Regulatory Options for the European Light Aircraft (ELA1)

Phase 3
FINAL REPORT

November 2010

Hawk Information Services Limited

Contract Number EASA.2009.C.53

FINAL REPORT

Approval and Authorisation

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Record of Revisions

Version	Description of Revision
1.0	First draft for review by EASA 11 November 2010
2.0	Final 24 November 2010

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Executive Summary

Background to the Study

Microlight aeroplanes are a comparatively new class of aircraft that evolved from 'powered hang gliders' in the 1970s. They currently operate in individual European Member States under a wide range certification and operational scenarios, and with the sub-450 Kg class being included in Annex II of Basic Regulation (BR) 216/2008 of 20th February 2008 such aircraft classes come under the auspices of the National Aviation Authorities.

With the design evolution of aircraft and engine technologies, these simple, low powered airframes have increased in complexity, but have been able to stay within the weight limitations by the application of modern, strong lightweight materials.

Recital 5 of BR 216/2008 declared that consideration should be given to regulate at Community level, aeroplanes and helicopters with a low maximum take-off mass (MTOM) and whose performance is increasing, that can circulate throughout the Community and that are produced in an industrial manner.

In addition, there is a significant and increasing industrial base in some European Member States that are designing and manufacturing aircraft to meet the Light Sport Aircraft (LSA) category successfully introduced to the United States some five years ago.

Many of the most commercially successful designs have been designed and built in the EU by German, Czech and Italian companies. However, those aeroplanes cannot be operated legally within the EU as they do not comply with existing regulation; that is they are neither EASA certified nor fall under the provisions of Annex II for Member State regulation. It is open to these companies to opt for certification of their aircraft, but the costs and constraints that this implies suggests an alternative route to be followed.

It is therefore this class of aircraft that the proposed ELA1 category and the proportionate regulation envisaged by Recital 5 of BR 216/2008 aims to address.

Objectives of Study

The aim of the study was to identify successful regulatory scenarios and practices that have been applied to the regulation of microlight aeroplanes under Annex II control in Member States. Data for the safety outcomes in microlighting was collected. Having identified such regulatory practices, the aim was to rationalise these into suggested regulatory frameworks for the proposed ELA1 process.

The intention of the study has clearly been to look at the practices that are seen to work well in the microlight regulatory environment *and neither was there any intent to change the scope of Annex II with respect to regulation of microlights within Member States.*

Scope of Study

It was agreed by EASA at the outset that helicopters, gyroplanes and airships would be excluded from the study.

The study addressed a sample of European Member States that it was felt best represented the span of microlight regulatory environments across Europe at the current time.

The study was divided into three report phases:

1. Study of microlight regulations and accident data in a selection of European countries and the LSA in the USA
2. Regulatory Impact Assessment of options for the future regulation of the ELA 1 range of aircraft
3. Final report

Conclusions of Study

1. The degree of regulation of microlight aeroplanes varies enormously across the European Member States that were investigated. The level of regulation and control in each of the domains (initial airworthiness, continuing airworthiness, licensing and operations) applied by each NAA, appeared to reflect the historical perspective adopted by the Member State when microlight activity arose.
2. Those Member States that have a lighter regulatory environment also have the largest populations of both microlight aeroplanes and adherents and the largest microlight-related industrial activity.
3. Three Member States have a significant design and manufacturing industry based not only around the European microlight category, but also - and often significantly larger - activity in the design and supply of aircraft to the USA LSA category.
4. Those Member States with a high degree of regulation have the smallest populations but, not surprisingly, have better data records with regard to accidents and activity rates. One of the significant and widespread difficulties encountered during the study was access to consistent and comparable data for comparison across Member States. This was particularly important with regard to accident causal analysis. Many Member States do not involve their Accident Investigation Agencies in microlight accidents – even when there have been fatalities. Some Member States have delegated the responsibility of accident investigation to the local police and judiciary for the purposes of determining liabilities rather than causes. Access to this data was not possible.
5. Microlighting is successful in many of the Member States because of the following attributes:
    - low cost of operation and training increases the number of people able to afford to fly
    - operations from unprepared grass fields allows many more airfields to exist

- instruction by individuals without a CPL and from unlicensed airfields increases the number and spread of instructors
- shorter and simpler training reduces time commitment
- often simpler pilot medical requirements
- large variety of aeroplane types and costs available, including used examples

6. Technical advances in the design and construction of airframes and engines has been a result of the following parameters:

- low initial entry costs have allowed many manufacturers to become established
- larger numbers of manufacturers leads to strong competition which in turn leads to technical innovation
- a tightly defined microlight class leads to innovation to distinguish between aircraft designed within similar constraints
- innovation can be very rapid if not restricted by long and expensive certification requirements
- technical innovation is encouraged if changes to design are not restricted by re-certification costs
- larger markets sustain a variety of aircraft types and companies

7. The safety outcome findings overall were that over the ten years from 2000 to 2009 the microlight aeroplanes fatal accident rate for the two predominant microlight types (flex-wing and 3-axis) was an average of around 1.4 per 1,000 registered microlight aircraft per annum. Accident rates in the countries that were studied were between 1.2 and 1.6 for each of the ten years. It was not possible to measure the accident rates in relation to exposure as microlight aeroplanes' annual operating hours data was collected in only a few Member States.

8. The microlight aeroplane fatal accident rate compares with the average glider fatal accident rate of also around 1.4 per 1,000 glider aircraft per annum, measured over eight years' available data 2000 to 2007. A comparison with the fatal accident rate for aeroplanes between 450kgs (the upper limit of microlights) and 1200kgs MTOM – being the ELA 1 range – was not possible due to the unavailability, generally, of discrete data for this group.

9. From the limited (real) causal analyses available in microlight accident reports, very few fatal accidents in microlighting seem to be attributable to failures of initial airworthiness. Some accidents resulted from airframe failure in circumstances in which the accident reports referred to flight outside the flight envelope. Although accidents arise from engine failures these are often ascribed to 'running out of fuel', maintenance issues or similar reasons.

10. The overwhelming indicated causes of accidents in microlighting are due to pilot error, lack of planning, pilot decision-making and similar factors unrelated to the aircraft itself. From this can be deduced that reductions in accidents and therefore improvements in safety are more likely to accrue

through actions addressing pilot education, situational awareness and monitoring standards of piloting. In particular it would seem that efforts should be addressed to pilots at the post licence stage, often with significant experience.

11. The microlighting accidents experience, in terms of causes is very much the same as in the Community regulated sectors of light aviation. Certainly in gliding, where evidence is available, fatal accidents due to failure of initial airworthiness are rare. The same is generally true of aeroplanes. Again, future efforts to improve the accidents rates are more likely to show a positive payback if directed at pilots and their education, decision-making etc rather than aircraft regulations. There is a strong argument for encouraging light aviation industry members' associations in Member States to increase their proactive stance on this subject through established safety management programmes, rather than trying to reduce accidents through further regulation and rules.

12. The regulatory 'package' for ELA 1 should not only address the initial airworthiness process, to make it less expensive, but should consider the other aspects including continuing airworthiness, pilot training and licensing, training organisations etc. In particular the microlight community has generally a less procedural framework for ensuring continuous airworthiness including maintenance of microlights. Those frameworks are more orientated to owner responsibilities and manufacturers' guidance, and simpler structurally with less division of responsibilities than evident in Part M. The regulation of parts is generally less restrictive than for community-regulated light aircraft.

13. In January 2008 the U.S. FAA initiated the LSA Manufacturers Assessment to evaluate the health, state of systems implementation, and compliance of the LSA industry as a whole. Specifically, the goal was to assess current LSA industry manufacturing systems and processes through on-site evaluation, analysis, and reporting under a continuous improvement process, and to provide recommendations to enhance aviation safety. The reason for the review was to see how the LSA manufacturing industry in the USA was handling the processes established by the new regulations, after five years of the new category. There were also some concerns that parts of the industry may not be as familiar with the traditional aviation safety processes as perhaps was needed.

14. The FAA team visited 30 of the 52 US based registered facilities, which provided a 93% confidence level in the results. The report was published in June 2010 and contains criticisms of the LSA industry's lack of compliant processes. However, in discussions with the Hawk study team, the FAA was also of the view that the level of oversight and method of regulation was appropriate for the level of safety required for this category of aircraft and it was content with its decision to use industry consensus standards for design and production of LSAs. The follow through actions on the part of the FAA include education of manufacturers.

The Options for Regulatory Impact Assessment

The six RIA options considered were:

Option 0

Do Nothing

This represents a position of ‘no change’ from the current proposals for ELA 1.

Option 1

Use of self-certification for Initial Airworthiness

This option focuses on changes to the EASA current proposals (as at July 2010) for aircraft within the ELA 1 MTOM range whilst retaining the overall legal scope of Community regulation in terms of the MTOM range of 451kg to 1,200kg. The option considers mainly initial airworthiness for which aircraft manufacturers would be responsible for self-declaring compliance of their products with design and production standards established through industry-based consensus processes. In addition the option considers other possible changes and improvements to other regulatory subjects for ELA 1. Implicit in Option 1 is the choice of manufacturers to retain or adopt either conventional DOA / POA approvals, resulting in TCs for initial airworthiness certification, instead of adopting the industry consensus route to compliance, depending inter alia on marketing and other considerations. The range of aircraft covered by the ELA 1 process would remain within the scope of Community regulations, suitably adapted.

Option 2

Delegation or devolution to Accredited Bodies (Assessment Bodies)

This option considers the application of the concept of the use of Accredited Bodies to ELA 1, as referred to in Regulation 1108/2009, whilst retaining the overall Community regulatory framework with appropriate modifications. Accredited Bodies would be empowered by delegation to issue legal certificates of compliance with implementing rules and / or industry-based standards established by consensus processes. This option would be an alternative to Option 1 in respect of initial airworthiness but could also extend to the issue of certificates for other regulatory topics such as pilot training and licensing and training organisations. As with Option 1, the range of aircraft covered by the ELA 1 process would remain within the scope of Community regulations, suitably adapted.

Option 3

The Light Sport Aircraft (Aeroplane)

Within the context of options 1 and 2 this option considers the issue and distinct case of the proposed European Light Sport (LSA) Aeroplane category, which is part of the proposed wider ELA 1 aircraft MTOM range. Consideration is given to this category primarily because there is now a significant regulatory timescale issue for designers, manufacturers and potential customers in relation to the European market. The USA LSA has now been in existence for over 5 years, being supplied by a significant number of European based manufacturers. Yet these manufacturers, and their potential customers in Europe, cannot sell a European LSA version in Europe as the aeroplanes are not issued with type certificates under EASA Part 21.

Option 4

A 'Mixed Economy'

This option evaluates a range of issues under each regulatory topic for the range of aircraft from 451 kg up to 1,200 kg MTOM that are subject to Community regulation, with a view to recommending changes that would represent a mixture of regulatory approaches. It represents partial deregulation, with some regulatory topics and / or aircraft categories de-regulated from the EU level whilst retaining elements of the EU regulatory framework for certain aircraft categories and / or regulatory topics.

Option 5

Total de-regulation from EU regulation

This option would take the aircraft within the MTOM range of the ELA 1 process out of the scope of Community regulation completely and transfer them to Annex II of Basic Regulation 216/2008.

Recommendations of the Regulatory Impact Assessment

There were three recommendations as outcomes of the RIA:

Option 1 was a recommendation to use industry-based consensus systems combined with manufacturers' declarations of compliance as a form of initial airworthiness certification of products, as an alternative to the current certification by EASA under DOA and POA approvals.

Option 2 is recommended to be considered seriously and investigated further, which is a proposal to use industry-based accredited or assessment bodies to undertake compliance and certification functions, under delegated authority from either the NAAs or EASA.

As a sub-set of Options 1 and 2, consideration has been given in Option 3 to the urgent issue of the proposed European LSA. A recommendation is made to find a solution to introduce the LSA into Europe on a more rapid timescale than is currently envisaged by following the current full regulatory timetable and process including an anticipated change to the Basic Regulation.

The recommendations should be viewed in combination.

Abbreviations and Definitions

Within this report, the following abbreviations are understood to have the assigned meaning.

Abbreviation	Definition
a/c	Aircraft
AeCI	Italian Aeroclub
Amdt	Amendment
AME	Aeronautical Medical Examiner
BCAR	British Civil Aviation requirement
BMAA	British Microlight Aircraft Association
BR	Basic Regulation
CAA	UK Civil Aviation Authority
CPL	Commercial pilot's licence
CS	Certification Specifications
DAeC	Deutscher Aero Club
DOA	Design Organisation Approval
DULV	Deutscher Ultraleichtflugverband
EASA	European Aviation Safety Agency
ELA	European Light Aircraft
ELT	Emergency Locator Transmitter
EMF	European Microlight Federation
EU	European Union
EULSA	European Light Sport Aircraft
FAA	Federal Aviation Administration
Ft	Feet
GA	General Aviation
IAS	Indicated Airspeed
ICAO	International Civil Aviation Organisation
JAA	Joint Aviation Authorities
JAR	Joint Aviation Requirements
Kts	Knots (airspeed)
Kph	Kilometres per hour
KSAK	Royal Swedish Aero Club
kg	Kilogram
LAA UK	UK Light Aircraft Association
LAA-CR	Czech Light Aircraft Association
Lb	Pounds (weight)
LBA	Luftfahrt-Bundesamt (German CAA)
LSA	Light Sport Aircraft (USA)
NAA	National Airworthiness Authority
N/k	Not known

NLF	Norwegian Airsports Federation
NPPL	National private pilot's licence
NPL(M)	National Pilot's Licence (Microlights)
MTOM	Maximum Take-off Mass
POA	Production organisation approval
PP	Powered parachute
PPL	Private pilot's licence
Ref	Reference
SME	Small to Medium-size Enterprise
USA	United States of America
VFR	Visual Flight Rules
VLA	Very light aircraft
WS	Weight shift (control)

Definitions

1. Aeroplane and Aircraft

Attention is drawn to the use of the words 'aeroplane' and 'aircraft' in the study and this report. The definition of these words is as per ICAO. All aeroplanes are aircraft, but aeroplanes have engines (which enable take-off under own power), whereas aircraft that do not have engines (for take-off under own power), such as gliders (or 'sailplanes') are not aeroplanes.

2. Microlight aeroplanes

Microlights are by definition aeroplanes, included in Annex II of the BR, but include gliders with engines enabling take-off under their own power where the MTOM is < 450kgs for two-seat types or < 300kgs MTOM for single-seat types.

3. Gliders / sailplanes

The term 'gliders' (or 'sailplanes') is used in the study to refer to 'conventional' gliders rather than foot-launched hang-gliders. Hang-gliders are not within the scope of the study and are generally included in Annex II of the BR by reason of their MTOM.

Gliders without an engine enabling self-launch if < 450kgs (two-seat) or 300kgs (single-seat) are within the scope of Community regulations. Gliders with engines enabling self-launch and which are > 450 / 300kgs MTOM microlight limits are with the scope of Community regulations.

Section 1

Overview of consultations with stakeholders and methodology of study

1.1 Stakeholders

In order to undertake this study, Hawk deemed it important from the outset to consult with as many and varied stakeholders within the European microlight community that was possible within the constraints of both time available and the study objectives.

Stakeholders were divided into three groups:

1. National Aviation Agencies (or regulatory authority if not the NAA)
2. National Microlight Associations and the pan-EU microlight association, EMF
3. Microlight Industrial representatives - manufacturers, importers and operators (flying schools)

Research was then undertaken to establish names and contact details of the various individuals concerned in each of the stakeholder groups for the target countries of the study.

1.2 Methodology

During the initial planning phase it was decided that it would be important to ensure, as far as possible, equivalence across all the countries and stakeholders and that this could be best accomplished by having an agreed structure to the study questions. Accordingly, the Hawk team compiled a set of questions to encompass the four major study areas:

- Initial airworthiness
- Continuing airworthiness
- Licensing and Medical
- Operations

Each of the study domains could then be approached in a uniform manner, to ensure as far as possible the study looked at the features within each country with a similar approach.

Prior to widespread issue, the question sets were tested within the UK stakeholder communities and further refined in the light of these field trials.

Over a period of some 16 weeks, visits and meetings were arranged with the various individuals to undertake face-to-face interviews in each of the nominated countries.

1.3 Cooperation

With one exception, the Hawk team encountered extremely high levels of cooperation throughout the first phase of the study across all countries. As may have been expected each organisation concerned was keen to establish its own particular point of view. Once the stakeholder community understood the true nature of the study, a large degree of openness and helpfulness was evident across all stakeholders and domains.

1.4 Limitations of methodology and data constraints

Whilst the questions were constructed in order to establish factual responses, it is inevitable that any personal bias of the interviewee may influence the responses. Also it was not always possible to find one correspondent in each organisation who was sufficiently familiar with all four domains, and so the input and opinion of others was sought and recorded.

Most of the data collected was fact (as opposed to opinion), but wherever appropriate the opinions of the correspondent were sought – not just their personal views but also those of the community they represented. In this way it was possible to develop a picture not only of the situation as it stands, but the views of both the user and the regulator on the positive and negative aspects of the local situation, any changes being proposed and how the regulatory position may be improved.

Naturally all of this commentary is subjective and difficult (if not impossible) to quantify; therefore, many of the outputs from the consultations are statements of fact about the regulatory environment together with perceptions and opinions.

The only area of real statistical study, but with significant limitations as to what was available, particularly for the Community regulated sector, relates to the accident and safety data.

Section 2

Microlight Regulatory Topic Overview Charts

The tables on the following pages offer a comparison of microlight regulatory topics across the European counties studied.

The regulatory regimes are:

- Initial Airworthiness
- Continuing Airworthiness
- Licensing and Training
- Operations

In the following table, a ✓ indicates a 'yes' or positive and a ✗ indicates 'no' or negative. WS = weight shift microlight. PP = powered parachute.

Initial Airworthiness	CZ	F	D	I	NL	N	S	UK
Microlight definition	Annex II	Annex II	Annex II	Annex II	Annex II	Annex II	Annex II	Annex II
Particular requirements	Max empty weight allows 2x70kg pilots + 30mins fuel	Engine power limits. Allow for 156kg pilots + 1 hr fuel & 35kts max stall	Ballistic parachute system required	35kts (65kph) max stall. No restriction on adjustable propellers, retractable undercarriage,	M/L has to be 'certified' in either UK, D or CZ	35kts (65kph) max stall. Extra 50kgs for amphibians. Flight manual for a/c > 70kg empty.	Two-seat min. payload 175kg 35kts (65kph) max stall. Extra 50kgs for amphibians.	Two-seat min. payload 172kg plus 1 hour fuel at max continuous rpm.
Microlights classes (excluding autogyros, M/L helicopters)	WS, 3-Axis, PP	WS, 3-Axis, PP	WS, 3-Axis, PP	WS, 3-Axis, PP	WS, 3-Axis	WS, 3-Axis	WS, 3-Axis	WS, 3-Axis, PP
State regulation / rules	✓	✓ IAW requirements but option for own	✓	✓	✓ Self-declaration to accepted design codes	✓	✓ (High level: LFS but delegated to KSAK)	✓
Industry implementation of rules	✓	Self-declaration	✓	✓	✗	✓	✓	✓
Does State control detailed design	✗	✗	✗	✗	✓	✗	✓ (high level only)	✓
Does State control production processes	✗	✗	✗	✗	✓	✗	✗	✓
Ultimate legal responsibility	Ministry of Transport	Owner	Ministry of Transport	Owner	Ministry of Transport	Ministry of Transport	Swedish Board of Transport	Dept of Transport
DOA required	✗	✗	✗	✗	✗	✗	✗	✓
Alternative to DOA	3 prototypes then submit to ČR LAA	Self-declaration to code followed	DULV or DAeC approval	Owner deposits manufacturer statement with AeCI (NAC)	Only a/c designed to Czech, German, UK codes allowed	Only a/c designed to Czech, German, Swedish, UK codes allowed	KSAK compliance declaration and recommendation to NAA to issue approval for type acceptance	✗

Initial Airworthiness (Continued)	CZ	F	D	I	NL	N	S	UK
Design standards / codes applied	UL2 (Germany) for WS	DGAC IAW codes plus 'other'	German LTF codes (recent mandatory requirement)	Manufacturer's choice	Czech, Germany, UK	Czech, Germany, Sweden, UK	KSAK IAW based on UK BCAR-S or ASTM	BCAR Section S (manufactured)
Responsibility for design standards	ČR LAA	Manufacturer	DULV or DAeC	Manufacturer	NL-CAA	NLF	KSAK	UK CAA
POA required	✗	✗	✗	✗	✗	✗	✗	✓
Alternative to POA	ČR LAA approval	Self-declaration	DULV or DAeC approval	Owner deposits manufacturer statement with AeCI (NAC)	n/a	n/a	n/a	✗
Self-certification (by owner)	✗	✓	✗	✓	✗	✗	✗	✗
TC issued	✓	✗	✓	✗	✗	✗	✗	✗
TC ICAO or non ICAO	Non-ICAO	✗	Non-ICAO	✗	✗	✗	✗	✗
Supplemental TC (STC)	✓	✗	✓	✗	✗	✗	✗	✗
C of A	National ČR – prototype (Z), Amateur-built (A), Production (P)	✗	✓ Non-ICAO	✗	✓ special CofA, Non-ICAO for aircraft built to UK, Czech, German codes /standards	✗	✗	✗
Permit to Fly required	✗	✗	✗	✗	✗	✓	✓	✓
Other certification	✗	✗	✗	✓	✗	✗	✗	✗
Differentiate factory produced from amateur-built	✓	✓	✗	✗	✗	✗	✗	✓
Oversight of design	Industry committee inc. CTO ČR LAA	DGAC reserve powers	Delegated to DULV & DAeC	✓ AeIC	n/a	Delegated to NLF (imports)	Delegated to KSAK (imports)	✓ CAA

Initial Airworthiness (Continued)	CZ	F	D	I	NL	N	S	UK
Is there oversight of production / manufacturers?	✗	DGAC reserve powers	✗	✓ AeIC	n/a	Delegated to NLF (imports)	Delegated to KSAK (imports)	✓ CAA
Audit?	✓ Ministry of Transport	✓ DGAC reserve powers	✓ LBA audits DULV & DAeC	✗	n/a	✓ Ministry of Transport	✓ of KSAK by NAA	✓ CAA of BMAA & LAA
Is an Unqualified Import of microlights permitted?	German only	✓	✗	✓	Compliant with Czech, German, UK codes	from Czech, Germany, Sweden, UK	Compliant with Czech, German, UK codes	✗
Environmental compliance certification (noise)	✓	✗	✓	✗	✓	✗	✗	✓
Flight test requirements	✓	✓(but optional)	✓ per design code	✗ other than manufacturer	✗	✗ other than manufacturer	✓	✓
State regulatory approval costs for initial airworthiness control	✗	€20 / €40 for filing dossier	✓	✗	✗	✗	✓ SEK 3,000 for type approval	✓ c. £12k p.a.
Other non-state regulatory approval costs	✓ LAA (CR)	✗	✓ DULV& DAeC	AeCI - €207 for WS / €413 for 3-Axis for filing dossier	✗	✗	NAA pays KSAK to manage IAW system. No KSAK charge allowed to importer	BMAA or LAA charges owners for oversight of amateur-built a/c
State registration of microlights	✓	✓ €20 / 2 years	✓	✓ AeCI	✓ (small cost)	✓	✓	✓ (£65)
Repair design standards	✓	✗	✓	?	✓	✓	✓	✓
Parts and appliances certification	✗	✗	✗	✗	✓	✗	✗	✓
Airworthiness Directives	✓	?	✓	?	✓	✓	✓	✓
Is there a Single seat deregulated class?	✗	✓	✓	✗	✗	✗	✓	✓
Are Microlight gliders permitted	✓	✓	✓	✓	?	?	✗	✓

Continuing Airworthiness	CZ	F	D	I	NL	N	S	UK
Is there a Revalidation of C of A or permit?	✓	✓	✓	✗	✓	✓	✓	✓
Frequency of revalidation	Annual or biennial	Biennial	Annual	None	Annual	Annual	Annual / 100 hrs	Annual
Who approves revalidation	LAA	Self declaration	DAeC / DULV	N/a	NAA	NLF	KSAK	BMAA or LAA
Is there a requirement to follow a specified maintenance schedule?	✗	✗	✓	✗	✓	✓	✓	✓
Who specifies maintenance schedule	Manufacturer	Manufacturer	Manufacturer	Manufacturer	Manufacturer	NLF / Manufacturer	Manufacturer	Manufacturer
Is owner maintenance permitted?	✓	✓	✓	✓	✓	✓	✓	✓
Who approves inspectors?	LAA	N/a	DAeC / DULV	n/a	NAA	NLF	KSAK	BMAA or LAA
Is an aircraft logbook mandatory?	N/K	✗	✓	✗	✓	✓	✓	✓

Licensing & Training	CZ	F	D	I	NL	N	S	UK
Licence type	NPL(M)	NPL(M)	NPL(M)	NPL(M)	NPL(M)	NPL(M)	NPL(M)	NPPL(M)
Authority for licence issue Delegated to Aero Club	✓	✗	✓	✓	✗	✓	✗	✗
Separate Ratings for different classes	✗	✓	✓	✓	✗	✓	✓	✗
Validity Period (years)	2	Lifetime	5	Lifetime	5	2	1 or 5	Lifetime
Revalidation requirements	5 hrs in 2 yrs	None	Same as JAR PPL	None	Similar to JAR-PPL	12 hrs In prev 24 months	12 hrs In prev 12 months	12 hrs In prev 12 months every 2 years
Privileges	Day VFR	Day VFR	Day VFR	Day VFR	Day VFR	Day VFR	Day VFR	Day VFR
Theoretical Knowledge Exam	✓	✓	✓	✓	✓	✓	✓	✓
Theoretical Knowledge Hours	45	No min specified	No min specified	33	JAR-PPL	No min specified	No min specified	No min specified
Minimum Flying Training Hours for Initial Issue of licence	20	By judgement of supervising Flying Instructor	30	16	45	Min 25	20 with min 5 solo	25
Further hours required for carrying a passenger	50 hrs total + min 5hrs on type		✓	Additional 30	✗	Min 50	Additional 10	✗
National training Syllabus	✓	✗	✓	✓	✓	✓	✓	✓
Syllabus controlled by	LAA	None	DAeC & DULV	AeCI	NAA	NLF	NAA	NAA
Pilots Log Book required	✗	✗	✓	✗	✓	✓	✓	✓
Licensed Airfield required for Training	✗	✗	✓	✗	✓	✗	✗	✗
Examiner Structure	✓	✗	✓	✓	✓	✓	✓	✓
Medical requirements	ICAO Class II	Certificate	JAR Class II	Certificate	JAR Class II	Self certification	JAR Class II	Self certification
Status of examining doctor	'Approved' Doctor	Sport Doctor	AME	Sport Doctor	AME	Any doctor	AME for initial	Own Doctor

Operations	CZ	F	D	I	NL	N	S	UK
Basic Licence Privileges	Day VFR	Day VFR	Day VFR	Day VFR	Day VFR	Day VFR	Day VFR	Day VFR
VFR 'On Top' permitted	✗	✗	✓	✗	✓	✓	✗	✓
Are Operations regulated by the State?	✓	✓	✓	✓	✓	✓	✓	✓
Flight in Controlled Airspace permitted	✗	✓ (depends on equipment fit)	✓ (depends on equipment fit)	✗	✓ (requires min equipment)	✗	✓ (depends on equipment fit)	✓
Approved Airfield required for Training	✗	✗	✓	✗	✓	✗	✗	✗
Altitude restriction in Class G or lower	✗	✓	✗	500' and 1000'	1200'	✗	✗	✗
Operation allowed from Licensed airfields	✓	✓	✓	✗	✓	✓	✓	✓
Operations only allowed from an approved airfield	✓	✗	✓	✗	✓	✓	✗	✗
Mandatory Radio fit	✗	✗	✓	✗	Comms Mode S	✗	✗	✗
Min Equipment = ASI, Altimeter, Compass and Engine Instruments	✓	✓	✓	✓	+ Mode 'S' & ELT	✓	✓	✓
Can Microlights be hired?	✓	✓	✓	✓	✓	✓ within Clubs only	✓ within Clubs only	✓
Is there a Minimum fuel requirement?	✓	✓	✓	✓	✓	✓	✓	✓

Section 3

Pan-European Accident Data Overview

3.0 Introduction

During the course of the study accident data from eight Member States were investigated.

The detail of the calculations, the basis upon which the rates are derived and most importantly the caveats associated with the base data may be found in the Phase 1 Report and its appendices.

This overview of accidents and accident rates is divided into four sections combining the overall data from the Member States that were investigated, as follows:

I. Microlighting

II. Power Flying - GA Aeroplanes < 1,200kgs MTOM

III. Gliding

IV. Ballooning

Much of the data is also shown in the individual country sections within the main body of the Phase 1 report, where applicable.

3.1 Overview

The degree of regulation of microlight aeroplanes varies enormously across the EU Member States that were investigated during the first phase of this study. The level of regulation and control in each of the domains (initial airworthiness, continuing airworthiness, licensing and operations) applied by each NAA appeared to reflect the historical perspective adopted by the Member State when microlight activities started.

In general those Member States that have a lighter regulatory environment also have the largest populations of microlight aeroplanes and participants, and also the largest microlight-related industrial activities.

Three Member States have a significant microlight design and manufacturing industry based not only around the European microlight category, but also - and often significantly larger - activity in the design and supply of aeroplanes to the US LSA category.

In attempting to compare accident rates between the different aircraft categories, extreme caution needs to be exercised. This is because each activity has different characteristics in terms of the risk profile. Ballooning is quite different to the other activities; gliding is also distinct in terms of inherent risk. The two activities that resemble each other most closely in risk profile are microlighting and aeroplanes; but unfortunately for this study, separating the accident rates for aeroplanes up to 1,200kgs has proved particularly difficult.

3.2 Completeness of data

3.2.1 Microlights

The study team found it very difficult to collect all the necessary data in order to meet the requirement for a ten-year analysis of accident rates in microlighting in the selected countries. Comprehensive, complete, consistent, comparable, accurate and reliable accident databases for microlighting across Europe do not exist, although credit should be given to the European Microlight Federation for its attempts to create such a database.

Generally the data for the number of fatal accidents and fatalities has been available, with a few exceptions for certain years in one or two countries

The data for the total number of accidents, serious injury accidents, and particularly exposure data in the form of total annual microlight aeroplane operating hours in each country, was not available in many cases. Where it was available, difficulties were experienced in ascertaining whether the ICAO definitions of serious injury accidents, minor injury accidents and incidents had been followed in the categorisation of data.

For the microlight aeroplane accident data that was obtained, causal analyses were either very limited or non-existent. In many cases the analyses that were available against individual accidents was generally very brief and descriptive more of the phase of flight than reflective of the real cause of the accident.

For many Member States, annual reporting of microlight aeroplane operating hours is not required. Except for a few countries there is very little data available for a complete 10-year period. Therefore, on the advice of the EASA project team, the study calculated fatal and total accident rates in relation to the microlight aeroplane populations, which are generally more complete. This is the only basis upon which comparisons of accident rates could be attempted.

There is, however, a drawback with this measure. That is, the available population data across the countries studied varied between the registered fleets and the ‘active’ fleets. Not all registered microlight aeroplanes are ‘active’ (i.e. with current forms of airworthiness) at a point in time or during a survey year. As accidents happen to ‘active’ aeroplanes it was necessary, where applicable, to estimate the ‘active’ fleet numbers for some countries based certain parameters. In two cases the registered fleets had to be estimated as no national register existed. Consequently, in the table below, two accident rates are provided; one for estimated registered fleets and one for estimated ‘active’ fleets.

Generally, those Member States with a high degree of regulation have the smallest national microlight populations but, not surprisingly, have better data records with regard to accidents and activity levels. Of particular significance is that many Member States do not involve their Air Accident Investigation agencies in microlight accidents, even when there have been fatalities. Some have delegated the responsibility for accident investigation to the local police and judiciary for the purposes of determining liabilities rather than causes, and access to this data was not possible.

3.2.2 Aeroplanes

The study team had the greatest difficulty in data collection for aeroplanes up to 1,200kg MTOM (the currently proposed upper limit for ELA1 process).

In all European countries studied, available national databases, usually under the control of the NAA or accident investigation agency, whilst containing individual records of accidents, were not in a form that enabled a data selection to be made by the required MTOM range.

Often the records were grouped in an MTOM range up to 2,250 or 5,700kgs and in a form that did not provide the Hawk study team with the ability to search the database against the relevant MTOM parameter. However, in some cases (e.g. the UK database) the study team was able to analyse a significant number of records over the selected 10 years (2000 to 2009) to extract the relevant records and data.

A further limitation was trying to establish a valid data set of accidents involving aeroplanes up to 1,200kgs, as the aeroplane population data was not configured in way that made this possible to identify.

As one of the objectives of the study was to compare accident rates, expressed as 'accidents per 100,000 hours' between microlighting and the relevant aeroplanes, it was necessary to try and establish the national annual volume of activity (hours), as the measure of exposure to risk.

Unfortunately it was found that no such comprehensive records exist in many of the selected countries. Consequently it has not been possible to provide a comprehensive overview of relevant accident statistics for aeroplanes or even the raw data of aeroplane populations or pilot populations.

3.2.3 Gliding accidents data

Extensive and detailed databases with causal analyses of gliding accidents exist in some of the countries, going back over many years. Aggregation of causal analyses across the countries selected for this study has not been possible, but where individual countries' analyses are available they have been used to illustrate the typical profile of accident causes.

The standard measure of accident rates in aviation is in relation to 100,000 hours. In the gliding world, the key measure of activity is the number of launches (i.e. flights). Some of the national statistics also present total annual flying hours. In most countries the collection of the hours' data is not as comprehensive as flight numbers, and the reliability of the hours' data that is collected is almost certainly less robust than the flight numbers. For these reasons it was finally decided to relate accident occurrence to glider aircraft populations rather than flight hours.

3.2.4 Ballooning accidents data

Ballooning population and accident data was obtained for some countries although activity data was not generally available. As the incidence of fatal accidents in the ten-year period was negligible, EASA agreed that the presentation of ballooning data could be included in the overview section without any detail in the country sections.

3.3 Microlight Accident rates

The evidence collected points to a slightly higher rate of accidents within those Member States that have less regulated or more 'liberal' regimes – especially so in those Member States that do not have a nationally approved flight training syllabus. The population, operational flight hours and accident data for some countries represent low numbers. In these cases a very small number of statistically random events (accidents) can have a very significant impact on the calculated accident rates. Therefore no statistical significance should be attached to the resulting accident rates in those countries. The countries that fall into this category of low microlight population numbers are Netherlands, Sweden and Norway. However out of all the countries studied, two of these were able to provide the most comprehensive data.

The next level in terms of microlight population and activity numbers are the Czech Republic, Germany and UK, where the data, if complete and accurate, can be regarded as statistically reasonably significant.

The top two countries in terms of microlight population and activity numbers are France and Italy. Here the numbers are sufficiently large to ensure that the randomness in the numbers of accidents is of less significance statistically.

Despite these statistical constraints, some observations and conclusions can be made but again with the caveat that they depend on the completeness, accuracy and reliability of the data. In particular the assumptions that underpin the population and activity data are very important and due allowance should be made for gaps and / or inaccuracies in this data.

The following table summarises, for 10 years (2000 to 2009):

- total number of fatal accidents
- total number of reported accidents
- estimated average registered microlight aeroplane population
- estimated average 'active' microlight aeroplane population
- average annual fatal accident rates per 1,000 registered microlights
- average annual fatal accident rates per 1,000 'active' microlights
- average annual total accident rates per 1,000 registered microlights
- average annual total accident rates per 1,000 'active' microlights

It is emphasised the microlight aeroplane population figures are 10 year arithmetic averages and disguise the growth in general of the microlight aeroplane population during this period. The accident rates are weighted by country populations and accidents.

Microlight Accidents Combined 3-axis & flex-wing	CZ	F	D	I	NL	N	S	UK	Total
No. of Fatal Accidents (10 year total)	34	147	67	115	2	2	5	20	392
Total No. of reported accidents (10 year total)	282	856	585	203	25	151	104	456	2,662
Total registered aircraft population (10 year average)	2,490	8,200	3,500	8,032	365	193	345	4,011	27,136
Estimated total 'active' aircraft population (10 year average)	1,358	6,182	2,489	6,000	280	160	270	2,292	19,031
Fatal accidents per year per 1000 registered aircraft	1.4	1.8	1.9	1.4	0.5	1.0	1.4	0.5	1.4
Fatal accidents per year per 1000 estimated 'active' aircraft	2.5	2.4	2.7	1.9	0.7	1.2	1.8	0.9	2.1
Total accidents per year per 1000 registered aircraft	11.3	10.4	16.7	2.5	6.8	78.2	30.1	11.4	9.8
Total accidents per year per 1000 estimated 'active' aircraft	20.8	13.8	23.5	3.4	8.9	94.4	38.5	19.9	14.0

Caution is required in interpreting the total accident rates per population, as the basis of accident reporting varies country to country. Furthermore, countries with a small microlight aeroplane population are subject to statistical randomness in accidents influencing unduly the resultant accident rates.

In terms of state regulatory control and oversight, the Netherlands is probably the highest, followed by the UK. The fatal accident rates of 0.5 per 1,000 registered microlight aeroplanes (and 0.7 and 0.9 per 1,000 estimated 'active' microlight aeroplanes) seem to suggest there is correlation. However, in the case of the Netherlands there were just two fatal accidents in 10 years. Because of the population size, the UK can be regarded as a sufficiently statistically significant.

Sweden and Norway have a degree of state oversight but with substantial delegation of day-to-day control to the national microlight organisation. Their fatal accident rates per 1,000 registered microlights are in the 1.0 to 1.5 range, but again the microlight aeroplane populations and accidents are small numbers. The accident rates are subject to large variability with a very small absolute change in the fatal accident numbers.

France and Italy have the largest populations of microlight aeroplanes combined with the highest absolute number of fatal accidents. Both countries have a 'light' regulatory framework in which there is minimal control by the Member State over airworthiness, and in the case of France, a totally devolved pilot training regime. France has the second highest estimated registered fleet fatal accident rate, whilst Italy compares with the Czech Republic where there is a comprehensive delegated regulatory framework managed by the Czech LAA.

The fatal accident rate for Germany needs to be interpreted with caution because of some uncertainties over the microlight aeroplane population numbers.

3.4 Data Study Conclusions

Microlighting would appear to have a similar fatal accident rate to gliding, when measured in relation to the respective aircraft fleet populations. Utilisation of gliders in terms of flight hours may be higher than microlights as a result of the longer average times of the cross-country flying element. If so, this is likely to place the fatal accident rate for gliding slightly better than microlighting.

Comparison of microlighting fatal accident rates with ‘conventional’ light aeroplanes is not really possible as the data for the latter is generally not available in the segmented structure required.

As referred to above, ballooning is statistically the safest form of light aviation in terms of the risk of fatal accidents. Certainly failure of the balloon envelope due to initial airworthiness is rarely if at all the cause of accidents that do occur. Most accidents are in the landing phase, for obvious reasons.

Furthermore, it is evident from the studies of accident causes that the failure of Initial Airworthiness control is seldom a factor in fatal accidents. The prime cause of accidents remains as piloting errors or poor decision-making during critical phases of flight.

Section 4

Environmental Aspects

1.1 Environmental Overview

Microlight aeroplanes have a number of advantages over conventional light aeroplanes that contribute to their success and popularity: fuel type and efficiency, operation from smaller unprepared airfields, and low noise footprint. These factors increase availability and reduce costs, and are more environmentally friendly than the alternatives presented by conventional light aeroplanes.

4.2 Unleaded fuel

Microlight aeroplane engines are mostly operated on normal automotive 95RON unleaded fuel. Typical light aeroplane engines are operated on aviation fuel, known as 100LL or 100 low-lead, which costs substantially more than unleaded automotive fuel and despite its name contains considerably more lead than leaded automotive fuel.

4.3 Fuel efficiency

A typical two-seat tubular construction Rotax 912 powered microlight aeroplane, such as the Best Off Skyranger or Ikarus C42, consumes around 12 lph (litres per hour) at cruise speed. Older 2-stroke powered aeroplanes also operate at similar values of fuel consumption but return lower airspeeds. This may be compared to a typical light aeroplane such as the Cessna 152, which consumes around 24 lph at cruise speed.

Note that whilst examples of different types of both microlights and light aeroplanes can exhibit higher or lower fuel consumptions and cruise speeds the examples chosen are reasonably representative of the choice of aeroplanes presented to an aspiring pilot: a new or quite recently built microlight aeroplane or a considerably older light aeroplane.

The fuel consumptions are compared on an hourly basis as flying time is often the main consideration in leisure flying rather than distance travelled. However, the typical cruise speeds of the named examples above are fairly similar at around 80-100kts depending on the source of data.

Taking the cost saving due to reduced fuel consumption and the lower price of unleaded automotive fuel, typically currently around €1.40 compared to aviation fuel around €2.00 per litre, the fuel saving for a microlight aeroplane over a comparable light aeroplane can be around €1800 per annum.

4.4 Low noise footprint

Early microlights utilised small 2-stroke petrol engines for reasons of lightweight, high power and low cost. These engines were not very fuel efficient, and operated at high rotational speeds. The use of tuned exhaust systems was common, and small propellers were often used without reduction drives. The result was the generation of considerable high frequency noise, which when coupled with the slow flying speed of early microlights resulted in much noise nuisance.

As a consequence of the noise problems, a number of countries introduced noise limits on microlight aeroplanes or adapted existing aeroplane limits, notably the UK and Germany. This led to reductions in noise levels, and more recently the popularity of fast Rotax 912 powered, aerodynamically controlled aeroplanes with tractor configuration propellers has reduced the noise levels noticeably below that of conventional light aeroplanes. Much work has also been done on propeller design in this regard. These developments have been possible in regulatory environments that have not placed undue barriers to technological progress.

4.5 Small airfields

The ability of microlights to operate from short, unprepared airfields has allowed them to avoid large concentrations of aeroplanes at traditional aerodromes. This reduces the impact of aeroplane operations, in particular noise but also including land use: farm airstrips in the countryside are relatively unobtrusive for the wider population, in contrast to traditional airfields, and barns may have a secondary use to hangar a small number of aircraft. This land use can provide a useful supplementary income to small farms.

Many microlight types are designed to be de-rigged and transported on a trailer, allowing home storage and operation from any field where owner permission and national rules permit. This further dilutes the impact of aeroplane operations and storage and reduces costs. Where hangarage is constructed it may be of simpler and lower-impact design than conventional hangarage, with weight shift microlights particularly easy to store with their wings detached from the trike unit.

4.6 Electric power

The lower regulatory burden on microlights allows and encourages innovation. In particular a number of electrically-powered aircraft have been flown to date, mainly battery-powered but also utilising fuel cell technology. The lightweight, low-power and often low endurance requirements of microlights are well suited to current motor and battery technology, with electric power already verging on practicality for single seat designs intended for self-launch soaring flight.

Whilst battery costs are high, due to the high costs of low production-run specialist engines used in aeroplanes, the additional costs are not as significant as they are in the automotive world.

As observed in the model aircraft world, it is expected that improvements in technology over the next few years will allow electric power to spread to the heavier and faster microlight types.

The low duty-cycle of most microlight aeroplanes makes renewable energy sources a practical proposition in combination with electric power plants.

Section 5

The Regulatory Impact Assessment

5.1 Introduction

In the RIA six options were analysed for the regulation of light aircraft in what is termed the ‘ELA 1 range’. ELA 1 comprises a proposal by EASA for a process of regulatory compliance, primarily for initial airworthiness, covering aeroplanes from 451 to 1200kgs MTOM, gliders and balloons.

The RIA discussion and process was based on the foregoing study of microlight aeroplane (< 450kgs MTOM) regulations in Europe, and the LSA in the USA (<600kgs MTOM). Microlights in Europe are outside EU Community regulation and are subject to a variety of national regulations. In the USA, the FAA regulates the LSA quite differently to the methodology applied to aeroplanes in this MTOM range in Europe.

The scope of the RIA was to consider a range of options for the future regulatory framework of aircraft covered by the proposed ELA1 process, including if necessary changes to the Basic Regulation EC 216/2008. Such aircraft are those that are currently subject to regulation at Community level (aeroplanes from 450 /472.5 to 1200kgs MTOM, gliders and balloons). By agreement with EASA, helicopters, autogyros and airships were excluded from consideration. Other regulatory topics were covered, not just initial airworthiness which has been the primary driver in the development of proposals of the ELA 1 process.

As a sub-set of the above objectives, particular focus was also given to the proposed EuLSA category, in the light of interest from various parties and stakeholders and the content of the work of EASA working group MDM.032.

As part of the RIA process a workshop was held in Köln on 19th October 2010. All interested parties from across the Member States were able to attend, and the audience comprised representatives from various NAAs, manufacturers, membership associations and individuals. The conclusions of the Phase 1 report and the draft RIA were presented. The issues raised and discussed during the workshop have been incorporated in the final edition of the RIA and this report.

5.2 The Issue

The issue centres upon whether an alternative regulatory framework to that currently applicable would be more appropriate for aircraft in the proposed ELA 1 range.

Fundamental to the RIA considerations was the fatal accident experience of microlighting in Europe compared to that of the EU-regulated light aviation sector, and the more recent U.S. LSA experience. In trying to establish the respective accident records the intention was to draw comparisons and try and establish whether there is any visible or proven correlation between the respective regulatory frameworks and fatal accident rates.

Underlying the entire RIA process was the question of whether the regulatory framework established in Regulation EC 216/2008 (and its preceding EC 1592/2002), together with the supporting Implementing Rules, the most appropriate for light aviation and does it reflect a proportionate approach commensurate with the overall safety objective?

In so far as the study and the RIA were able to determine, the outcome has been expressed in terms of recommendations as to which options should be taken forward to a future EASA working group, BR.010.

A key driver in many of the considerations is the issue of financial and human resources required for compliance with regulations, as this affects all stakeholders in the light aviation sector.

5.3 Why the issues need to be addressed

1. The current BR and Part 21 Implementing Rules for initial airworthiness, applied to aircraft in the ELA 1 light aviation sector, whilst providing a level of safety that has proven successful historically through its predecessor rules embodied in JAR 21, is regarded by many stakeholders as too burdensome economically for the light aviation sector. In part this is a reflection of the size of individual economic units that require regulatory approval and oversight. The regulatory compliance costs are an order of magnitude greater in proportion to the turnover and financial resources of these organisations compared with the larger aircraft industry. These costs represent a significant investment / development period and continuing business risk.
2. Alternative processes and procedures for the official acceptance of initial airworthiness of aircraft need to be explored and solutions found and agreed. The purpose is to achieve lower regulatory compliance costs for designers / manufacturers (particularly SMEs which typically populate this sector), so as to stimulate economic development whilst maintaining an acceptable safety level in respect of initial airworthiness. Reduction in the regulatory cost burden for launching new aircraft would also afford opportunities for greater competition amongst designers and manufacturers.
3. The combined European and worldwide market for the LSA / EuLSA is potentially significant in relation to the total global light aviation sector. Currently there is a barrier to marketing the LSA and EuLSA in Europe due primarily to lack of an appropriate airworthiness code establishing standards, and also the regulatory costs associated with reaching full type certification.
4. Harmonisation of the US LSA and proposed EuLSA design standards would benefit the industry from both a design and manufacturing viewpoint as well as for the end-users / customers.
5. Evidence of accident rates in the microlight aeroplane sector, which has varying degrees of national regulation throughout Europe but with no EASA-level initial airworthiness type certification, demonstrates that microlighting is not materially different to the EASA-regulated light aviation sector in safety outcomes as a result of initial airworthiness failures. Airworthiness regulatory compliance costs are significantly lower than those for EASA-regulated aircraft.
6. Part M (continuing airworthiness and maintenance) is proving to be a contentious invention for aircraft owners, pilots and service support organisations in some EU Member States. This may be due in part to

interpretation and implementation by some NAAs. In general Part M has replaced national systems that over time have proved to be an acceptable guarantee of safety levels. Part M is seen as a significant increase in financial burden with no potential gain in safety outcome. In some cases it is viewed as a potential reduction in safety due to the increased focus on paperwork rather than 'hands-on' practical maintenance. Whilst the original Part M was modified through the work of EASA working group M.017, so as to adapt it to the light aviation sector, there is a general view amongst stakeholders that these changes did not go far enough to make Part M more widely acceptable.

5.4 The Six Options considered in the RIA

The options are described in the Executive Summary of this report.

5.5 RIA Outcomes

Option 0 – 'Do Nothing', Option 4 'Mixed Economy' and Option 5 'Total de-regulation at EU level' were discarded for the reasons detailed in the RIA report.

Options 1, 2 and 3 were taken forward for recommendation (see below).

The full reasoning and rationale behind these decisions can be found in the RIA report. Set out below is a summary of the key findings in the analysis of impacts and the risk assessment of making the proposed changes.

5.6 Analysis of Impacts

The assessment of impacts used the Multi-Criteria Analysis (MCA) methodology together with elements of a qualitative assessment. The criteria applied in the assessment covered safety, environmental, economic, equity and proportionality, social and regulatory harmonisation.

5.6.1 Safety impact

Based on the assessed experience of the microlight sector and also the USA LSA category there is a low negative safety impact expected with a change to an industry consensus based approach to standards for initial airworthiness and manufacturers' self-declaration of compliance for ELA 1 in place of the traditional DOA / POA approach. The change would be primarily for economic reasons for the manufactures and ultimately the end users in terms of aircraft owners and pilots.

All the evidence from the accident statistics points to a very low incidence of fatal accidents caused by failures in initial airworthiness, whether in aircraft regulated by the Member States or as now EASA, and those aircraft subject to forms of initial airworthiness regulatory control utilising the expertise of industry and sector associations.

All the indicators are that a change to industry-based self-declaration, and with the use of a periodic review process if necessary to assure compliance with approved airworthiness standards, would not materially affect adversely the fatal accident rates of the aircraft categories concerned.

5.6.2 Environmental impact

The implementation of the European LSA is forecast to lead to overall environmental improvements compared with current Part 21 / CS 23 aeroplane fleets, where substitution of fleet type occurs. This is due to the improved aerodynamic and engine technologies adopted from microlights in the LSA category for the USA market, but as yet not available to the European market. A fast track implementation of LSA in European would accelerate this potential benefit. The extension of a new approach for the EuLSA is forecast to benefit the design of CS23 aeroplanes through technological improvement migration.

5.6.3 Social impact

Light aviation and in particular flying light aeroplanes, including the proposed EuLSA category, could be rejuvenated through a relaxation of regulations. If lower capital and operating costs are achievable there is the potential for a reversal of the downward participation trends in the last 20 years or so. Recreational aviation is an important activity in the lives of a significant number of EU citizens from a young age (14+) right through to people in their later life (70+). It is a legitimate pursuit offering adventure, discipline and in particular decision-making skills that are life-experience enhancing. It also provides an extremely valuable pool of people who, if they start in light aviation at a young age, can aim to expand their experience into commercial aviation including airlines and the supporting industries. These are vitally important economic drivers, built around the social aspects of light aviation. Costs have become an increasingly significant barrier to access to light aviation. Thus anything that can be done to widen equitable access should be done but without building into the regulatory framework automatic assumptions that such progression to commercial aviation is what all participants want to achieve. Pilot medical barriers to the light aviation sector also need to be challenged using objective risk criteria.

5.6.4 Economic impact

Provided the impact of safety is neutral, the largest positive impact from the changes proposed is likely to be economic. An industry consensus-based process for ELA 1 initial airworthiness is likely to be far more attractive to most manufacturers, and certainly the smaller ones. This is turn will generate benefits downstream in terms of the range of products, their cost and the market size, particularly if the EuLSA category can be implemented without further undue delay.

The industry-based approach would release EASA and NAAs from a significant element of their certification activity cost bases, allowing concentration on the higher MTOM end of GA and also CAT.

European manufacturers need to be able to compete on level terms with their counterparts in the USA in particular, but also in the future with manufacturers in emerging economies of the Far East, India and China. At present they are at a competitive disadvantage by not having, in particular, an EuLSA European market.

5.6.5 Equity and proportionality

The impact of implementing the proposed options 1, 2 and 3 is likely to be highly positive for SMEs, particularly those with LSA models for the European market. It would enable them to compete more effectively in a global market.

Using the MCA weighted scoring template (applying a larger weighting to safety than other criteria) and applying a zero score for Option 0 as the baseline by which to measure the other options, Options 1, 2 and 3, score very positively at +38, +47 and +41 respectively, whilst options 5 and 6 are negative at -19 and -94.

It is emphasised that Options 1, 2 and 3 are not mutually exclusive, and this report recommends taking forward these three options to the BR.010 working group.

5.7 Risk Assessment

The risk assessment of the options deals essentially with one proposed change to the Basic Regulation for light aircraft. That is, to delegate responsibility for the determination of compliance with initial airworthiness standards for ELA 1 aircraft from EASA to industry by the establishment of a consensus process operated by a recognised standards body.

The aircraft manufacturer would self-declare compliance with the agreed standards of design and production. The initial airworthiness design standards would be determined either by EASA (by means of Certification Specifications) or by industry consensus, with input to that process from EASA. This reflects Option 1.

In addition, Option 2 proposes oversight and / or review of the implementation of the consensus process and manufacturers' compliance by approved 'accredited bodies'. Certificates, in a form to be determined, would attest the airworthiness of each of the products and would be issued by accredited bodies on behalf of EASA or an NAA.

A further modulation is contained in Option 3, which is a recommended 'fast track' to implement Option 1 for the EuLSA category.

The nature of the primary risk evaluated is the risk of an increase in the rate of fatal accidents caused in the future <u>by a failure caused by insufficient oversight or inappropriate design codes of initial airworthiness.</u>

The fatal accident risks considered are focused on both the pilot and other occupants of an ELA 1 aircraft. In addition the fatal accident risks to 'uninvolved' third parties, outside the aircraft, are also considered.

The risk evaluation is sub-divided into:

1) Proposed EuLSA aeroplanes (450-600kg) for which there is currently no separate fatal accident data in Europe
2) The remainder of the proposed ELA 1 MTOM range, which includes
    a) Aeroplanes from 600kgs to 1200kgs MTOM
    b) Gliders / sailplanes (current MTOM 850kgs but with a proposed extension)
    c) Balloons (current hot air balloon envelope capacity 3400 cubic metres)

The risk evaluation for aeroplanes, including the proposed EuLSA, is based on evidence drawn from 10 years of fatal accident data of the Annex II microlight aviation sector in Europe and the 5-year fatal accident data for the USA LSA category. These sources are the only two available sectors in terms of current and past initial airworthiness compliance processes that offer broad comparisons. The other comparable sector is amateur-built aircraft (also Annex II) where initial airworthiness is in most countries determined with varying degrees of industry-based oversight. However, the collection of data on fatal accidents for the Amateur-Built Aircraft sector was not within the scope of the study.

The evidence collected in the study shows that the number of fatal accidents that are attributable directly to a failure of initial airworthiness as the primary cause is negligible in the case of aeroplanes and gliders and virtually non-existent in balloons.

The question therefore is, would transferring responsibility for initial airworthiness compliance to industry, through the mechanisms proposed and described, be likely to adversely affect this extremely low fatal accident record due to failure of initial airworthiness?

5.7.1 Evaluation

The bases of evaluation are set out in detail in the RIA report.

5.7.1.1 European LSA

The probability of incremental initial airworthiness failure (i.e. over current rates) through the alternative compliance process is assessed as 'improbable' – a risk score of 2.

It is estimated that 1 incremental event may occur for approximately every 8,000 aeroplanes over their expected life. As the EuLSA category would be new, the expected European LSA aircraft population by the end of 20 years is forecast to be c. 12,000. Using these figures the incremental fatal accidents would be 1.5 involving, statistically, between 1.5 and 3 people.

In terms of severity the events would be classified as 'hazardous' because of the estimated fatalities (see RIA report attachment B table 16), thus a risk score of 4.

The resulting compounded risk score is thus 8.

5.7.1.2 Aeroplanes from 600kgs to 1200kgs MTOM

The probability of incremental initial airworthiness failure (i.e. over current rates) through the alternative compliance process is assessed as 'improbable' – a risk score of 2.

It is estimated that 1 incremental event may occur for every 8,000 aeroplanes over their expected life. As the aeroplanes produced under this process would be new, the expected new aeroplane EU population by the end of 20 years is forecast to be c. 15,000. Using these figures the incremental fatal accidents would be 0.5 involving, statistically, between 0.5 and 2 people.

In terms of severity the events would be classified as 'hazardous' because of the estimated fatalities, thus a risk score of 4.

The resulting compounded risk score is thus 8.

5.7.1.3 Gliders / sailplanes

The probability of incremental initial airworthiness failure (i.e. over current rates) through the alternative compliance process is assessed as 'extremely improbable' – a risk score of 1. This is because sailplanes are less complex than LSAs and aeroplanes, gliders / sailplanes being mainly without engines and propellers as the means of take-off and landing.

It is estimated that 1 incremental event may occur for every 6,000 sailplanes over their expected life. As the gliders produced under this process would be new, the expected new glider population by the end of 20 years is forecast to be c. 5,000. Compared to the current European glider / sailplane aircraft population of c. 21,000 the number of new gliders produced under the alternative process may not be as great as sailplanes have been type certified to date.

Using these figures the incremental fatal accidents would be 0.8 involving, statistically, between 0.8 and 1.6 people. In terms of severity the events would be classified as 'hazardous' because of the estimated fatalities, thus a risk score of 4.

The resulting compounded risk score is thus 4.

5.7.1.4 Balloons

The probability of incremental initial airworthiness failure (i.e. over current rates) through the alternative compliance process is assessed as 'extremely improbable' – a risk score of 1. This is because balloons are the simplest form of aircraft. It is estimated that 1 incremental event may occur for every 15,000 balloons over their expected life.

As the balloons produced under this process would be new, the expected new balloon population by the end of 20 years is forecast to be c. 3,500. Current annual worldwide balloon production is c. 700 p.a. Compared to the current EU balloon population of c. 4,000 the number of new balloons produced under the alternative process may not be as great as balloons have been type certified to date.

Using these figures the incremental fatal accidents would be 0.2 involving, statistically, between 0.8 and 1.0 persons. In terms of severity the events would be classified as 'hazardous' because of the estimated fatalities, thus a risk score of 4.

The resulting compounded risk score is thus 4.

5.8 Conclusions

The following conclusions were arrived at as a result of the RIA study:

1. The consensus approach considered under Option 1 has proved to be a workable solution in the US LSA category for MTOM up to 600 kg. There is therefore no reason in principle why this approach for Initial Airworthiness on ELA1 cannot be extended to cover MTOM up to 1200 kg. Option 1 requires an amendment to the Basic Regulation and / or Regulation 1702 (Part 21) to enable an industry consensus process to be used in place of the requirement for a DOA and POA, and the need for a Type Certificate.

2. If such a declarative approach is to apply, it may need to be complemented by independent certification. This could be accomplished by the use of Accredited Bodies which are capable of issuing certificates of compliance and which are independent of the designers and / or manufacturers.

The recommendation is that the Option 2 proposal of using assessment bodies under delegation from either the NAAs or EASA to undertake compliance functions should be investigated further. Option 2 also probably requires an amendment to the Basic Regulation also.

3. Option 3 concludes that a rapid solution should be found for an industry-acceptable initial airworthiness implementation of the proposed European LSA, either by means of an appropriate interpretation of and route through Regulation 1702 / Part 21, or a fast-track change to the Basic Regulation to enable this to happen. In addition the recommendation is that a change to the Basic Regulation is undertaken, perhaps on the normal timescale, to permit industry-consensus, initial airworthiness processes for the ELA 1 MTOM range of aircraft, other than LSA.