FSAMP

Flight safety and airworthiness –
a masters programme

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Steering committee for the Erasmus+ project «Flight safety and airworthiness – a master's programme» 561989-EPP-1-2015-1-UK-EPPKA2-CBHE-JP-ERASMUS + CBHE

Tashkent, the Republic of Uzbekistan 27-28 October 2016

Project coordinator: Dr Peter Barrington, Head, School of Aerospace and Aircraft Engineering, Kingston University, London SW15 3DW
Project manager in Uzbekistan and Russia: Dr David Campbell, erasmusfsamp@gmail.com +79164172166

Оглавление

Agenda:

27 October:

14.00 – 14.20

Opening:

Welcome from the

- Rector of the National University of Uzbekistan, Rectorof the Tashkent State Technical University and other guests
- Presentation on the work of the two universities

14.20 -14.30

Approval of minutes and matters arising from –

- Stakeholders conference of the project 12th May
- Project steering committee 13th May

14.30 – 15.30

Report on the requirements for the development of the masters programme in «Flight safety and airworthiness" – Presentation and discussion

15.30 – 16.00 Coffee break

16.00-18.00

Discussion on report continues: The following questions to be decided:

- Future of graduates;
- Key graduate competencies;
- Requirements for students enrolling on course;
- Program structure.

19.00 Project dinner

28 октября

09.30 – 11 . 00

Discussion of draft program contents (curricula) for the modules:

- Introduction to the aviation sector and legislation (reporter – Igor Milyukov);
- Business economics for the aviation sector (reporter – Giulliana Koppotelli);
- Management systems in aviation (reporter – Aleksei Olenov, Leonid Fedotov);
- Airworthiness (reporter – Yuri Kiselov)

11.00 – 11.30 Coffee break

11.30 – 13.00

Continue of discussion of draft programs.

13.00 – 14.00

Lunch

14.00-15.00

Discussion and decision on equipment purchase: (reporter Leonid Fedotov, David Campbell)

15.00 – 15.30

Planning further actions for the development of the programme.

15.30 – 16.00 Coffee break

16.00 – 17.30

Discussion on aims of staff exchange in 2017 г., planning of exchange visits.

17.30 – 18.00

Information and discussion of other opportunities in the Erasmus+ and Horizon 2020 programs.

List of participants in steering committee 27-28th October Tashkent

Name	Name in Russian	Institute	Position
Avaz Rakhimovich Marakhmiov	Марахмиов Аваз Рахимович	National University of Uzbekistan	Rector
Otabek Zhumaev	Жумаев Отабек -	National University of Uzbekistan	Project coordinator
Bakhtiyar Kholmatzhanov	Холматжанов Бахтияр	National University of Uzbekistan	Senior lecturer in Dept of “Astronomy and Atmospheric physics”
Anzirat Nigmadzhanova	Нигмаджанова Анзират	National University of Uzbekistan	Project manager at NUUz
Talat Akhunov	Ахунов Талат	National University of Uzbekistan	Head of Dept of “Astronomy and atmospheric physics”
Damir Talipov	Талипов Дамир	National University of Uzbekistan	Head of Education methodology
Farkhod Khamidullaevich Rizaev	Ризаев Фарход Хамидуллаевич	Tashkent State Technical University	Rector
Nurilla Fatkhullaevich Zikrillaev	Зикриллаев Нурилла Фатхуллаевич	Tashkent State Technical University	Vice rector
Dmitrii Viktorovich Bystrov	Быстров Дмитрий Викторович	Tashkent State Technical University	Head of International department
Nuriddin Anvarovich Abduzhabarov	Абдужабаров Нуриддин Анварович	Tashkent State Technical University	Coordinator of working group
Tulkun Akhmadzhanovich Sagdiev	Сагдиев Тулкун Ахмаджанович	Tashkent State Technical University	Head of department
Aziz Khodzhievich Sultanov	Султанов Азиз Ходжиевич	Tashkent State Technical University	Senior lecturer
Makhmudzhon Azadovich Azadov	Азадов Махмуджон Азадович	Tashkent State Technical University	Senior lecturer
Dzhakhangir Abduvalievich Islamov	Исламов Джахангир Абдувалиевич	Tashkent State Technical University	Senior lecturer
Peter Barrington	Питер Баррингтон	Kingston University	Head of school of aerospace engineering
Paul Wagstaff	Пол Вагстафф	Kingston University	Senior lecturer and consultant School of aerospace engineering
Giuliano Coppotelli	Джулияно Коппотелли	University of Rome (La Sapienza)	Director of programme for aerospace structures
Andres Carrion Garcia	Андрей Каррион Гарсиа	Polytechnical university of Valencia	Director of the centre of quality and change mangement
Elena Vasquez Barrachina	Елена Васквез Баррачина	Polytechnical university of Valencia	Centre for quality, professor of statistics and operations.
David Campbell	Дэйвид Кэмпбелл	Kingston University	Dept of aerospace engineering, project manager
Irina Kulik	Кулик Ирина Александровна	Moscow power engineering institute	Head of international department
Levon Agamirov	Агамиров Левон Владимирович	Moscow power engineering institute	Professor, Dept of innovative technologies in the high tech sector
Iurii Kiselev	Киселев Юрий Витальевич	Samara University	Senior lecturer Dept of the use of aviation technology
Petr Kuznetcov	Кузнецов Петр Анатольевич	Far Eastern Federal University	School of economics and manage-ment, director for development
Iuliia Kuznetcova	Кузнецова Юлия Геннадьевна	Far Eastern Federal University	Head of design office in School of engineering
Leonid Fedotov	Федотов Леонид Викторович	Ulyanovsk Institute of Civil Aviation	Head of scientific research
Alexey Olenev	Оленев Алексей Анатольевич	Ulyanovsk Institute of Civil Aviation	Vice rector for investment and innovation

Minutes of Stakeholder conference of ERASMUS+ FSAMP Project

12th May 2016.

Held at the Moscow Institute of Power Engineering.

Preliminary agenda attached (Appendix A).

Attendance list attached (Appendix B).

Meeting was opened at 10.15 by Vladimir Zamolodchikov, Pro-Rector of MPEI. After his welcoming speech he passed the chair to Vladimir Sokolov, Head of the Department of Innovation Technologies at MPEI.

An Introduction to the work of the European Union and its cooperation programme with the Russian Federation was given by Mr Sven-Olov Carlsson Deputy Head of the European Delegation to the Russian Federation.

A welcome was given on behalf of the EU partners by Dr Peter Barrington of Kingston University.

During the course of the one-day meeting, all questions included in the agenda were covered. Presentations made by David Campbell, Alexei Olenev and Leonid Fedotov and Yuri Kiselev are attached.

The Round table discussion on the structure and content of the masters programme was moderated by Andres Garcia-Carrion. Representatives of all partners in the project contributed, as did representatives from TsAGI, MAI and the Moscow Civil Aviation School.

The discussion concluded by agreeing that:

- the programme should be based on one common module covering the main elements of flight safety systems, the contents of which will be defined by the working group;
- each institute can then use this common module with its own additional specialisation (profile);
- a list of common additional modules (including for example on metrology, fuel quality, ATC/ANC) should be developed;
- the programme should have a practical orientation
- a clearly defined procedure to enable mobility between institutions should be developed.

These issues were passed on to the steering committee for development.

Signed and dated,

Vladimir Sokolov, Head of Innovation in High Technology Sectors at MPEI.

Minutes of Steering Committee Number 2 of ERASMUS+ FSAMP Project

13th May 2016.

Held at the Moscow Institute of Power Engineering.

Preliminary agenda attached (Appendix A).

Attendance list attached (Appendix B).

Meeting was opened at 11.15 by Peter Barrington of Kingston University.

The following items were discussed:

1: A review of activities already completed in the project – opening meeting, study tour. Participants were satisfied with the content and results of activities, minor problems with accommodation and travel will be resolved before next events. **Responsible: D Campbell.**

2: Project learning outcomes and structure: The general conclusions concerning structure and content reached during the stakeholders' conference were developed and expanded on. The following conclusions were added to those reached in the stakeholders' meeting:

i) In general, the aim of the programme is not just to help to train safer pilots or more competent engineers, but to train and educate specialists who have a comprehensive view of what affects and ensures air safety;
ii) More work needs to be done to define requirements for entrants to the programme and on the likely future employment of graduates. It was decided that entrants should have, at least, relevant technical or aviation related bachelor degrees and be engaged in technical or managerial roles directly related to flight safety.
iii) The programme should be universal, not linked to the specifics of a particular aircraft or industrial interest;
iv) Given that each partner institution has different profiles and uses different education standards, to develop one universal programme will be difficult. Therefore, the programme will consist of one common block of module covering a systematic approach to aviation safety used by each institute and then the development of separate profiles – in flight safety, airworthiness, management of airports and operations – to be used by each institute as required.
v) That a number of important issues exist that affect flight safety such as meteorology, fuel quality and fuelling, aerodynamics that while not part of the central common block can be offered as optional modules;
vi) Although the common block should pay serious attention to laws and regulations in the sphere of aviation safety, it should be aimed at establishing a clear understanding of the quality management – flight safety management approach.

It was therefore agreed that the Common module should have the following structure:

i) The common block "Introduction to aviation safety" should occupy one third of the first year of either an 18 month or two year programme. This allows a further one

third of the first year for selective modules and one third for institute profiles. The final 6 or 12 months will be practical work or research.

ii) For convenience the programme will use the Russian credit structure – one year is 60 credits, one credit 36 hours of student activity.
NB. During the meeting we said that one third of one year is 30 credits. This is wrong – one third is twenty. So the following credit proportion has been adjusted according.

iii) The common block "Introduction to aviation safety" will be divided into the following modules:
- Background in aerospace fundamentals (Введение в авиационную отрасль) 2 credits (зачетные единицы)
- Legislation and regulation in aviation safety 3 credits
- Management systems in the sphere of aviation 8 credits
- The economics of air transport 3 credits
- Airworthiness (Летная годность) 4 credits.

iv) A list of additional modules such as meteorology, fuel safety will be compiled and a common structure developed.

The following actions were agreed:

a: Working groups will develop the curricula (в форме аннотации) for each of the above modules by the end of June 2016. The working groups are as follows:

- Background in aerospace fundamentals and Legislation and regulation in aviation safety – **Coordinator: Igor Milyukov (MPEI)**
- Management systems in the sphere of aviation - **Coordinator: Leonid Fedotov (UICA)**
- The economics of air transport - Coordinator: **Giuliano Coppotelli (UniRoma)**
- Airworthiness – **Coordinator: Yuri Kiselev (SU)**

b: An additional work group will analyse and define entry requirements and expected learning outcomes in line with graduate employment expectations with a report to be produced one month before the next steering committee – **Coordinator: David Campbell**

c: **Partners** will send volunteers to assist in the work of each work group to David Campbell by the end of May.

d: A discussion on the structure and content of the profiles will take place at next steering committee.

3: Partnership agreement: It was reported that Rome and Valencia are almost ready to complete the signing of their partnership agreements with Kingston. This should be done by the end of May 2016. **Responsible: Peter Barrington.**

It was reported that some of the Russian and Uzbekistan partners are ready to sign. Others need a translation of the remaining annexes. It was agreed that the remaining annexes would

be translated by 25th May and distributed and providing that no further questions arise, partners should sign the agreements by the end of May. **Responsible: David Campbell.**

4: Project website: Vladivostok are responsible for the site and it is hoped it will be established by end of May. **Responsible for coordination with Vladivostok: David Campbell**

5: Project timetable:

The following dates were agreed for the next steering committees:

- 27th October 2016 Tashkent
- 25th May 2017 Vladivostok
- 19th October 2017 Samara
- 24th May 2018 Ulyanovsk
- Final conference: date to be decided. Third quarter of 2018 in Moscow.

Staff exchanges: Staff exchanges begin towards the end of 2016, it was agreed to leave dates until the programme requirements and staff training analysis were nearer completion**. David Campbell responsible for coordinating.**

Student exchanges: These are planned for 1st half of 2018. It was agreed that partners would investigate suitable and convenient dates. **David Campbell responsible for coordinating.**

6: Next activities:

i) Visits by David Campbell to discuss with project participants, present seminar of flight safety and conduct staff training gap analysis to Tashkent and Vladivostok are to take place before August. **Responsible: David Campbell.**

ii) An analysis of equipment requirements is to be conducted. **Responsible: Leonid Fedotov**

7: Other business: Vladimir Sokolov raised the question of the importance of ensuring that exchange visits during the project were two way. It was agreed to investigate possibilities to do this with the Erasmus+ office. **Responsible: Peter Barrington and David Campbell**

8: Meeting closed: Peter Barrington closed the meeting at 1610 with thanks to the Moscow Power Engineering Institute for their work in organising the meeting.

N.B. Documents referred to in this report are for information only. Readers are recommended to ensure they have the latest editions of any documents they use.

1: Terminology

International Civil Aviation Organisation (ICAO) translates terminology in the following way:

Security: Безопасность. Safeguarding civil aviation against acts of unlawful interference. This objective is achieved by a combination of measures and human and material resources.

Safety: Безопасность полетов. The state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.

Safety management systems: Система управления безопасностью полетов (СУБП). A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

State safety programs: Государственная программа по безопасности полетов (ГосПБП). An integrated set of regulations and activities aimed at improving safety.

Human factor principles: Аспекты человеческого фактора. Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

Airworthiness: Летная годность. The status of an aircraft, engine, propeller or part when it conforms to its approved design and is in a condition for safe operation.

2: General introduction

The International Air Transport Associated recently forecast that Uzbekistan is to be the fastest growing market for international passenger traffic by 2017. This conclusion is based, according to the Asian Development Bank, on the country's potential as the main cargo hub in the region, as a convenient stop-over for intercontinental flights and as a centre for maintenance, repair and pilot training.

Russia too has one of the fastest growing markets. With 40% of scheduled Russian passenger flights headed towards the EU and passenger traffic in other directions recently reaching an all-time high, relationships between the EU and Russia, between the EU and Central Asia and between Central Asia and Russia in the field of civil aviation are of growing importance. According to Matthias Ruete, Director-General of Mobility and Transport for the European

Commission, high safety and security standards are a pre-condition for the sustainable growth of the sector.

Aviation safety relies on the reliability of aircraft construction and maintenance, the competence of pilots and traffic management staff, the quality of ground handling and airport services, the way in which security services combat terror threats, the way in which cabin crews deal with air-rage and on the way all these elements and the interrelations between them are managed. Today's approach to aviation safety as described by the European Aviation Safety Policy is holistic, with strong pro-active, evidence-based, aviation safety activities requiring a systematic approach to managing the machine-human-environment relationships. International oversight bodies including the International Civil Aviation Organisation, the European Aviation Safety Agency and the Federal Aviation Authority now require that these issues are dealt with by implementing "Safety Management Systems".

These initiatives however are based on air safety programmes developed and implemented at government level, in much the same way as EASA's European Strategic Safety Initiative is implemented at trans-national and national level.

Discussions with experts in the Uzbekistan and Russian aviation sectors have identified "Personnel training " as a key priority at enterprise level to assist in developing staff competencies in safety management systems in such areas as pilot training, engineering, and the management of the aerospace sector.

This Erasmus+ project financed by the European Union and supported by the governments of the Republic of Uzbekistan and of the Russian Federation is aimed at developing masters programmes in Flight Safety and Airworthiness on the basis of collaboration between universities in the participating countries (Uzbekistan, Russian Federation, UK, Spain and Italy) with the aim of raising the competence levels of those involved in the aviation industry in the area of flight safety management.

This project assists in harmonising the approach to training with the use of international best practice focusing on flight safety, airworthiness and safety management systems. This requires a change in mind set, away from traditional compartmentalised training emphasising technical solutions to the use of a formal, holistic top-down business approach to managing safety risk by establishing polices, organisational structures and accountabilities backed by a safety promotion framework and culture.

3: Aim of report

The aim of this report is to assess current international best practice in the training of flight safety and airworthiness personnel in the context of the current relevant professional and regulatory guidelines.

An important aspect of this assessment is the review of the approach of the EU, Uzbekistan and Russian education systems to life-long learning and the building of strong inter-university

relationships. This will improve the understanding of the project participants of the competence based modular approach to programme design.
The final part of the report is an assessment of stakeholder requirements for the new programme. The stakeholders include aircraft manufacturers and maintenance organisations, airports, air users (airlines), training schools and the partner universities themselves.
As a result of this assessment, an expected graduate profile, competencies and learning outcomes are proposed and a program structure and content defined.

4: International approach to air safety – ICAO and EASA requirements

The **International Civil Aviation Organization (ICAO)** is the UN specialized agency tasked by the 1944 Convention on International Civil Aviation (Chicago Convention) to work with the member states to reach consensus on international civil aviation Standards and Recommended Practices (SARPs) and policies in support of a safe, efficient, secure, economically sustainable and environmentally responsible civil aviation sector.

ICAO "Global Aviation Safety Plan" [1] defines the approach to Aviation Safety agreed by the member states including Uzbekistan and Russia. It sets specific objects to be met over the next 15 years. It expects that by 2025, each member state will have established an effective safety oversight system and have implemented the ICAO State Safety Programme Framework. Each member state has the flexibility to establish their own specific approaches to meeting these objectives.

ICAO's GASP has a clearly defined framework based on four safety performance enablers:

- the effective and coordinated implementation of safety management Standards and Recommended Practices (SARPs);
- international and regional cooperation to coordinate the implementation of safety policies, oversight activities and the components of State safety programmes (SSP) and Safety management systems (SMS);
- investment in maintaining, upgrading and replacing aviation infrastructure as well as in training future aviation professionals;
- the exchange of safety information to detect emerging safety issues and facilitating effective preventative action whilst ensuring that such information is adequately protected.

ICAO's GASP is supplement by ICAO's "Annex 19 – Safety Management" [2] which outlines in more detail the requirements for SSPs and SMSs as they apply at national and enterprise level.

The **European Aviation Safety Agency (EASA)** is the European Union's agency responsible for research into and analysis of aviation safety issues, authorisation of foreign operators, advising the EU on safety legislation, the implementation and monitoring of safety rules, the

certification of aircraft and components and the approval of design, manufacturing and maintenance organisations.

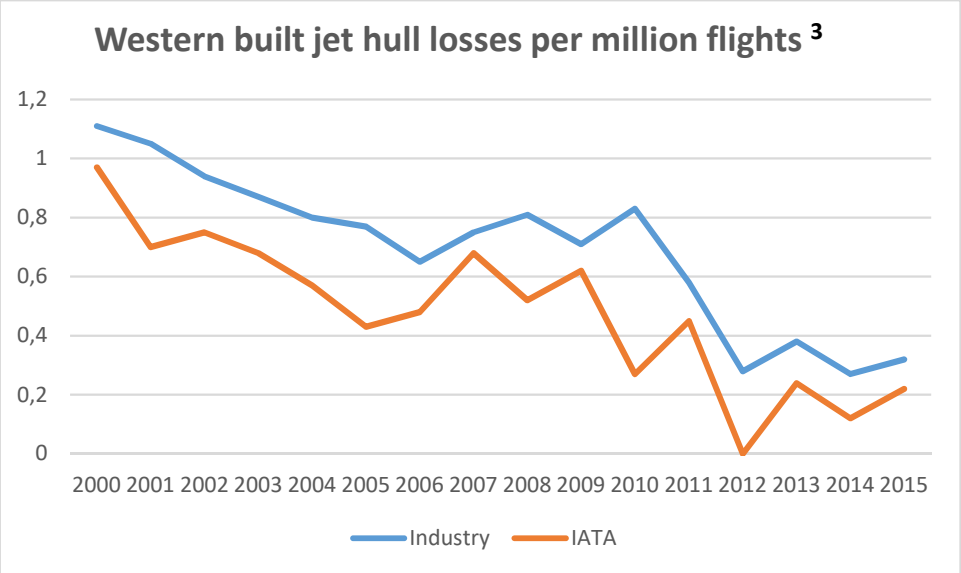
For historical reasons there are some differences between the ICAO regulations and those of EASA, but in general they use the same approach to the management of flight safety. EASA has a systematic approach. Safety, it explains affects all aspects of aviation: airworthiness (both initial and continuing), flight operations and the licensing of flight crew, aerodromes and the air traffic management and navigation systems. Although, of course, neither Uzbekistan or Russia are part of EASA, airlines operating in the EU are still subject to EASA rules.

EASA's approach to aviation safety requires at national and an all-European level the implementation of State safety programmes based on:

- the clear definition of policies, objectives and responsibilities;
- safety risk management;
- safety assurance using oversight mechanisms, the collection and analysis of data and safety improvement activities;
- safety promotion based on training and communication.

At the level of individual operators, manufacturers, maintenance and training organisations, airports and support systems, each is expected to have a Safety management system in place based in general on the same principles as those of the State safety programme.

These principles mark a change in approach to aviation safety. The former approach was reactive, based on the introduction of rules and procedures developed from the investigation of incidents and accidents and the monitoring of their implementation. This approach had been historically effective with a significant and steady reduction in accident levels over the last three decades of the twentieth century. But as the trends in Diagram 1 demonstrate, the approach had reached its limits by the middle of the first decade in the 21st century.



EASA, in 2014 noted that there had been steady improvement in aviation safety over previous years, but that there was no room for complacency. EASA noted that as "air traffic is expected

to almost double by 2030 and the fact that the average annual rate of fatal accidents in scheduled passenger operations in the European Union has remained more or less stable for the past years … new approaches are necessary to complement the existing and successful safety measures in order to drive further safety improvements in aviation".

Recognising that aviation had become significantly more complex, in part because of the introduction of fly-by-wire systems, demanding that more attention be paid to human factors and the role of organizational processes, EASA's new approach is holistic, with strong pro-active, evidence-based, aviation safety activities requiring a systematic approach to managing the machine-human-environment relationships.

In stressing human factors as the most important enabler of change, the new approach is based on involving staff through their representative organisations, ensuring competence based training for those professionals in charge of delivering safety and in establishing a genuine safety culture integrating effective incident reporting and a "just culture".

The "just culture" recognises that only a small proportion of unsafe human actions are deliberate and therefore deserve sanctions. It is based on creating an atmosphere of trust in which essential safety information is encouraged whilst drawing a clear line between acceptable and unacceptable behaviour.

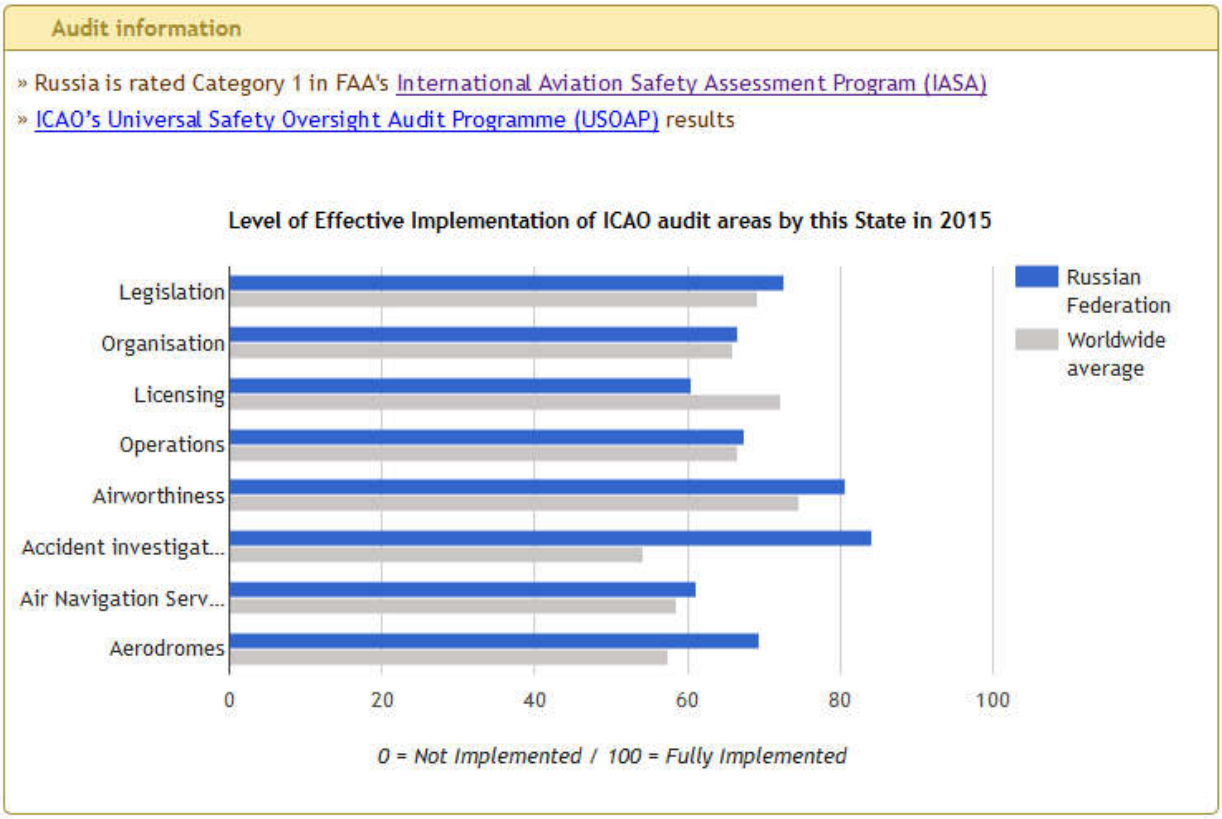
5: Approach to air safety in Russia and Uzbekistan – Rossaviatsia and MAK requirements

Responsibility for air safety in Russia is not so clearly defined as in other countries. General Petr Deineken, President of the Federal Agency for Air Transport's (Rosaviatsia) Public Council: "At the current time, [the system for managing the air fleet] is spread between four structures: the Department for state civil aviation policy (part of the Ministry of Transport), the Russian transport inspectorate (Rosntransnadzor), the International Aviation Committee (MAK) and the Federal Agency for Air Transport (Rosaviatsia). However hard you look in these structures, you will not find one person answering directly for airworthiness of for air safety…"[4]

The situation is further described by Oleg Smirnov, President of the Public commission for civil aviation of Rostransnadzor: " Every air company has a flight safety management system. With one, no aerodrome will allow a plane to get on the runway. But at the national (state) level, we have no system. Although many other countries do have one".[5]

In some ways however, Russia has taken significant steps towards implementing ICAO recommendations in the eight audit areas as demonstrated by the results of the 2015 report.[6]

Diagram 2:



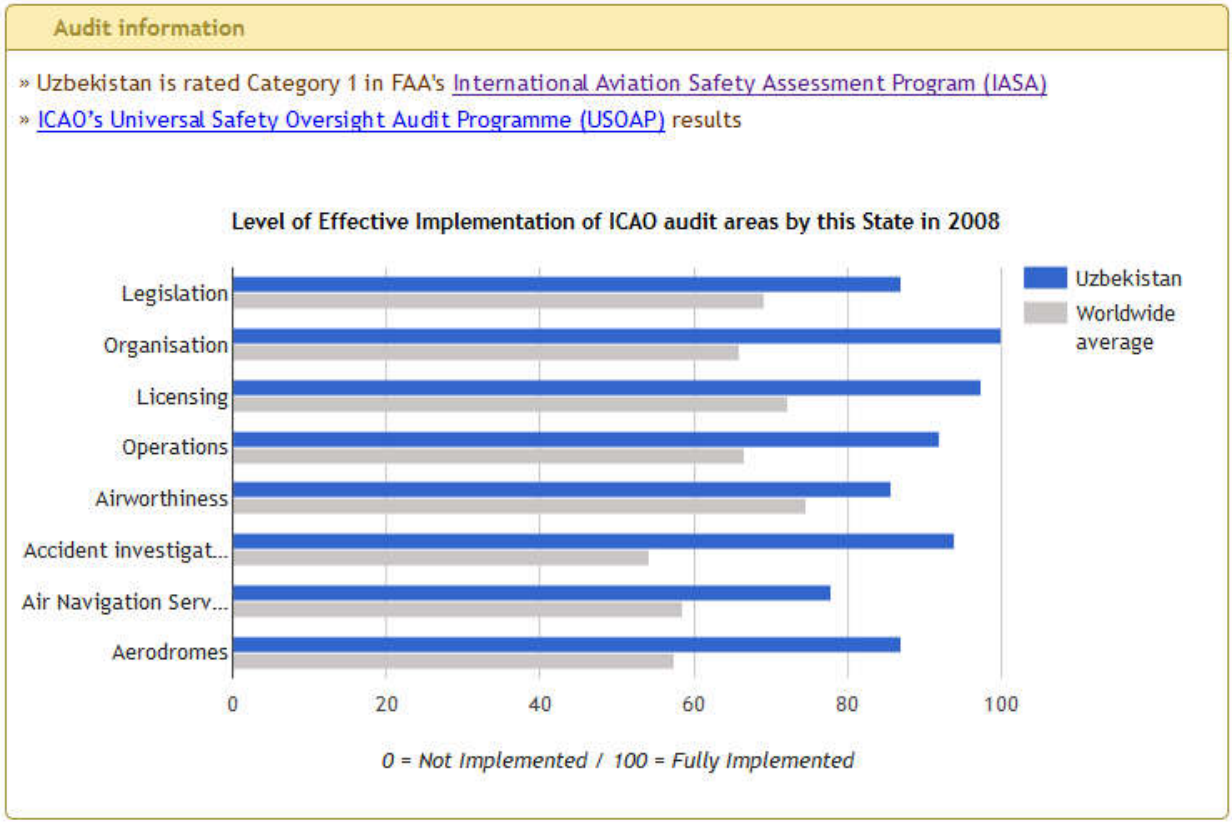
In reality this leads to a dual approach. Russian operators flying in the European Single Sky or to other regions are subject to the ICAO approach. Within Russia, the requirements are less stringent. However, Rosaviatsia does require that in line with the requirements of Annex 19, commercial airlines, technical service organisations, navigation services, aerodromes and pilot training centres implement Safety management systems. Details of the requirements are found at:[7]

http://www.favt.ru/dejatelnost-bezopasnost-poletov/

In December 2014, the Uzbek Cabinet of Ministers approved the "State Flight Safety Programme" to achieve an acceptable level of safety in Uzbekistan's aviation sector. "Davavianazorat" the State Aviation Inspectorate is responsible for implementing the plan.

Uzbekistan too has taken significant steps towards implementing ICAO recommendations in the eight audit areas as demonstrated by the results of the 2015 report.[8]

Diagram 3:



6: International education requirements – for Masters programmes

The approach to the development of training programmes within the European Higher Education Area of which Russia is also a member follows a general framework which aims to support the modernization of the training and education system, to ease the recognition of qualifications between countries and internationally and to improve the quality of training in line with the requirements of the changing labour market. Both the Uzbek and the Russian Ministries of Education are going through a process of bring the country's education standards into line with these aims.

The features of higher education programmes within this approach are:

- they fit the Qualification framework based on three cycles – bachelor, master and doctor;
- they are designed to develop specific skills and competences which are reflective of future employment demands;
- a modular structure is used to enable the use of a credit transfer system.

Following a 3-4 year bachelor course, a typical master course would normally be expected to last for 1,5 or 2 two years and be worth 90-120 credits, a credit being equivalent to 36 hours of student work.

In general, this is the approach currently being used by the Ministry of Education in Russia. For example, the Federal State Education Standard (3+ generation) 38.04.02 for a master in

management specifies a two year 120 credit programme of which approximately half is devoted to research or project work. The engineering standard “Aircraft construction” also specifies a two year program for 120 credits. However, far from all Higher Education Institutes follow this model. Some still use the degree level “specialist”, for example “Aircraft operations and the organization of air traffic)” is a 5 year 300 credit program.

A comparative analysis of different programmes is in Diagram 4.

For best practice as far as the programme content is concerned, the approach of IATA can be used. The IATA Diploma “Safety management in civil aviation” is offered as a form of professional development for safety system managers, policy makers and senior managers. It covers the central themes of the Global aviation safety plan, State safety program, Safety oversight program, Standards, practices and procedures and the principles of Safety management systems and offers elective modules covering issues such as Hazard and risk management, Airworthiness and certification, Aircraft recovery (piloting skills), Emergency response planning, Fatigue risk management, Human factors in aviation, Safety, quality and business management, Aviation quality and service processes, Incident and accident investigation, Medical issues, Operational risk management. In this way, students on the IATA diploma course gain a solid foundation in the key elements and can then select modules relevant to their own area of work.

Other programmes that can be used as a benchmark include that of City University London in “Air safety management” the taught (auditory part) part of which consists of the following:

An induction course – no credits.

Two out of three compulsory modules lasting 15 credits each – covering:

- Crisis management
- Active safety management
- Safety risk management

And two elective modules of 15 credits each, covering such issues as Airworthiness, Airline maintenance, Airline operations, Marketing, Economics, Human resource management, Psychology, Accident investigation, Leadership, Quality, safety and Aviation business, Law.

An eight module course is offered by Emirates university which over a year covers Aviation safety risk management, Human factors in aviation, Air transport management and strategy, Crisis management and emergency planning, Airport and airline security operations, Airworthiness, Accident investigation and Aerodrome safety and navigation.

7: Conclusions

The development of a Masters program in Flight Safety and Airworthiness on the basis of collaboration between universities in the EU, Russia and Uzbekistan will play an important role in raising the awareness and understanding of the modern approach to aviation safety and enhancing the competence levels of those involved in the aviation industry. A focus on flight safety and safety management systems will be beneficial as it requires a change in mind set, away from traditional compartmentalised training emphasising technical solutions to the use of a formal, systematic and holistic business approach to managing safety risk by establishing polices, organisational structures and accountabilities backed by a safety promotion framework and culture.

Future graduates

Graduates of the programme will expect to work as flight safety specialists in their own field in airlines, airports, aerospace manufacturers, maintenance and servicing organisations, regulatory or inspection bodies and/or, with the accumulation of sufficient and relevant experience as managers of flight safety systems, inspectors, auditors or incident investigators in aviation organisations or alternatively, to be engaged in university based scientific research and development.

Core competencies of graduates

The proposed Masters' programme in Flight Safety and airworthiness should be designed to train specialists and managers so that they:

- Demonstrate a sound and holistic knowledge and understanding of safety programmes and safety management systems in the context of the modern aviation business, national and international regulations;
- Have the ability to collate relevant safety related information and data to analyse complex situations and formulate judgements based on a "just culture" approach;
- Can clearly and unambiguously communicate, including in English, their conclusions using various medias to specialist and non-specialist audiences;
- Possess the necessary management skills to plan and apply their knowledge in their own specialised field in a business environment;
- Possess the learning skills to continue self-directed or autonomous study and develop and research innovative ideas in the field of aviation safety.

Masters programme entry requirements

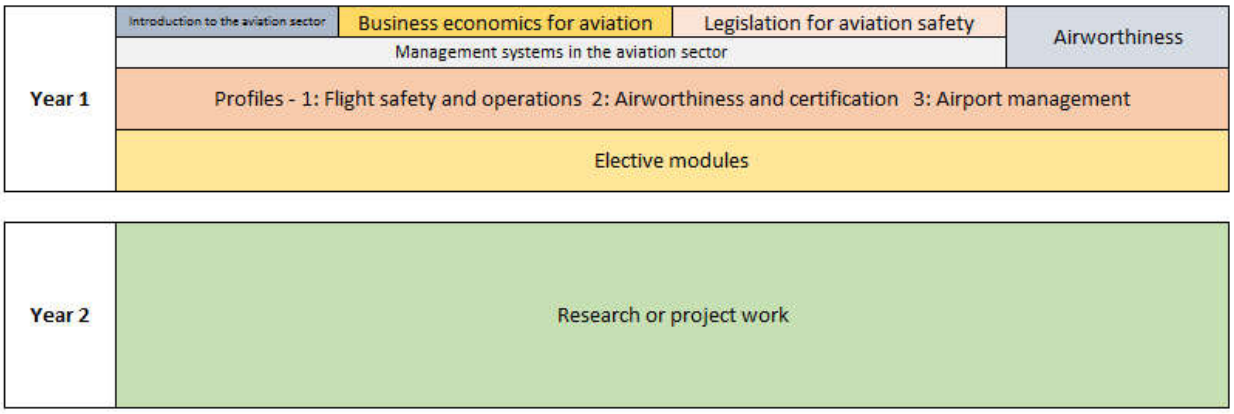
Students entering the masters programme shall have completed either

- a Bachelor level programme (grade 4 or 5) in an approved programme relevant to one of the fields of aviation and/or aeroengineering;
- a Bachelor level programme (grade 4 or 5) in Management or Quality management with relevant experience in the aviation sector;
- the first four years of a specialist programme in one of the fields of aviation and/or aeroengineering.

Adaption to professional development courses

The modular basis of the masters programme allow it to be readily adapted as professional development courses. They can be offered to managers and specialists from the aviation sector who have professional qualifications and relevant experience for training as safety system managers, inspectors and analyst/investigators.

Course structure



Given the different educational profiles of the universities involved, the masters programme will consist of one common block of 20 credits lasting for one third of the first year covering the central issues of aerospace fundamentals, legislation and regulation in aviation safety, management systems in the sphere of aviation and the economics of air transport.

A further block of 20 credits will consist of separate profile courses relevant for each participating institute – for example: flight safety and operations, airworthiness and certification, airport management.

A final block of 20 credits will consist of selective courses covering important issues such as meteorology, fuel quality and fuelling, aerodynamics, incident and accident investigation and human factors in flight safety.

The second year of the masters programme will consist of project work or research.

International harmonisation

To facilitate international harmonisation the course structure will be developed using the ECTS approach and the course content will be developed and reviewed in line with current international best practice.

[1]

http://www.icao.int/publications/Documents/10004_cons_en.pdf (In English)

http://www.icao.int/publications/Documents/10004_cons_ru.pdf (In Russian)

[2]

http://www.skybrary.aero/bookshelf/books/2422.pdf (In English)

http://aviadocs.com/icaodocs/Annexes/an19_cons_ru.pdf (In Russian)

[3] Data taken from IATA safety reports

[4]

http://www.mk.ru/social/2015/11/02/vyvody-ekspertov-za-bezopasnost-poletov-v-rossii-ne-otvechaet-nikto.html/

[5]

http://www.kp.ru/daily/26454.3/3323941/

[6]

https://aviation-safety.net/database/country/country.php?id=RA

[7]

http://www.favt.ru/dejatelnost-bezopasnost-poletov/

[8]

https://aviation-safety.net/database/country/country.php?id=UK/

Appendix 1

University	Kingston	Rome (La Sapienza)	Valencia
Course	**Aerospace Engineering Masters (MSc)**	Aerodynamics, propulsion and structures	Aeronautical engineering
Length	1 year	2 year	2 year
Modules (Name and credits)	1: Induction 2: Engineering Research Techniques, Entrepreneurship and Quality Management 3: Computational Fluid Dynamics for Aerospace Applications 4: Aerospace Stress Analysis and Advanced Materials 5: Aerospace Group Design Project	1: Gasdynamics 2: Aeronautical structures 3: Control systems 4: Flight dynamics 5: Aeromotors 6: Air traffic control Then 10 of the following: 7: Aeodynamics and mathematics 8: Aerodynamics and design 9:Combustion 10: Experimental aerodynamics 11: Testing for structures 12: Turbulence 13: Vibration and noise control 14: Aeroelasticity 15: Computational gasdynamics 16: Environmental impact of aeroengines 17: Hypersonics 18: Thermo and thermoelastic analysis 19: Aeroelasticity 20: Aerospace materials 21: Non-linear analysis	1: Advanced aerospace science and technology 2: Aeronavigation including Flight management systems 3: Infrastructure 4: Aerospace vehicles 5: Propulsion systems 6: Avionics 7: Project
Practical/diploma	2 modules		13,5 credits
1 credit = 1 ECTS credit	2 Kingston credits = 1 ECTS credit	1 Italian credit = 1.1 ECTS credit	1 Spanish credit = 1 ECTS credit

General professional competencies

A graduate:

- Demonstrates professionalism and innovative thinking during work activities, based on a knowledge of the basic principles and practices for aviation safety;
- Uses the main analytical tools and methods for resolving management tasks;
- Uses the culture of presentations and interpersonal relations and is able to formulate and present in an accessible form information, data, instructions and ideas;
- Is able to work in partnership with colleagues and teams for the successful implementation of both simple tasks and complicated systematic projects;
- Is able to resolve social-psychological and management problems, assess risks, design management systems for organisations with the aim of overcoming inter-functional misunderstandings;
- Knows and understands the principles of change management and is able to understand the need for change, to initiate and manage change to completion.

Professional competencies

A graduate:

- Knows and understands the basic factors which influence aviation safety and how they interrelate;
- Knows and understands the basic conceptions of systems for the management of flight safety in accordance with the principles of ICAO, EASA and MAK;
- Selects and uses effective methods for the identification , assessment and management of hazards and risks;
- Critically assesses strategies for the development and strengthening of safety cultures including the role of leadership, structures and systems for monitoring and accountability;
- Identifies methods for the measurement of performance in the field of aviation safety.

Professional competences for the profile (specialisation) "Human factors and aviation safety"

- Demonstrates a systematic understanding of the elements which contribute to aviation safety including software, machines, people, environment and the interfaces between them;
- Is able to identify, assess and use suitable and modern techniques for the assessment of the human-machine-environment interface, human performance, safety performance and risks;
- Uses measures for the management of hazards and mistakes in aviation with the limits of international standards and best practice;
- Uses the developed techniques in own speciality including in repair and maintenance, cockpit design, training and simulation, incident and accident investigation, occupational safety and safety management;

Professional competences for the profile (specialisation) "Aircraft operations, certification and maintenance"

- Demonstrates an understanding of the main features connected to the design and exploitation of complex aircraft, components and equipment at a level required by airworthiness standards;
- Is able to describe and detailise the organisation and nature of airworthiness requirements in regards to design, production and operations of aircraft;
- Is able to find the relevant specific requirements and use them in making sound engineering decisions;
- Understands the role and importance of compliance, substantiation, validation, certification and approval for the process of ensuring flight safety.

Professional competences for the profile (specialisation) "Airports and operations"

- Demonstrates a systematic understanding of the relevant international and national regulations and explains their influence on the planning, design, operations in decision making in the area of flight safety in airports;
- Demonstrates a critical understanding of those questions which influence airport partners (operators, commercial clients, retailers) and is able to explain how commercial pressures can affect their operations and airports;
- Demonstrates and is able to uses techniques of mathematical modelling for problem solving in the field of air transport management;
- Demonstrates a deep understanding of the complex interrelationships between technical, human and operational realities and pressures on management.

Contents of module "Management systems in aviation"

Module size – 8 credits - 268 hours. 36% contact hours.

8 courses of 12 hours contact time, with 24 hours non-contact work.

Course 1: Introduction to management systems in the aviation sector.

- What is management? What is a management system? Quality and safety.
- The principles of quality management – ISO 9004.
- Strategy and policies, infrastructure.
- Standardisation, continuous improvement and change management.
- Management systems in aviation.
- International and national organisations (IATA, ICAO, EASA, FAA, Rosaviatsia, International Aviation Commission) – their roles.

Course 2: Statistics and data management.

- The basis of statistics for aviation (2).
- The basic statistical tools
- Collecting and analysing data.
- Data security.
- Communicating safety data.

Course 3: Risk management.

- The basics of risk management.
- Identifying the source of risk and risk categorisation in aviation.
- Analysing risks.
- Managing risks.
- Software and other tools for risk management.
- Monitoring the effectiveness of Risk management systems.

Course 4: The ICAO approach to aviation safety.

- Introduction to the ICAO approach. The annexes.
- State safety programme.
- Basic elements of law.
- The state system and its functions.
- State oversight mechanisms.
- Solving safety problems.

Course 5: The ICAO annexes

- Annex 6 – Operations.
- Annex 8 – Airworthiness.
- Annex 11 – Navigation and air traffic control.
- Annex 13 – Incident investigation and accidents.
- Annex 14 – Aerodromes.
- Annex 17 – Security.

Course 6: Flight safety management systems. (1)

- General position.
- Role of leadership and safety policy.

- Key personnel, their competencies, rights and responsibilities.
- The coordination of emergency responses.
- FSMS documentation (2).

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Course 7: Flight safety management systems. (2)

- Managing risks for flight safety.
- Analysis of risks and their reduction.
- Estimating effectiveness of safety assurance.
- Continuous improvement.
- Personnel training.
- Communications.

Course 8: Key questions of flight safety.

- Automation.
- CFIT – Controlled flight into ground**, events during approach and landing**
- **Crew resource management**, pilot fatigue.
- Flight path monitoring.
- **Loss of control in flight**.
- Runway safety.

Contents of module «human factors»

Volume of module – 4 credits – 144 hours. 33% contact hours.

4 courses for 12 contact hours, 24 hours students own work.

Course 1: Human factors in aviation - introduction.

- History and definition of" human factors".
- The effect of human factors on safety and efficiency.
- Models for the analysis of the human factor: SHEL, James Reason, HFACS.
- Managing fatigue and stress.
- Methods for the analysis of human error.
- Human information processing.

Course 2: Aspects of psychology in aviation.

- Organisational forms and structures
- Theories and practice of motivation
- Formation of and management of teams
- Practical problem solving
- Overcoming conflict
- Effective communications and a "just culture"

Course 3: Human factors in design.

- Flight deck design and passenger cabin
- Questions of automisation
- The person-machine interface
- Practical management of human error
- Questions of maintenance and service
- Practical instruments

Course 4: Human factors and operations.

- **CRM – Crew resource management** (2).
- **TRM – Team resource management.**
- TRM for Air traffic management (2).
- Managing competencies.

Contents of the module «Airworthiness»

Volume of module – 4 credits – 144 hours. 26% contact hours.
38 contact hours, 106? hours students own work.

1: Basic understanding, terms and definitions. International standards. Historical background. Responsibilities of the state in the area of airworthiness.
2: Type certification for transport aircraft. General position. Flight characteristics and handling qualities.

3: Construction requirements, Flight loads. Engine requirements. Propeller requirements.

4: Requirements for power plants. Mounting and use. Instruments and equipment required. Installing instruments and equipment. Emergency-rescue equipment. Aeronavigation beacons and anti-collision beacons.

5: National standards for airworthiness. Historical background. General demands for airworthiness with the failure of functional systems (aircraft systems, equipment, power plants).
6: Requirements for flight characteristics, control and maneuverability, centre of gravity, rigidity and flexibility of aircraft in flight, requirements for flight control characteristics. Flight limitations. Requirements for equipment.

7: Strength requirements. General position. Flight loads. Calculated conditions when manoeuvring and in unstable air conditions. Other load factors. Emergency landings. Assessing strength fatigue.
8: Procedures for the certification of aviation technology. Type certification. Type construction of prototype. Airworthiness certification.

9: Certification tests for aircraft. Certification tests for main and supplementary aero-engines and propellers.
10: Structures of systems for maintaining airworthiness of aircraft and the characteristics of their components. Technical and regulatory documentation for the maintenance of airworthiness.
11: Resource provision for the maintenance of airworthiness. Information support for the maintenance of airworthiness.
12: The organization of state control for the maintenance of airworthiness. The certification of operators and service organisations.

13: Certification of aircraft.
14: Manuals for the use of aircraft. Proof that the relevant airworthiness rules have been adhered to. Type certification.

15: Aircraft registration. Noise emission certificates. Airworthiness certificates.

16: Type certificates for transport aircraft. Noise emission certificates. Content of type certificates. Use of type certificates.
17: Certificates of airworthiness: classifications (categories) and their content. The issue of standard airworthiness certificates. The use of airworthiness certificates.

18: The preparation of documental proof for obtaining (prolonging, renewing) airworthiness certificates.

Review of options for the purchase of equipment by the project.

In the project application, it was proposed that we purchase software for the simulation of flight safety management systems for use during the project. The budget for equipment purchase – 120000 euros.

Within the limits of this budget it is today possible to purchase such software and have enough to buy some hardware items that could be useful for the project.It is proposed the spend approximately 60-70% of the budget on the software for use by all and the remainder on hardware.

Criteria for equipment purchase.

- Software and hardware purchased should be of use to all partners in the project;
- Each partner should have assess to the equipment purchased;
- The life expectancy of purchased hardware and software should be no less than 5 years.
- Software purchased should be accessible to all but sufficiently self-standing so that the different partners can use it independently of other partners.

Proposal:

To purchase an “enhanced learning” system adapted for use in conjunction with flight safety management systems including:

Software:

- Study system enabling the student to select and complete suitabe courses and to have his knowledge assessed;
- An information platform for interactions with the student during the study process;
- For distance education, the conduct of webinars and master-classes, consultation with lecturers;
- Access to standard programmes such as Microsoft office, Visio, Moodle, Skype;
- Access to instruments for managing flight safety;
- Access to data-bases with information on incidents and accidents;
- Access to information portals in the aviation field;
- Access to data-bases for the documentation related to risk management and safety;
- Access to the sites of IATA, ICAO, EASA, Rosaviatsia, MAK.

Hardware:

- 2 separate servers with virtual servers for each partner;
- Back-up capacity;
- Remote access for users;
- Independent power supplies and internet lines.

Service:

- Installation;
- Training;
- 5-year service.

Additional hardware:

- «Integrated software safety trainers»;
- Stable power supplies;
- Thermal scope;
- Aviation meteorological station.