ENCLOSURE 1

(CJAA Report)

1 GENERAL INTRODUCTORY INFORMATION

1.1 CURRENT REGULATORY ENVIRONMENT

1.1.1 Aviation Safety Principles

Aviation and specifically aviation safety have been right from the beginning highly regulated. This may be explained as follows:

- Flying is not a natural activity for mankind. Public confidence in that mode of transport must be established.
- Aviation is also a powerful weapon of war. There are numerous examples in the past of bombers and transport airplanes developed from the same design.
- Sovereignty of States over their airspace is a fundamental principle.

Some regulations were written even before World War One (WWI), when aviation was still basically a sport.

The development of Air Transport after WWI led to the signature of the first Convention for Air Navigation in 1919. (CINA: Conference Internationale de la Navigation Aerienne). Also most of the western countries set up Authorities and developed detailed regulations in the mid twenties.

The basic principle regulating the safety of one flight can be expressed as follows:
An aircraft is only allowed to fly if it has been designed, manufactured, operated and maintained in accordance with relevant regulation and if its crew is also qualified in accordance with relevant regulations. Such principle is usually incorporated in high level regulations. It is also necessary to develop safety regulations for Air Transport Infrastructure (airports, navigation aids) and for Air Navigation Services.

The required level of safety depends on size, complexity and kind of operation of the aircraft. Kind of operation means for example Commercial Air Transportation; Aerial Work, Private Aviation… The highest level of safety is required for large aircraft operated in Commercial Air Transportation. Less stringent level of safety is required for small private aircraft.

This difference between public and private use exists also in other modes of transportation.

It should be well understood that aviation safety is a shared responsibility between Authorities, Operators, Manufacturers, Crews…. The Authorities are responsible for Aviation Safety Regulations (i.e. developing, adopting, and enforcing regulations); the others have the primary responsible to comply with Aviation Safety Regulations.

Due to this shared responsibility, development of Aviation Safety Regulations should involve interested parties (manufacturers, operators, crews, maintenance organisations….)."

Lessons learned from experience is a very important element of aviation safety. Accidents and serious incidents are analysed by independent investigation boards with the objective to define the causes and propose safety recommendations. These recommendations, together

with the information obtained through incident reporting systems (mandatory and voluntary) are used to improve requirements

Historically the purpose of aviation safety regulations was to protect people on the ground. Due to the development of Commercial Air Transportation and social legislation, the purpose is now to protect people on the ground, crews and passengers.

1.1.2 International Organisations Involved in Aviation Regulation:

JAA/EASA:

Today the JAA (Joint Aviation Authorities) are a co-operative body for Aviation Safety. 38 National Authorities have signed the JAA Arrangements. The JAA adopt and jointly implement Joint Aviation Requirement (JARs) in the following fields:

- Design and manufacture; operations and maintenance of aircraft
- Licensing of aviation personnel
- Aircraft noise and emissions.

http://www.jaa.nl

In accordance with the Regulation (EC) No 1592/2002 of the European Parliament and of the Council of 15 July 2002 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, on 28 September 2003, the European Aviation Safety Agency (EASA) started operations. The main task of the Agency is to ensure a high level of safety and environmental protection in the field of civil aviation.

To this end the agency will assist the Commission in the latter's legislative and regulatory tasks.

It will also be responsible for issuing certificates of conformity with essential requirements and their implementing rules, to types of products and to design and other organisations involved in their production, maintenance and various training tasks, in particular when they are situated in third countries. In areas in which certificates are issued by the member states' administrations, the agency will assist the Commission in the monitoring of the application of Community law by setting up inspection arrangements.

The agency will also assist the Commission in the latter's tasks in relation with third Countries and International organisations.
Lastly, it will establish a market monitoring system to assess the effect of Community Legislation and its implementation, in particular with regard to the resulting levels of safety and environmental protection.

http://www.easa.eu.int

EUROCONTROL:

EUROCONTROL, the European Organisation for the Safety of Air Navigation, which currently numbers 31 Member States, has as its primary objective as the development of a seamless, pan-European Air Traffic Management (ATM) system. The achievement of this objective is a key element to the present and future challenges facing the aviation community,

which are to cope with the forecast growth in air traffic, while maintaining a high level of safety, reducing costs and respecting the environment.

EUROCONTROL services span the entire range of gate-to-gate air navigation service operations – from strategic and tactical flow management to controller training; from regional control of airspace to development of leading-edge, safety-proven technologies and procedures, and the collection of air navigation charges.

EUROCONTROL develops, co-ordinates and plans for implementation of short-, medium- and long-term pan-European ATM strategies and their associated action plans in a collective effort involving national authorities, air navigation service providers, civil and military airspace users, airports, industry, professional organisations and relevant European institutions.

EUROCONTROL is, and will continue to be, at the forefront of initiatives to increase the capacity and safety levels of ATM in Europe.

Member States of EUROCONTROL:

Albania, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, **Finland**,France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Malta, Moldova, Monaco, Netherlands, Norway, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, The former Yugoslav Republic of Macedonia, Turkey and the United Kingdom.

Within the EUROCONTROL organisation, the Safety Regulation Commission (SRC) is responsible for the harmonisation of air traffic management (ATM) safety regulation. This objective is being realised through the development of a harmonised ATM safety regulatory framework, to be implemented by the EUROCONTROL Member States.

The core of this framework is a set of EUROCONTROL Safety Regulatory Requirements known as ESARRs. Within the implementation of this framework, ESARRs are supported by Advisory Material (better known as ESARR Advisory Material - EAM documentation) that deals with Acceptable Means of Compliance (EAM AMC), Guidance Material (EAM GUI) on safety oversight issues and explanatory material on safety regulatory requirements, Compliance with ICAO requirements (EAM ICAO), Companion Documents (EAM COD) and Reference Material (EAM REF).

http://www.eurocontrol.int

ECAC:

ECAC is the European Civil Aviation Conference. JAA is an associated body of ECAC. Its principal objectives are to promote the continued development of a safe, efficient and sustainable European Air Transport System. The ECAC Constitution has been signed by 38 Member States.

http://www.ecac-ceac.org

GASR:

The Group of Airport Safety Regulators membership is open to full or candidate members of the JAA and that should have the safety regulatory functions in the field of airport operations separate from airport service providers.

Its main objectives are to develop a harmonised and cost effective approach to safety regulation of airports and ground aids operation and to produce aerodrome safety requirements. 12 States are members of GASR.

ICAO:

Aviation is international by nature, especially in Europe. Therefore international conventions were developed in the 1920s (CINA; Warsaw Convention…).

In 1944, in view that international relations will re-start after the war, the Chicago Convention was signed. Its purpose is as follows:

The "governments agreed on certain principles and arrangements in order that international civil aviation may be developed in a safe and orderly manner and that international air transport services may be established on the bases of equality of opportunity and operated soundly and economically".

The Convention established the International Civil Aviation Organisation (ICAO). This Convention which comprises around 100 articles has now been signed by more than 180 countries.

The Convention establishes that states have complete and exclusive sovereignty over their airspace (art. 1).

The Convention also establishes in its article 5 the right of non-scheduled flights (make flight into or in transit non-stop and stop for technical purposes).

Article 6 describes how scheduled services may be allowed.

Article 7 gives the right to states to refuse cabotage.

Article 5 to 7 address what is known as the five freedoms.

Article 8 directly addresses "Pilotless aircraft" and establishes clear limits for their operations:

> ***Pilotless aircraft***
>
> *No aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a contracting State without special authorization by that State and in accordance with the terms of such authorization. Each contracting State undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft.*

Article 33 requires States to recognise as valid licenses, Certificates of Airworthiness that have been issued in accordance to requirements that are equal or above the minimum standards defined in the Convention.

The minimum standards of Article 33 are defined in Article 37. Article 37 states that States undertake to co-operate to ensure the highest practicable degree of uniformity in *inter* alia

regulations. To achieve this, Article 37 envisages that ICAO will adopt and amend international standards and recommended practices. These international standards and recommended practices are included in ICAO Annexes.

There are 18 annexes among which Annex 1 (licensing), Annex 6 (operations); Annex 8 (airworthiness)

As indicated in Article 33, national requirements may not be less stringent than the international standards.

National requirements may of course include the recommended practices. ICAO however allows states to notify differences (in particular when the national requirements are less stringent than the international standards) but in that case other states are not obliged to recognise licenses, Certificates of Airworthiness…

With respect to future applications for civil UAVs, the ICAO will serve as the fundamental institutional means by which international civil regulatory provisions can be agreed. The ICAO, on the basis of the Chicago Convention to which over 185 States are party, provides the legal institutional means by which the important subjects such as airworthiness/operational approval and ATM aspects of civil UAV operations can be agreed.

It is evident that the process which leads to the eventual publication by ICAO of Standards, Recommended Practices, Guidelines and Procedures will form the basis for ensuring global interoperability for civil UAV applications, which in turn will foster safety, security and market expansion. Such processes, intended to address the needs of the civil UAV community, will be undertaken in full consideration of all other airspace users, based on validated and demonstrated civil UAV operational airspace requirements.

Existing ICAO regulations, pertaining to ATM, already provide for the integration of many categories of airspace users, UAVs included, who have demonstrated special requirements. Such existing ATM regulations have been shown to meet a vast majority of operational airspace requirements for a multitude of airspace user categories. In the context of UAVs, existing ICAO regulations with respect to ASM can provide for operations of civil UAVs, where such UAVs are not able to demonstrate conformance to other regulatory requirements, necessary for operations outside of reserved airspace.. It will be the purview of the ICAO regulatory development process to define the extent to which any additional international regulatory material, related specifically to civil UAVs, is to be defined. In the context of European civil UAV developments, the established regional planning processes of the ICAO global working arrangements support the introduction for consideration of specific issues such as civil UAVs, on the basis of regional requirements. In this way regionally identified and substantiated requirements, demonstrating possible shortcomings of existing international regulations in meeting UAV airspace requirements, could be translated into globally disseminated regional or global ICAO regulations.

Http://www.icao.org

NATO:

An Alliance of sovereign countries - The North Atlantic Treaty was signed in 1949 and created an alliance of sovereign countries committed to each other's defence. NATO is not a supranational organisation: it is a platform which allows member countries to meet and take collective decisions, enabling them to achieve national security objectives through collective effort. The representatives of each member country consult and participate in each decision that is taken within the forum that NATO provides. Members maintain their independence and sovereignty. A NATO decision is therefore the unanimous decision of 19 governments.

The member countries are: Belgium, Canada, the Czech Republic, Denmark, France, Germany, Greece, Hungary, Iceland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Spain, Turkey, the United Kingdom and the United States.

NATO's essential purpose - To safeguard the freedom and security of its members through political and military means. NATO contributes to the security environment by defending democratic values, individual liberty and the rule of law; working for peace and stability across the Euro-Atlantic area through the collective defence of its members and through partnerships with non-NATO countries; and by taking a leading role in peacekeeping and crisis response operations. By contributing to peace and security, NATO helps to create the appropriate climate for political stability and economic growth.

NATO has been involved in UAVs from the very beginning. Military and NATO in particular are the larger users of UAVs and the Alliance plans contemplate a significant expansion in roles and numbers for the coming years. NATO was a pioneer in issuing Air Traffic Management Procedures for UAVs and The NATO Air Traffic Management Committee (NATMC) published a document called "Guidance for UAV operations, design specification, maintenance and training of human resources" in 1996. Subsequently, this document was released to the whole International Aviation community without restrictions. This document is now under review, and is soon ready for approval. NATO will continue its endeavors to produce an updated version of its document which subsequently could be expanded with the contributions of other aviation and industrial organizations

In 1999 a joint NATO/Eurocontrol workshop was organized where it was recognized the value of such document but also the need to update and expand it. Within NATO the NATMC continues to monitor closely the evolution of the UAVs and maintains close relations with relevant organizations, particularly with Eurocontrol. The NATO armaments planning community trough the Air Group VII also investigates the design and operational use of UAVs and is sponsoring the creation of research programs leading to common design of interfaces, payloads and related issues.

NATO

1.1.3 National Regulatory Environment for UAVs

1.1.3.1 Introduction

This section aims to reflect the main features of the current national regulatory environment for UAVs in the JAA Member States, USA and Canada, the main concerns, needs and recommendations of their Civil Aviation Authorities (CAAs) . The information below is based on responses to the detailed questionnaire prepared by USICO and distributed by the Central JAA to the Civil Aviation Authorities of all the JAA member states (37 states), FAA and Transport Canada. 25 Authorities of the 40 addressed responded, 22 by filling in the questionnaire and 3 by letter or e-mail.

1.1.3.2 Current status of national legislation specifically addressing UAVs

- A number of addressed Member States (14) responded that they have no legislation available specifically addressing the airworthiness and operations of UAVs, nor have such legislation in preparation; 1 State has legislation for military UAVs only.
- Some Member States have certain provisions in their high-level legislation (Civil Aviation Act or equivalent) allowing them to address UAV specifically and their lower level legislation (regulations, guidelines, policies) is already in preparation (e.g Spain, Slovak Republic).
- Some Member States (e.g. Switzerland, Norway) have limited legislation/regulations available which is mainly focused on operational requirements for "small UAV" under 20(30) kg covering "model aircraft" or unmanned aerial balloons.
  Note: *Some Member States (Austria) prefer to define UAV as separate from "model aircraft" while others consider "model aircraft" to be a UAV.*
- Some Member States (e.g. France, United Kingdom, Canada (only operational), Croatia (only operational).) have their legislation developed into more or less advanced lower level detailed regulations, guidelines and/or policy documents to cover UAV operations and/or airworthiness. Some of these States (Croatia) continue with development of their regulations, guidelines or policies for UAVs.
- There are no dedicated airworthiness codes for UAVs developed nationally.

1.1.3.3 National requirements or policies applied to UAVs in case of an application is received for a UAV certification.

Those states **not having specific regulations for UAV** available would in majority improvise when they received an application. One country would not accept such application – due to the fact of missing national regulations for UAVs. Those that would accept such application would establish a working group and would either use their generally applicable existing regulations / guidelines developed for manned aircraft or would define ad-hoc requirements applicable for specific application or would apply requirements of some other state(s). Some states would consider all aspects of the application (operational , airworthiness) together, as a part of safety case assessment . For some states receipt of application would be the reason or even prerequisite to initiate a rulemaking for UAV. Many states would appreciate the JAA/EASA/EUROCONTROL to develop legislation/regulations for UAVs and are awaiting the results from UAV Task – Force activity.

The regulatory approach **of those states that have specific regulations for UAVs** differs from state to state and cannot be easily summarised.

Examples of some airworthiness requirements applied by the states having regulations for UAVs available:

- Some of the states require or would require standard Certificate of Airworthiness, some (special) Flight Permit and some would exempt a UAV from a need to have any airworthiness approval, depending also on (mass) category of the UAV. Usually two airworthiness categories are recognized : "small UAV" and "big UAV" using a mass limit criteria.

- In case airworthiness approval is required for UAV , selected and appropriately adapted airworthiness codes for manned aircraft (JAR-VLA, JAR-VLR….) are or would be used in most cases, supplemented by Special Conditions to address remote piloting, autonomous control, datalink etc. .

- Some of states would consider installation of a self-destructing device

Examples of some operational requirements applied by some states having operational regulations for UAVs:

- Authorisation to use airspace
- Qualification of operators and pilots (usually for operations of UAV above a mass limit (e.g. 20 kg)
- Use and registration of airports for take-off and landing
- Permission for take-off and landing outside airfields
- Prohibited areas of operation close to or over persons, roads, congested/populated areas etc.
- Right of way
- Assignment of frequencies

Some states would requires compliance with environmental standards.

1.3.3.4 Existing national UAV programmes and UAV used in airspace

Based on responses from the states:
- UAVs (except "model aircraft") are not flying in national airspace: **9** countries
- Only military UAVs: **5** countries
- Only civil: **5** countries
- Civil and military: **4** countries

14 authorities have not (yet) received any application or it is unknown. 9 authorities had received an application.
Apperently the most advanced situation (either in civil and/or military fields) is in UK, Sweden France and Austria. More or less advanced military programmes exists in Germany, Croatia, Czech Republic.

1.1.3.5 Need for European legislation and legal obstacles foreseen for issuance of a European standard for UAV

Majority of the addressed JAA states would appreciate to have an EU/JAA legislation containing essential requirements for UAVs and detailed into certification specifications

and/or guidance material for certification and operations of UAVs in general (and for UAVs under 150 kg in particular), to support their national legislations. Majority of these states are not aware or do not foresee any legal obstacles that could delay issuance of the European UAV standard for UAVs.

One country (Spain) indicated that involvement of Defence sector should be required and proposes the EUROCONTROL to provide such coordination.

One state (Germany) identified "See and Avoid" ICAO requirement as such an obstacle and proposes to overcome this, for airspace classified C and higher, by presenting a safety case to ICAO which will demonstrate that an equivalent level of safety can be achieved by appropriate "Sense and Avoid" measures. Subsequently this must be reflected in ICAO SARPs. For all other airspaces proposed solution is by assuring full equivalent ""see and avoid"" capability through appropriate technical means. Alternatively an equivalent level of safety by ""sense and avoid"" technology would have to be demonstrated."

One country (UK) has recognised that according to the EU Regulation 1592/2002 applicable for EU Member States EASA started on 28 September 2003 and since then UAVs above 150 kg became a matter for EASA and subject to EASA/EC rulemaking procedures. EU Member States will remain responsible for certification of UAVs under 150 kg. This UK would welcome EU legislation to be consistent with their CAP 722 publication.

In present situation with no European standard\ available most of the states replied the they would not issue a permit to fly to a foreign UAV.

All the above topics were already identified and recognised by the JAA Task –Force.

1.1.3.6 Definition of UAV categories

Most of the states have no categories for UAVs. The following categories are recognised or are proposed to be recognised by most of the other states:

- **"Model aircraft"** category is usually defined by one or combination of the following criteria:

- maximum weigh/mass (12, 20, 25,30, 35 or 150 kg MTOW),
- engine under 50cc
- developed and used for recreation / sport / leisure / private use
- build in accordance with rules for model aircraft
- operated in direct view of the (external) pilot
- other then a balloon or a kite
- mechanically driven and not designed to carry persons or other living creatures.

This category is in some states sometime included but in most case excluded from definition of "UAV" In some states this category is exempted from airworthiness certification or this certification is done under declarative procedure only. Any commercial activity is either not allowed or requires permission from the relevant NAA.

- **"Small UAV"** under 150 kg MTOW , not meeting the criteria of "model aircraft", for which some limitations are applied in some states e.g.:
- operation restricted to 400 ft above surface
- operation within 500 m (visual range) of the operator
- maximum speed 70 kts
- limited kinetic energy not exceeding 95 KiloJoules
- ….

- …

- **"UAV" above 150 Kg** (within the scope of EU Regulation 1592/2002) not meeting any criteria above. Type certification is normally required.

Both the above UAVs are understood to be designed and intended for commercial use (aerial work)

In certain countries specific categories of vehicles are or are planned to be recognized as "UAVs" , e.g.

- Moored balloons
- Unmanned free balloons
- Rockets
- Other machines telecontrolled from the ground

Following criteria have been proposed to categorize UAVs:

- Remotely operated (visual range / camera or monitor operated) / automatically guided / piloted)
- Operating in VFR/IFR airspace (procedures) / above uninhabited areas / from airports
- By energy (size / weight / speed / fuel load)
- By potential security risk
- Flight testing / research
- Recreational use - models
- Altitude: high / medium / low
- Operation outside segregated airspace / within restricted airspace / in restricted airspace reaching down to ground level
- Fixed wing / rotorcraft / airship
- Mass criteria : <20 kg, , <150 kg, >150 kg MTOW

1.1.3.7 Areas of airworthiness and/or operations of UAVs that need special attention

The NAAs pointed out on a number of areas that according to them need special attention. These areas quite well correspond to the issues already identified by the UAV T-F and addressed by the UAV T-F Final Report, as shown in the following table:

IDENTIFIED AREA OF ATTENTION	TASK FORCE [UAV-TF]
Additional systems needed to replace the pilot on board (MMS, data link)	Chapter 7.8, 7.10
Air navigation rules / operating rules (VFR only?)	Chapter 7.18
Aircraft certification	Chapter 7.1, Appendix 3-3
Airworthiness and continuing airworthiness of engines, propellers	Chapter 7.2, 7.11
Airworthiness standards for the UAV system (including UAV Control Link, networks (if used), (ground) Control Station (including Human Factors), Flight Termination System)	Chapter 7.3
Autonomy of UAVs actions	Chapter 7.9
Certification /qualification / licensing of operating staff, crew, technicians	Chapter 7.19, 7.20, Appendix 4-3

IDENTIFIED AREA OF ATTENTION	TASK FORCE [UAV-TF]
Classification / types / classes	Appendix 3-1
Control and surveillance	Chapter 7.10
Dedicated safety means	Chapter 7.5, 7.7
Equipment	Chapter 7.17
Flights over populated areas	Chapter 7.4, 7.5, 7.7
Flights within and outside controlled airspace (regardless of flight rules)	Chapter 7.21
Frequency allocation	Chapter 7.13
Interference with VFR/IFR traffic -/ see (or sense) and avoid / collision avoidance / visibility to radar	Chapter 7.16, 7.21
Noise / pollution / radiation emissions	Chapter 7.12
Notification of / interface with air traffic control services	Chapter 7.21
Operational procedures	Chapter 7.7, 7.20
Operational restrictions	Chapter 7.5, 7.7
Operations in controlled airspace and over densely populated areas	Chapter 7.4, 7.5, 7.21
Performance	Chapter 7.4, 7.5, 7.6
Privacy protection (for entities on the ground)	Not addressed
Radio-controlled systems	Chapter 7.9, 7.10
Reliability / redundancy of system (power plant, communications, autonomous guidance)	Chapter 7.5
Restriction of area operation (airspace, altitudes)	Chapter 7.1
Safety measures / fail safe methods	Chapter 7.5
Security issues (attack / spying) / security of datalinks for control	Chapter 7.7, 7.8, 7.15
UAV classification	Annex 1, Appendix 3-1
UAV-specific emergency procedures / equipment	Chapter 7.5, 7.7, 7.17
Weather limitations	Implicit in airworthiness
Criteria and procedures for safety analysis for operations and airworthiness (safety case)	Chapter 7.5, 7.21
UAV definitions	Chapter 4
Interface and communication with other airspace users (manned aircraft owners and operators) from airlines to micro-light associations	Chapter 7.21
Maintenance and manufacturing issues	Chapter 7.20

Table: Cross-reference between the areas that national authorities identified as "needing attention" and the issues addressed by the UAV Task Force.

1.2 FUTURE UAV APPLICATIONS

1.2.1 Introduction

Information contained in this section, further detailed in ANNEX 5 focuses on a potential for future civil applications of UAVs in next 6-7 years, the main challenges, market drivers and constraints. The information is based on a study conducted recently by USICO for the European Commission.

1.2.2 Current UAV applications

Since decades UAVs are widely used for military missions mainly in the area of tactical and strategic reconnaissance. World wide around 300 different types of UAVs are available showing a wide range of system performance concerning speed, altitude, mission duration, and payload capability. Because of much lower investments in comparison to manned aircraft development not only the well known global players in aeronautics such as EADS, Boeing, Lockheed, Northrop-Grumman, IAI but also small companies and research institutes are developing and operating UAVs as well as pushing the related technologies.

Currently, some 32 nations are developing or manufacture more than 250 models of UAVs. 41 countries operate some 80 types of UAVs, primarily for reconnaissance. This clearly shows the global interest in UAVs.

1.2.3 Commercial perspectives

In 2000 the world market for UAV systems reached approximately EUR 1.1 billion, with a continued compound annual growth rate forecast of approximately 7 percent for the period 2001 – 2006. To date approximately 90+ % of all funding for UAV systems are a direct result of national government requirements channelled through their military and defence program elements. With few exceptions this is a world wide trend and one which will likely continue until national airspace issues are resolved. Therefore rest of this decade will be greatly influenced by this funding trend and technology developments will be influenced by national requirements.

For the next years the development and operations of European UAVs –either military or civilian - is one of the most important challenges and at the same time one of the biggest opportunities of the European Community and its industries to stay at the technological and commercial frontier of aeronautics.

1.2.4 Civil applications

To trigger high growth in sales and use, UAVs must find missions in expanding, partly civil market areas such as global monitoring of environment and security (GMES) and communications. To do so, or even to be deployed swiftly for out of area operations, UAVs must be able to fly in the national or international airspace. For this airworthiness aspects, operational rules and a tight integration of UAVs in the air traffic management is essential allow an easy demonstration of civil applications of UAVs.

1.2.4.1 Market entry

For market introduction three promising categories of market entry candidates for civil applications are found (see Fig.1-1):

- Technology induced applications
  focusing on local range applications in the area of visual inspection and earth observations based on mini-UAVs / small UAVs and highly miniaturised payloads.
- Platform induced applications
  based on existing medium altitude military platforms to perform governmental and scientific missions as well as dedicated infrastructure monitoring tasks for pipeline and power line monitoring.
- Service induced applications
  to use high altitude geostationary UAVs as new infrastructure elements for future telecommunication systems for mobile communications to overcome the shortcomings of both the terrestrial tower-based and satellite systems.

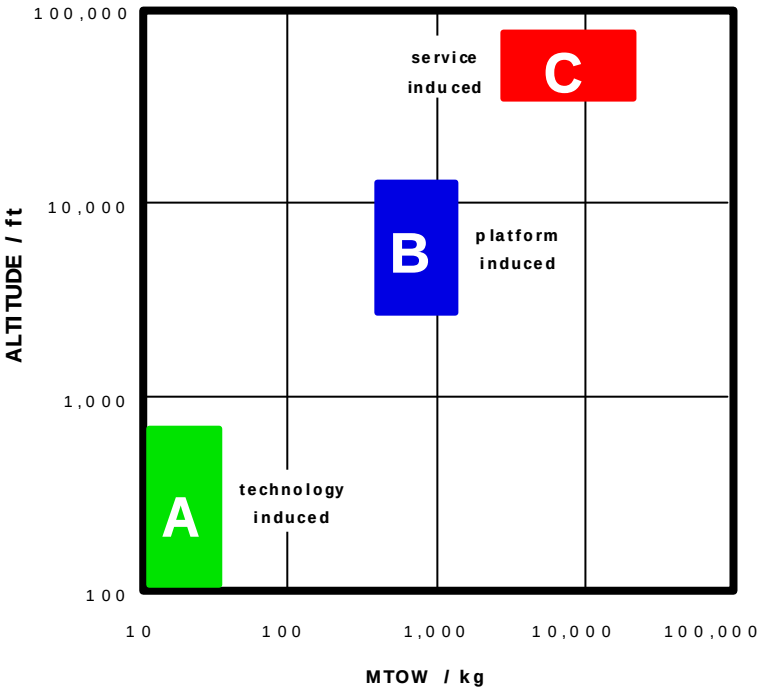

Fig. 1-1

To open the market for civil UAVs it is important to see clearly their strengths and weakness.

Major market drivers for civil UAVs are

- unique flight performance (high altitude, long endurance)
- suitability of use in “dull, dirty and dangerous” missions

Major market restraints against civil UAVs are

- lack of airspace regulations
- insurance
- lack of communication frequencies
- cheaper operations of manned aircraft in civil missions

1.2.4.2 Civil applications timeline

A ranking of the most important near, medium and long term applic ations for the defined reference cases of civil / commercial use of UAVs are shown in Fig. 1-2.

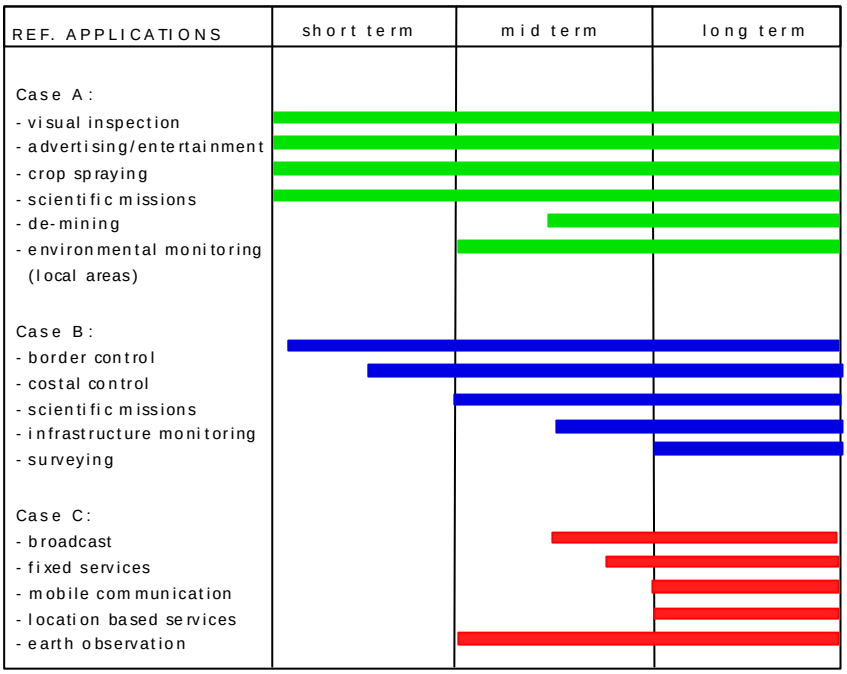

Fig. 1-2: Timeline of introduction of civil / commercial applications for UAVs (short term 1-2 yrs, midterm 3-5 yrs, long term 6-7yrs).

1.2.4.3 Next steps

The next steps for market introduction of civil UAVs are quiet clear. First, UAV must assure the relevant authorities that they can be safely operated in civilian airspace including over populated areas at safety levels comparable to those of commercial aviation. Secondly, UAV manufacturers have to improve the existing military platforms or design new platforms to meet the requirements of the civil market. Cost efficiency, easy and safe operations and high system reliability are here the main design drivers for future civil UAVs.

Under such conditions civil UAV applications will replace those presently operated by satellites in space, by manned aircraft and on the ground and their replacement will be contingent on meeting the twin challenges of economic efficiency and safety.

1.3 BACKGROUND TO THE JOINT JAA/EUROCONTROL INITIATIVE ON UAVs - UAV TASK-FORCE ESTABLISHMENT AND WORK

1.3.1 Introduction

The UAV Task -Force (hereinafter "UAV T-F") was established in September 2002 on the basis of a joint initiative and decision of the JAA and Eurocontrol governing bodies. This decision was taken in reaction to the growing European UAV Industry and their recognised need for the authorities to commence work leading to future joint European regulations for Unmanned Aerial Vehicles (UAV). The non-existence of such joint regulations is seen as a major obstacle for a further development of the European UAV applications. The JAA Regulation Director was charged with establishment and organisation of the UAV T-F.

1.3.2 Terms of Reference

The Terms of Reference for the joint JAA/Eurocontrol UAV Task –Force, as agreed by the JAA and Eurocontrol governing bodies (see Annex 1 to this report), have requested the UAV T-F to develop and deliver in the Final Report a CONCEPT for future European regulations for Unmanned Aerial Vehicles (UAV), its justification and recommendation for a future regulatory work. The areas covered by the agreed Terms of Reference include the traditional JAA safety issues as the airworthiness and certification of UAVs, continued airworthiness and maintenance, operations and personnel licensing including organisational approvals to design, manufacturing and maintenance organisations, and also to operators of UAVs. Moreover, areas like ATM issues and security issues were also included. The working methods agreed for the UAV T-F include meetings and information exchange using e-mail communication. The time frame for completion of the UAV T-F work was established to be 12 months with delivery of the Final Report in September 2003. This time frame for delivery of the Final Report to the JAA Committee was by decision of the JAA Executive Board later extended till 1st quarter of 2004.

1.3.3 Composition

The National Aviation Authorities of the JAA member states, Eurocontrol as well as the European UAV Industry were invited to participate on the work of the UAV T-F. The FAA and U.S. UAV Industry also got an invitation and sent their representatives. The Eurocontrol nominated 3 persons representing both Safety Regulatory Unit and Safety Regulatory Committee. The civil aviation authorities of France, United Kingdom, Italy, Sweden Greece and FAA responded positively by nominating one or more representatives. The response from the European UAV industry was positive above expectation and a number of European organisations and associations active in the UAV field including EURO UVS and USICO sent their nominations. The total number of more than 40 participants or contributors participated on the work, either in Working Groups or directly on the UAV T-F main sessions. The complete list of participants, their nominating organisations and/or affiliations can be found in the Annex 2 to this report.

1.3.4 Working Methods

The UAV T-F plenary meetings, separate Working Group meetings, the Steering Group meetings of the Leadership (see below), Teleconferences of the leadership and e-mail communication were used as major working methods.

1.3.4.1 Leadership

It was proposed and agreed to have a joint co-chairing to the UAV T-F with one Co-chair nominated by Eurocontrol and one by the JAA. Bogdan Braguta was nominated as a Co-chair for Eurocontrol. Yves Morier, JAA Regulation Director agreed to act Co-chair for the JAA part, supported by Ms Giuliana Tamburro (ENAC Italy) acting as his Deputy. Peter van Blyenburgh, president of the EURO UVS association was nominated as the Secretary to the UAV T-F.
To improve co-ordination, a Steering Group was established later lead by both Co-chairs, with attendance of the Deputy and the three leaders of the established Working Groups (see 1.3.4.2).

1.3.4.2 Organisation of Work

Due to the large number of participants available and large number of issues to be dealt with the UAV T-F decided (on their 1st meeting) to establish 3 Working Groups (WGs) to work under and report to the UAV T-F. The tasks allocated to the main UAV T-F were divided among these Working Groups. The titles of these Working Groups indicate the nature of the allocated tasks:

Working Group I :	**General, Safety and Security** (Leader: André Clot, Remote Group, UK)
Working Group II:	**Airworthiness & Continued Airworthiness and Environment** (Leader: Karl Buhlmann, EADS Dornier, Germany)
Working Group III:	**Operations, Maintenance and Licensing** (Leader: Lex Risseeuw, ADSE, Netherlands)

The Eurocontrol representatives agreed that Eurocontrol would take responsibility for the **ATM** issues and to hold a two-way dialogue with the Working Groups and the UAV T-F.

1.3.4.3 Meetings

The UAV T-F held 5 major meetings at the Central JAA in the following days:

1st meeting 9-10 October 2002
2nd Meeting 28-30 January 2003
3rd Meeting 6- 8 May 2003
4rd Meeting 2- 3 September 2003
5th Meeting 10-11 December 2003
6th Meeting 11-12 March 2004

The meeting dates were used partly for the Working Groups to meet separately, and partly for the plenary sessions of the main UAV T-F.

Apart from the above meetings the WGs held several separate meetings according to their needs.

A special co-ordination meeting of the Steering Group at Eurocontrol was held on 9 July 2003 to discuss ATM issues.