### Realização

| DCA-BR | Organização Brasileira para o Desenvolvimento da Certificação Aeronáutica |

### Apoio

| ANAC | CAEX | Novotel |

| Bravoo | BRVANT | Santos Lab |

### Patrocínio

| AEL - AEREOELETRÔNICA | AGX - TECNOLOGIA | EMBRAER - Defense Systems | eSysTech | Gyrofly |

| Konatus | Price Induction Brasil | Sentient | Solentech | TBX | xmobots |
An Internationally Coordinated Endeavour

GLOBAL ACCESS INITIATIVE

UAS Brazil 2010 Conference
Sao José dos Campos, Brazil – 28 Oct. 2010

LUAS: The European Approach
Status March 2009 – For Reference

By Peter van Blyenburgh
WHAT ARE THE PROBLEMS?

Light UAS (<150) are regulated by national aviation authorities
Europe: 27 countries  Risk of 27 non-harmonized regulations

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

The Critical Issues:
- Sense & Avoid
- 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 government
- scientific
- commercial
Insufficient political awareness at national & European Commission (EC) levels of:
- the current & future non-military UAS applications
- the cross-over potential of the relevant technologies

Insufficient coordination between EC Directorate Generals prior to the launch of UAS-related study contracts

No central repository of EC funded study results

Insufficient European academic R&D coordination

Insufficient importance accorded to UAS within the framework of SESAR

Insufficient contact between potential European national users groups

Insufficient active participation of EASA in EUROCAE WG73 (funding problem)

A clear European Vision at EC level is missing
UAS-RELATED REGULATORY MATTERS

- National approaches with cooperation between:
  - Industry
  - CAAs
  - Gvmt Authorities
  - Stakeholder Orgs
  - Academia
- National efforts to concentrate on standards (functional requirements) for Light UAS (<150 kg) (non-military applications)
- National Visions to be harmonized at the earliest possible stage
- National Visions to be coordinated to form a European Vision on Light UAS
- Regulatory approach to light UAS should be coordinated at European level by national CAAs in coordination with EUROCAE WG73 with participation of EASA, Eurocontrol, Air Navigation Service Providers, and Industry
- A common terminology in the national languages should be defined
WHAT SHOULD BE DONE?

EUROPE

EUROPEAN LEVEL – 1/2

UAS-RELATED REGULATORY MATTERS

♦ European National Visions (all classes of UAS) should be harmonized to create a European Vision (in coordination with SESAR)
♦ UAS should be recognized as a relevant stakeholder within SESAR
♦ The role of European Defence Agency (EDA) should be clearly defined
♦ The European Vision (civil & military) should be coordinated with NATO
♦ European standards (functional requirements) to be consensually defined by EUROCAE WG73 with active participation of EASA, national CAAs & Air Navigation Service Providers, Industry & other Stakeholders
♦ A common terminology in English should be defined

Europe should actively contribute to creating a Trans-Atlantic UAS Vision
**INDUSTRIAL + R&D MATTERS**

- **Political awareness** of unmanned systems, unmanned system-related technologies & their potential should be increased.
- **Unmanned system-related technologies** (air, ground, naval, space) should be recognized as being of strategic importance for Europe.
- **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** required for R&D, study contracts & tech. demos.
- **EASA** should be given the financial means of their ambitions.
- **Importance of SMEs & SMIs** should be recognized.
- **Access to EC 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 STAKEHOLDERS

Civilian Orgs
- GD Enterprise
- GD TREN
- GD Research
- EASA
- EUROCONTROL
- JAA

Military Orgs
- EDA – Euro. Defence Agency
- EMAAG - EuroMilitary Aviation Authorities Group
- J MAG - Joint Military Airworthiness Group
- NATO:
  - FINAS (USAR)
  - JCG UAV
  - JAPCC
  - NATMC
- OCCAR

National Orgs
- Min. of Transport
- Min. of Interior
- Min. of Defence
- Air Navigation Service Providers
- CAAs
- Model A/C Assns
- Technology Platforms
  - ASTRAEA, UK
  - NIMUP, Netherlands
  - Pégase, France
  - PLATINO, Spain

Prof. Orgs & WGs
- ASD
- EUROCAE WG73
- (Multi)-National WGs
  - UAV DACH
  - UAV Germany, DE
  - former Castor, Sweden
- National Assns:
  - AVBS, Czech Rep.
  - PEMA UAV, Portugal
  - UAS Norway
  - UVS France
  - Ass. of Aerospace Universities, UK

Multi-Nat. Orgs
- AEA
- CANSO
- EARTO
- ERA
- EREA
- EUGIN
- Eurocockpit Assn
- Euro Air Sport Assn
- IATA
- IFALPA
- IFATCA
- IOPA
- SESAR ExecCom
- SESAR J.U.

Existing Multi-National Tech. Platforms
- ACARE
- ERTRAC
- EUROP

The Pan-European Approach

Research
- Competence poles & Centres of excellence
- Academia

Industry
20 out of 27 Countries
## EUROPEAN INSTITUTIONAL UAS-RELATED ACTIVITIES

### NATIONAL

<table>
<thead>
<tr>
<th>Country</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>CAA &amp; Min. of Interior</td>
</tr>
<tr>
<td>Czech Rep.</td>
<td>Min. of Transport &amp; CAA</td>
</tr>
<tr>
<td>Finland</td>
<td>FDF &amp; CAA</td>
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<td></td>
<td>Artic Test Range</td>
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<tr>
<td>France</td>
<td>DGA-CEV - USAR-FW</td>
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<td>France</td>
<td>- USAR-VTOL</td>
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<td>- DGA (MoD) UAV-REG</td>
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<td>- Pégase</td>
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<tr>
<td>Germany</td>
<td>BWB-WTD - DFS</td>
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<tr>
<td></td>
<td>Min. of Transport</td>
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<tr>
<td></td>
<td>UAV DACH</td>
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<tr>
<td></td>
<td>UAV Germany NTP</td>
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<tr>
<td>Italy</td>
<td>DGAA &amp; ENAC</td>
</tr>
<tr>
<td>Netherlands</td>
<td>CAA - NIMUP NTP</td>
</tr>
<tr>
<td>Norway</td>
<td>UAS Norway</td>
</tr>
<tr>
<td>Slovenia</td>
<td>Uni. Of Ljubljana</td>
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<tr>
<td>Spain</td>
<td>PLATINO NTP</td>
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<tr>
<td>Sweden</td>
<td>FMV &amp; CAA UAV Vision</td>
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<td></td>
<td>Saab &amp; LFV Castor</td>
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<td>Switzerland</td>
<td>CAA &amp; Swiss AF</td>
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<td>Min. of Interior</td>
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<td>UK</td>
<td>ASTRAEA NTP</td>
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<td></td>
<td>CAA-DAP CAP722</td>
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<td>DoT &amp; NATS</td>
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<td>Min. of Interior</td>
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<td>MoD-DPA</td>
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<td>ParcAberporth</td>
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<td>RAF UAV Battle Lab</td>
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<td>UAVS Association</td>
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### MULTI-NATIONAL

<table>
<thead>
<tr>
<th>Organization</th>
<th>Description</th>
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<tr>
<td>ASD</td>
<td>ASG - UAV WG</td>
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<td>CANSO</td>
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<tr>
<td>EARTO</td>
<td>A.NPA</td>
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<td>EASA</td>
<td>INOU Programme</td>
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<td>EC-DGTREN</td>
<td>Market Study</td>
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<td>EDA</td>
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<td>Staff reqmt study</td>
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<td>UAS Roadmap</td>
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<td>EMAAG</td>
<td>WG-73 on UAS</td>
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<td>EUROCAE</td>
<td>UAV-OAT TF</td>
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<tr>
<td>Eurocontrol</td>
<td>ANT</td>
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<tr>
<td></td>
<td>UAV-OAT TF</td>
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<tr>
<td>Eurocontrol Experimental Centre</td>
<td></td>
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<td>ICAO</td>
<td>Formal WG on UAS</td>
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<td>IWGSUAS</td>
<td>JAA/Eurcontrol UAV TF</td>
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<tr>
<td>JMA(J(now includes ETAP)</td>
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<td>NATO</td>
<td>AG7 FINAS</td>
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<td>JAPCC</td>
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<td>NATMC</td>
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<td>RTO</td>
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<tr>
<td>SESAR</td>
<td>Security &amp; Environmt</td>
</tr>
</tbody>
</table>

**NTP = National Techn. Platform**
UAS-RELATED REGULATORY MATTERS

♦ Global approaches to be harmonized at earliest possible stage
♦ Approaches on both sides of the Atlantic should be coordinated
♦ Coordination between Eurocontrol + EASA & FAA
♦ Coordination between EUROCAE & RTCA & SAE & ASTM etc
♦ Coordination between SESAR & NextGen
♦ Efforts to be coordinated internationally (beyond Europe & USA) with: Australia, Brazil, Canada, China, India, Japan, N.Zealand, Russia, Singapore, South Africa, South Korea, UAE
♦ Standards (functional requirements) to be agreed on at ICAO level
♦ A common terminology in English should be defined

Europe & USA should be the dynamo to create a Global Vision
Eurocontrol & FAA are playing dynamically federating & leading roles
UAS standards work in EUROCAE WG73 & RTCA SC203 is progressing
EUROCAE & RTCA are endeavouring to coordinate their UAS activities
Global Access Initiative
International Coordination Council
National CAAs have formed JARUS to coordinate & harmonize their activities re: Light UAS
ICAO has started up an official UAS Study Group with the participation of 14 States (CAA: Australia, Austria, Canada, Czech Rep., France, Germany, Italy, Netherlands, Russian Fed., Singapore, South Africa, Sweden, UK, USA) & 8 international organizations (CANSO, Eurocae, Eurocontrol, IAOPA, ICCAIA, IFALPA, IFATCA, UVS International)

Conclusion: A coordinated international approach is becoming reality
## Interim WG on Light UAS

**Instigated by UVS International**

### 22 Participants

<table>
<thead>
<tr>
<th>Organization / University</th>
<th>Location</th>
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<tbody>
<tr>
<td>Austrocontrol, Austria</td>
<td>Austria</td>
</tr>
<tr>
<td>CAA, Belgium</td>
<td>Belgium</td>
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<tr>
<td>CGArm, France</td>
<td>France</td>
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<td>EADS DS, France</td>
<td>France</td>
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<td>Gates Technology, France</td>
<td>France</td>
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<td>IVW (CAA), Netherlands</td>
<td>Netherlands</td>
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<tr>
<td>Nimbus, Italy</td>
<td>Italy</td>
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<tr>
<td>SurveyCopter, France</td>
<td>France</td>
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<tr>
<td>University of Ljubljana, Slovenia</td>
<td>Slovenia</td>
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<tr>
<td>West Wales UAV Centre, UK</td>
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<tr>
<td>Barnard Microsystems, UK</td>
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<tr>
<td>CAA, UK</td>
<td>UK</td>
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<td>CybAero, Sweden</td>
<td>Sweden</td>
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<tr>
<td>European Air Sports Assn.</td>
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<td>Ghent University, Belgium</td>
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<td>HighEye, Netherlands</td>
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<td>LFV (CAA), Sweden</td>
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<td>Novadem, France</td>
<td>France</td>
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<td>UAS Consulting &amp; Services, France</td>
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<td>UVS International</td>
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</tr>
<tr>
<td>Eurocontrol</td>
<td></td>
</tr>
</tbody>
</table>

### 2 Observers

- FAA, USA
- RTCA SC203, USA

### 4 One day meetings

- **Start:** Sept 2007
- **End:** Jan 2008
Undertake initial work for EUROCAE WG73 in order to make it possible to effectively tackle the elaboration of proposed standards for Light UAS (<150kg).

Prepare a guidance document for EUROCAE WG73 on how to accomplish the aforementioned taking into account the financial & time & personnel limitations of the small and medium-sized industry & enterprises (SMI & SME) that constitute the backbone of the small UAS community.

- Review the Joint JAA/Eurocontrol UAS Task Force Final Report;
- Identify & group the currently existing regulatory documents;
- Produce a list of required Terms & Definitions;
- Identify the regulatory work re SUAS currently ongoing in Europe;
- Describe the current European market situation re SUAS for all applications;
- Identify the relevant European stakeholders;
- Propose a basic document describing the best way forward;
- Propose an initial work plan.

IWGLUAS ceased to exist after it delivered its recommendations in Feb 2008 and

IWGLUAS participants Become WG73 SG4 LUAS participants
LIGHT UAS

**Should be the Nr 1 Priority**

**They are here NOW**

- **INDUSTRY (Products & Services)** = PRINCIPALLY SMIs & SMEs

- Traditionally not recognized UAS stakeholders (commercial RC & model aircraft communities) should be involved

- European CAAs should agree on a common approach (JARUS)

- National approaches with co-operation between:
  - Industry (producers & services)
  - CAAs
  - Air Nav. Service Suppliers
  - Government Authorities
  - Academia
  - Stakeholder Organizations

- National associations & Working Groups & Centres of Competence to be used to organize national inputs

- EUROCAE should federate players around a common approach (SG4)

- A common terminology in English should be defined

- Minimize travel & out-of-country meetings
Matrix regarding European rules & regulations for model aircraft
Review of the Joint JAA/Eurocontrol UAS TF Final report
On-line library of regulatory docs = www.uvs-info.com
List of current & potential applications
Identification of the European stakeholders:
- Industry (products & services) - CAAs - Air Nav. Service Suppliers
- Government Authorities - Academia - Stakeholder Organizations
List of agreed Terms & Definitions
Light UAS segmentation, phased approach and definition of the initial work to be undertaken

Proposal to use a “sanitized” version of UK CAA’s CAP722 as the baseline document around which to bring the European CAAs together with the intent to start work towards a harmonized approach.
Detailed generic application scenarios defined in discussions with potential EU non-military government users

<table>
<thead>
<tr>
<th>Governmental non-military applications</th>
<th>Light UAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Customs Authorities</td>
<td>4</td>
</tr>
<tr>
<td>- Police Authorities</td>
<td>18</td>
</tr>
<tr>
<td>- Civil Security</td>
<td>9</td>
</tr>
<tr>
<td>- Environmental</td>
<td>9</td>
</tr>
<tr>
<td>- Flight Services</td>
<td>7</td>
</tr>
<tr>
<td>(supplied by civil flight service providing companies)</td>
<td></td>
</tr>
<tr>
<td>Total of Scenarios</td>
<td>47</td>
</tr>
</tbody>
</table>

For USEP report & scenarios see: 2007 UAS Yearbook & www.uvs-info.com
### Potential Governmental Non-Military UAS Applications Identified by USEP

#### 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

#### 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

#### The seeds of a totally new service industry?
### LIGHT UAS

<table>
<thead>
<tr>
<th>Class</th>
<th>Micro</th>
<th>MTOM</th>
<th>Flight Alt.</th>
<th>Flight Alt.</th>
<th>Regulated by National CAA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>MTOM &lt;1,5 kg</td>
<td>MTOM &gt;1,5 kg &amp; &lt;7 kg</td>
<td>MTOM &gt;7 kg &amp; &lt;20/25 kg</td>
<td>MTOM &gt;20/25 kg &amp; &lt; 150 kg</td>
<td>Flight Alt. &lt; 150 m AGL</td>
</tr>
<tr>
<td>Class II</td>
<td>MTOM &lt;1,5 kg</td>
<td>MTOM &gt;1,5 kg &amp; &lt;7 kg</td>
<td>MTOM &gt;7 kg &amp; &lt;20/25 kg</td>
<td>MTOM &gt;20/25 kg &amp; &lt; 150 kg</td>
<td>Flight Alt. &gt; 150 m AGL</td>
</tr>
</tbody>
</table>

### UAS

<table>
<thead>
<tr>
<th>MTOM</th>
<th>Flight Alt.</th>
<th>Flight Alt.</th>
<th>Regulated by National CAA</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTOM &gt; 150 kg</td>
<td>MTOM &gt; 150 AGL</td>
<td>&gt; 500 m from pilot</td>
<td>Flight Beyond Visual LOS</td>
</tr>
<tr>
<td>Incl. Optionally piloted aircraft</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MTOM** = Maximum Take Off Mass  
**AGL** = Above Ground Level  
**LOS** = Line of sight
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)

Class II | All Groups | Flight beyond visual LOS
Coordination with ATC
Rules of the Air apply
Which do not fall under Light UAS Class I definition

Topics to be dealt with:
- 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**

### Light UAS Class I

- 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)

### MTOM

- Micro: MTOM < 1,5 kg
- Grp A: MTOM > 1,5 kg & < 7 kg
- Grp B: MTOM > 7 kg & < 20/25 kg
- Grp C: MTOM > 20/25 kg & < 150 kg

### Topics to be dealt with

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

### Flight Altitude

- Flight In Visual LOS
  - Flight Altitude < 500 m
  - < 150 m Above Ground Level

---

**Light UAS Class I offers significant international market potential**

**Minimal impact on Air Traffic Management (ATM)**

**Will permit confidence building with regulatory authorities**
**OBJECTIVE**

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

A “sanitized” version of the latest update of UK CAA’s CAP722 has been reviewed and commented on by the ICC participants. Consolidation & review of the received comments is currently taking place.

The consolidated document will be reviewed by the members of JARUS & EUROCAE WG73 SG4 on Light UAS and the final guidance document will be produced.

The final guidance document will be submitted to EUROCAE WG73.

After approval by the EUROCAE Council, the final guidance document will be made available to all European and non-European CAAs, as well as all other interested parties.
CONCLUSIONS

UAS access to non-segregated airspace is a global issue.

Significant national & international efforts underway.

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

International coordination & cooperation is crucial.

Experience, study results & information should be shared.

ALL international stakeholders should be involved.

Europe will play an ACTIVE international role.

Light UAS should be dealt with on a PRIORITY basis.

Obtaining High Level Political Support Is now imperative.

Federating The International UAS Community

National Visions

European UAS Vision

North American Vision

Global UAS Vision

RA
Ind
Mil
Gvt
Sec
Uni
Sci
Federating, Instigating, Coordinating, Cooperating, Promoting, Disseminating Information for the Benefit of the International Unmanned Systems Community