-than-air UAS) (indoor & outdoor)
Aerial data collection (AU, AT, BE, CH, ES, IT, NL, SE, UK)
Aerial photography & video (many countries)
Agricultural fertilizer dispensing (CN, JP, KR)
Agricultural insecticide spraying (CN, JP, KR)
Cinema (aerial shots & special effects)
Critical infrastructure inspection (FR, NL)
Forest fire operations support (ES, US)
Historical monument inspection (FR)
Illegal cannabis cultivation detection (NL)
Magnetic field survey (AU)
Oil & gas pipeline monitoring (RU)
Terrain mapping (BE, DE, NL)



Survey on LUAS Applications For European Commission



Non-Military Applications for Light UAS

UVS International's Recommendations

European LUAS-Related REGULATORY MATTERS

◆ LUAS INDUSTRY (Products & Services) = PRINCIPALLY SMEs

- ◆ LUAS should be the EC's number 1 priority – LUAS are here NOW
- ◆ European CAAs should agree on a common approach to LUAS through JARUS
- ◆ National LUAS positions/visions should be created through co-operation between:
 - Industry (producers & services)
 - CAAs
 - Air Navigation Service Suppliers
 - Government Authorities
 - Academia
 - Other Stakeholder Orgs
- ◆ National associations & Working Groups & Centres of Competence to be used to organize national inputs within the framework of the International UAS Coordination Council
- ◆ European standards (functional requirements) for LUAS should be rapidly & consensually defined in EUROCAE, in coordination with NATO & EUROCAE WG73
- ◆ Traditionally not recognized UAS stakeholders (model aircraft community) should be involved
- ◆ EUROCAE should federate SMEs & other stakeholders in a separate WG with a work methodology geared specifically to SMEs
- ◆ Common terminology in English to be defined (in co-ordination with EUROCAE WG73 & ICAO)
- ◆ LUAS community should be recognized by the EC as a separate stakeholder



Survey on LUAS Applications For European Commission



Non-Military Applications for Light UAS

UVS International's Recommendations

European UAS-Related INDUSTRIAL & R&D MATTERS

- ◆ Political awareness of UAS & LUAS-related technologies & their potential should be created
- ◆ Unmanned system-related technologies (air, ground, naval, space) should be recognized by the EC as being of strategic importance for Europe
- ◆ In this context, the importance & dynamic force of SMEs should be recognized by the EC
- ◆ Definition of requirements for R&D, studies, and technology demonstrations should be better coordinated amongst all EC DGs & EC agencies in order to avoid duplication
- ◆ Increased funding is required for LUAS R&D, study contracts & technology demonstrations
- ◆ Development of S&A systems for certain categories of LUAS should be funded by the EC
- ◆ EASA should be given the financial & personnel means of their responsibilities & ambitions
- ◆ The access of the LUAS community to EC-funded study results should be improved
- ◆ Number of European technology demonstrations should be increased
- ◆ Public awareness of unmanned systems & their societal benefits should be improved



EUROPEAN COMMISSION



DG MOVE Hearing on **Light UAS** – Brussels, Belgium – 8 Oct 2009

Historic Event

1st European Commission Hearing on UAS

Participation

49 European LUAS community stakeholder representatives (industry & gvmt)

Objective

**Present the conclusions of the survey on non-military applications for LUAS
Create awareness with the EC on:**

- The ongoing non-military LUAS activities in Europe (governmental non-military, research, commercial);**
- Most current non-military UAS activities in Europe concern LUAS;**

**Give the LUAS community the opportunity to voice their opinion on the existing problems;
Give the LUAS community the opportunity to propose actions for consideration by the EC to resolve the current problems.**

Conclusion

The EC's Hearing conclusions are published in the 2010 UAS Yearbook

EC 1st UAS Conference – Brussels, Belgium – **1 July 2010**



EUROPEAN REGULATORS

Federating
The
International
UAS
Community

EASA – European Aviation Safety Agency

**31
Member
States**

Austria, Belgium, Bulgaria, Cyprus, Czech Rep., Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovak Rep., Slovenia, Spain, Sweden, Switzerland, United Kingdom

EUROCONTROL – European Organization for the Safety of Air Navigation

**38
Member
States**

Albania, Armenia, Austria, Belgium, Bosnia & Herzegovina, Bulgaria, Croatia, Cyprus, Czech Rep., Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta, Moldova, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, former Yugoslav Rep. of Macedonia, Turkey, Ukraine, United Kingdom

Regulators currently involved with UAS regulations

SE & UK CAAs have published new UAS regulations; DGAC is in the process of doing so; CZ CAA has produced a draft proposal for a national UAS regulation.



International Coordination Council

International advisory working group initiated by UVS International

Objective

Within the framework of UVS International's Global Access Initiative:

- **Contribute to increasing international awareness of UAS-related matters;**
- **Give national & multi-national working groups the possibility to make their voice heard globally;**
- **Increase the dual-directional flow of information in all regulatory matters between all ICC members;**
- **Be instrumental to organize and supply national inputs to international working groups, or other UAS-related international efforts;**
- **Contribute to standards work within EUROCAE WG73 SG4 on Light UAS.**

Current Participants

European Air Sports	Korea UVS, S. Korea	RCAPA, USA
UAS Norway	UATAR, Australia	UAV-DACH, Germany
UAVS, UK	Unmanned Systems Canada	UVS France
UVS International		

Coordination

The start-up of the ICC was coordinated with:

- **the chairman of EUROCAE WG73 SG4 on Light UAS;**
- **the chairman of JARUS.**



International Coordination Council

Principal

- Open to the international Light UAS (<150 kg) community;
- No single organization dominates;
- Increase the flow of information to all;
- Promote international coordination, cooperation & understanding.

Drivers

- Implement the recommendations produced by the Interim Working Group on Light UAS;
- Permit the international Light UAS community to contribute in a significant way to the standards work concerning Light UAS within the framework of EUROCAE WG73 SG4;
- Create a structure & methodology permitting SMEs & SMIs to contribute without over-stressing their personnel, time & financial limitations;
- Permit the national entities to elaborate their contribution in their national languages & supply national opinion papers in English.

Harmonization

- The national position papers are harmonized in EUROCAE WG 73 SG4 on Light UAS;
- Each ICC member delegates one or several representatives to participate in EUROCAE WG 73 SG4 on Light UAS.



UAS SEGMENTATION

**THE PAN
EUROPEAN
APPROACH**

Non-Recreational

LUAS

Regulated by National CAAs

Class I

Micro	MTOM <1,5 kg	Flight Alt. < 150 m AGL	< 500 m from pilot	Flight In Visual LOS & Ext. VLOS
Grp A	MTOM > 1,5 kg & < 7 kg			
Grp B	MTOM > 7 kg & < 25 kg			
Grp C	MTOM > 25 kg & < 150 kg			

Class II

Micro	MTOM <1,5 kg	Flight Alt. > 150m AGL	> 500 m from pilot	Flight Beyond Visual LOS
Grp A	MTOM > 1,5 kg & < 7 kg			
Grp B	MTOM > 7 kg & < 25 kg			
Grp C	MTOM > 25 kg & < 150 kg			

UAS

National Operating Rules & EASA Certification

MTOM > 150 kg Incl. Optionally-piloted aircraft	Flight Alt. > 150 AGL	> 500 m from pilot	Flight Beyond Visual LOS
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MTOM = Maximum Take Off Mass AGL = Above Ground Level LOS = Line of sight



UAS SEGMENTATION

**THE PAN
EUROPEAN
APPROACH**

Non-Recreational

Light UAS

MTOM <150 kg

Regulated by National CAA

Class I All Groups

- Visual LOS flight altitude control
- Visual LOS flight path control
- Outside of ATC
- Flight altitude: < 150m/400 ft AGL
- Max. flight dist.: < 500m from pilot
- Confined airspace
- Daytime VMC (visual meteorological conditions)
- Extended VLOS flight alt. control
- Extended VLOS flight path control

Topics to be dealt with

Operational approval including:

- Proof of safe flight
- Approved documentation
- Licensing & Training
- Limitations, etc
- Occurrence reporting mandatory

Class II All Groups

**Flight beyond visual LOS
and
Coordination with ATC
and
Rules of the Air apply
and
Which do not fall under Light
UAS Class I definition**

- Full set of regulations
- AOC – Aircraft Operators Certificate
- Registration
- Certification of Airworthiness
- Licensed pilot
- Type certification
- Maintenance Part 66 & 145
- Approval of Design Org, & Production Org, or demonstration of capability



Light UAS Class I = The Priority

**THE PAN
EUROPEAN
APPROACH**

Light UAS
Class I

**MTOM
< 150 kg**

- Visual LOS flight altitude control
- Visual LOS flight path control
- Outside of ATC (air traffic control)
- Flight altitude: < 150m/400 ft AGL
- Max. flight dist.: < 500m from pilot
- Confined airspace
- Daytime VMC (visual meteorological conditions)

Topics to be dealt with

Operational approval including:

- Proof of safe flight
- Approved documentation
- Licensing & Training
- Limitations, etc
- Occurrence reporting mandatory

Micro	MTOM < 1,5 kg	Flight In Visual LOS Flight Altitude < 500 m < 150 m Above from pilot Ground Level	
Grp A	MTOM > 1,5 kg & < 7 kg		
Grp B	MTOM > 7 kg & < 25 kg		
Grp C	MTOM > 25 kg & < 150 kg		

Light UAS Class I offers significant international market potential

Minimal impact on Air Traffic Management (ATM)

Will permit confidence building with regulatory authorities



Light UAS Working Group



**Federating
The
International
UAS
Community**

SG1 - LUAS SAFETY ASSESSMENT

SAFETY ARGUMENTS

- Safety Assumptions
- Management
- Operations
- System Description
- Safety Performance
- Developments
- Managed Evolution
- Safety Case Control
- Assurance of Compliance
- Acceptability of Safety Performance

SAFETY MANAGEMENT

- Safety Policy
- Safety Organisation
- Emergency & Incident Procedures
- Flight Operations Risk Assessment
- Flight Operations & Application Process

ORGANIZATIONAL APPROVAL

- Design
- Production
- Maintenance

FLIGHT OPERATIONS

- Concept of Operations
- Flight Trials
- Flight Trial Objective
- Flight Demonstration
- Flight Demonstration Objective
- Generic Risk Assessment
- Radio Frequency Protection

SYSTEM DESCRIPTION & SAFETY ASSURANCE

- UAS Design & Description
- Aircraft Guidance & Control System
- UAS Crew
- Pilot Station
- Communication Systems
- Additional Pilot Station Systems
- Telemetry System
- Launch & Recovery Systems
- Main Hazards & Mitigation

SAFETY PERFORMANCE

- Incident Handling
- Safety Surveys



Light UAS Working Group

SG2 - FLIGHT CREW LICENSING



**Federating
The
International
UAS
Community**

GROUND SCHOOL

- Air Law
- Aircraft General Knowledge
- Flight Performance & Planning
- Human Performance & Limitations
- Meteorology
- Navigation & Communications
- Operational Procedures
- Principles of Flight
- Communications

FLIGHT ASSESSMENT

- Flight Envelope
- Asset Management
- Methods of Command & Control
- Navigation & Communications
- Crew Management
- Emergency Procedures
- Ground Handling
- Launch & Recover
- Departure & Arrival
- Maintenance & Support
- Mission Systems
- Systems Performance
- Investigation Procedures

TRAINING SCHOOL APPROVAL



Light UAS Working Group

SG3 - OPERATOR LICENSING



**Federating
The
International
UAS
Community**

ADMINISTRATION

- Basic Concepts
- Legal Requirements
- Organisational Requirements
- Appointments & Responsibilities
- Accident & Incident Reporting
- Investigation Handling
- Medical Policy
- Recruitment, training & currency requirements

FLIGHT PLANNING

- Basic Concepts
- Light UAS Performance
- Operational Planning & Briefing
- Equipment & Payload Carriage
- Extreme Weather Operations
- Navigation & Communications
- Aerodromes, Launching & Landing Sites
- Night Flying
- Flight Time & Duty Hours
- Documentation

FLIGHT OPERATIONS

- VFR & IFR
- VLOS, ELOS, BLOS, BRLOS Operations
- LOS Communications
- Satellite Navigation
- Satellite Communications
- Operating & Weather Minima
- FIR / International Transit
- High Altitude
- Low / Ground Level
- Long Duration (days, weeks, months)

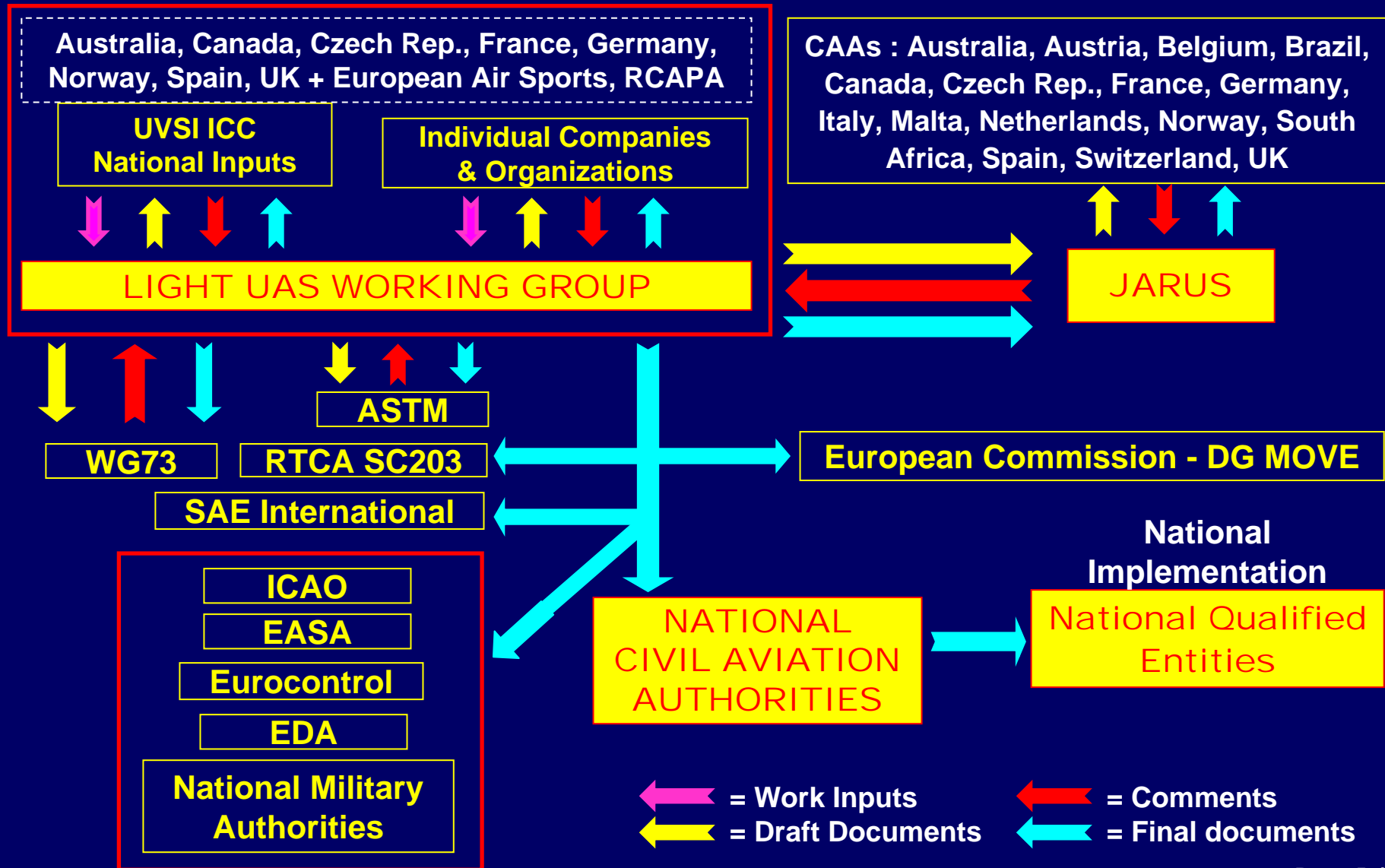
APPLICATION SPECIFICS

- Aerial Imagery (photography, video, photogrammetry)
- Aerial Sensing (scientific & research)
- Utilities (oil, gas, power lines, communications)
- Emergency Services (police, fire brigade)
- Security Services
- Urban Operations
- Disaster Management

CATEGORIZATION OF OPERATIONS



Light UAS Working Group Input & Information Flow





Current Status of Co-ordination & Co-operation

Federating
The
International
UAS
Community

- ◆ DG MOVE, Eurocontrol, FAA & ICAO are playing dynamic federating & leading roles
- ◆ EASA has produced its A.NPA after wide international consultation
- ◆ UAS standards work in EUROCAE WG73 & RTCA SC203 is progressing
- ◆ EUROCAE & RTCA are coordinating their UAS activities
- ◆ Eurocontrol has produced the UAV-OAT document
- ◆ EASA & Eurocontrol & FAA are coordinating their UAS activities
- ◆ National CAAs in Australia, Austria, Belgium, Brazil, Canada, Czech Rep., France, Germany, Italy, Malta, Netherlands, Norway, South Africa, Spain, Switzerland, UK have formed **JARUS** to coordinate & harmonise their activities relative to LUAS
- ◆ **JARUS** has produced its first deliverables
- ◆ ICAO has started up the UAS Study Group which has produced an advisory circular
- ◆ EC DG TREN has organized its first Hearing on LUAS (Oct '09)
- ◆ ICAO's Global ATM Forum on Civil/Military Coop. (Oct '09) had UAS on the agenda
- ◆ EUROCAE WG73 SG4 on LUAS has produced an advisory circular for CAAs
- ◆ EC-funded INOUI Consortium has produced its final report
- ◆ EC has organised its first UAS conference to create political awareness
- ◆ EC is organising a "high level group" which will actively promote LUAS access to airspace + identify & fund required R&D & technology validation demonstrations
- ◆ The upcoming World Radio Conference has UAS on the agenda

Conclusion: A coordinated European & international approach is becoming reality



Global Access Initiative

**GLOBAL
ACCESS
INITIATIVE**

**Instigated by UVS International in Aug. '05
co-ordination with UNITE/ACCESS 5**

Encourage creation of national UAS industry working groups, organizations & associations to create National Visions.

Reach out to all relevant stakeholders on a global scale.

Facilitate the international exchange of information.

Promote & coordinate collaboration on international scale.

Promote early stage international harmonisation of UAS-related standards, rules & regulations permitting UAS insertion into non-segregated airspace, while maintaining or increasing current flight levels.

www.uvs-info.com

**World's largest
generic
UAS web site**

**Make all information pertaining to work ongoing internationally regarding the introduction of UAS (all categories) into non-segregated airspace available to ALL .
Reference docs [military - regulatory authorities - studies - white papers (scientific, government & commercial user groups)]**



CONCLUSIONS

Federating
The
International
UAS
Community

UAS access to non-segregated airspace is a GLOBAL ISSUE

Significant national & international efforts are underway

No single country can come up with the “global” solution

International coordination & cooperation is crucial

Experience, study results & information should be shared

Regulatory
Authorities

Industry

Military

Government

Internal
Security

Academia

Scientific
Community

National Visions



European UAS Vision

North American Vision



**Global
UAS Vision**

ALL international stakeholders should be involved

Participation in EUROCAE &/or RTCA WGs is encouraged

Obtaining High Level Political Support Is Now Imperative



RECOMMENDATIONS

Federating
The
International
UAS
Community

Brazilian **participation in:**

Is encouraged

Brazilian Stakeholders

- **EUROCAE WG73**
- **Working Group on Light UAS**
- **Global Access Initiative**
- **“ Minimal Risk ” UAS initiative**
- **UAS Petition Letter Initiative**

Regulatory Authorities	Industry Research / Scientific Community	Military	Government	Internal Security	Academia Regional Government	ANSPs
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are invited to create a national Brazilian association & form the national Brazilian UAS vision, give Brazil a concerted national UAS voice towards the international UAS community, and become active participants in the ICC

The Brazilian UAS stakeholders are invited to become members of UVS International and support its actions for the international UAS community

Brazilian UAS Vision



European Union Vision
North American Vision
Other National Visions



**Global
UAS Vision**

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**Federating, Instigating, Coordinating, Cooperating,
Promoting, Disseminating Information for the Benefit of the
International Unmanned Systems Community**