



The research leading to these results has gratefully received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640211



Development of the Quality Assurance system for Aerospace Engineering in Europe

The PERSEUS Project

EASPA - Third Global Conference of Professional Accreditation in cooperation with ASPA

2 May 2016

Franco Bernelli



Table of Contents

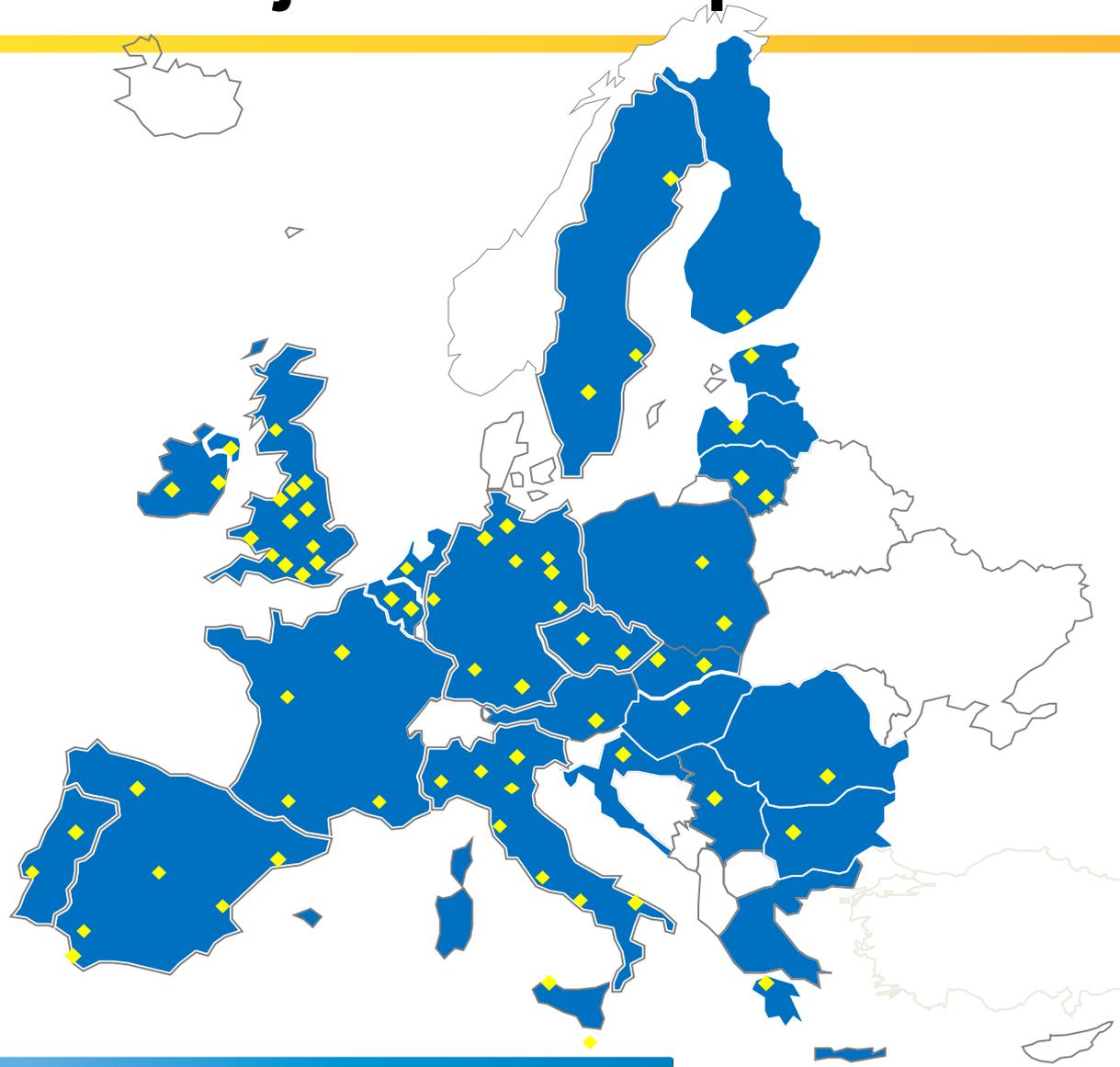
- Project Concept
- Objectives
- The Consortium
- Methodological Approach
- Current Status
- Next steps
- Open Issues

Project Concept

- Aerospace Engineering
 - International
 - Extremely competitive
 - Continuous technological evolution
 - Need for continuous evolution of skills
 - Need for sustained turnover of intellectual workforce (no gaps allowed)
 - Risk of not matching the job market needs in terms of graduates and skills

Project Concept

In Europe, over 200
University degrees related
to Aerospace /
Aeronautics / Air Transport
exist, offered by over 100
Universities



Project Concept

- A form of external quality assurance, either on the level of institutions or of programmes, is mandatory in all relevant countries.
- An outcome-oriented approach, forms the underpinning principle of all but a few national agencies.
- The vast majority of accreditation agencies do not stipulate any subject-specific criteria for degree programmes.
- Where such criteria exist, they do on the level of broad fields of a subject, e.g. engineering, but do not go beyond this into specific branches within the subject area.
- In Europe, a common understanding of what a graduate of an aerospace-related degree programme should know and be able to do, is currently lacking.

Project Concept

- PERSEUS stands for “Promoting Excellence & Recognition Seal of European Aerospace Universities”.
- Coordination and Support Action on H2020 MG.1.6-2014, “Improving skills and knowledge base in European aviation”.
- Contribute to better meeting the needs of the aerospace sector for highly skilled workforce.
- Focus on defining a specific quality system for aerospace studies.
- Promotion of the adoption of the quality system in aerospace Universities.
- Motivate and encourage the next generation of Europeans to get interested in Aeronautics and thus follow scientific and technical studies and careers in the Aeronautics and Air Transport research and industry.

Objectives

Objectives

- The main actions of this project are summarized as follows:
- Conduct a detailed survey providing a complete map of the quality and accreditation systems of all EU aviation related higher education courses, identifying common points and main features of each.
- Define a clear methodology for the evaluation of aviation related higher education programmes.
- In strict coordination with the participating Universities, industrial partners and research establishments, deliver a set of minimum requirements for aero-engineering curricula articulated in Learning Outcomes (in terms of knowledge, skills and competences) and based on the Qualification Frameworks of the sector and the requested -by the European Aerospace Industry and Civil Aircraft Transport- aerospace engineering profiles.

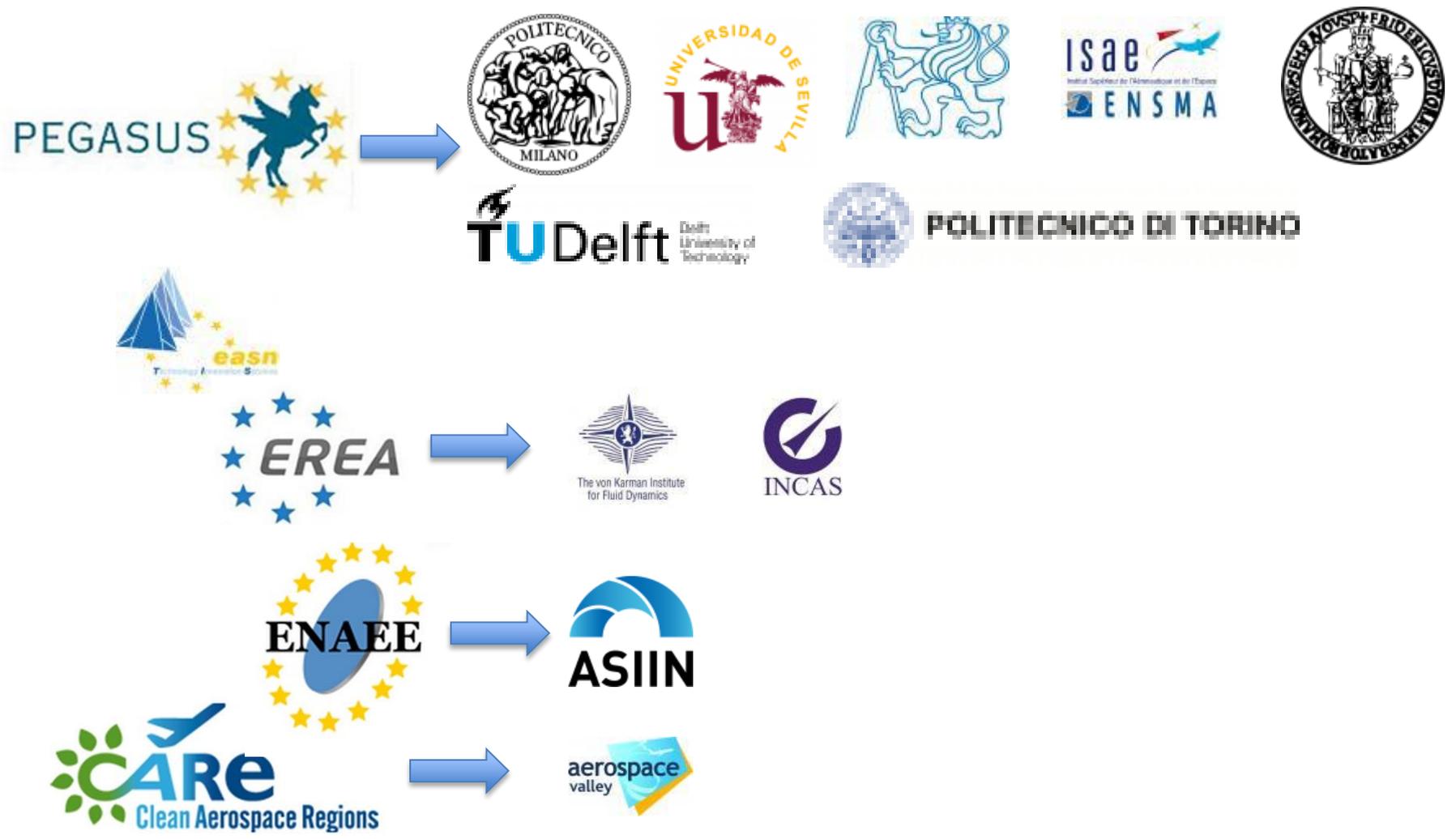
The Consortium

The Consortium

- PERSEUS brings together for the very first time a striking synergy of European Aeronautics and Air Transport stakeholders.
- Consortium members are representing the European Academia (PEGASUS, EASN), aviation Industry, (CARE), Research Establishments (EREA) and Accreditation Institutions (ENAAEE).
- Network of Experts and Advisory Board provide additional inputs and ideas.



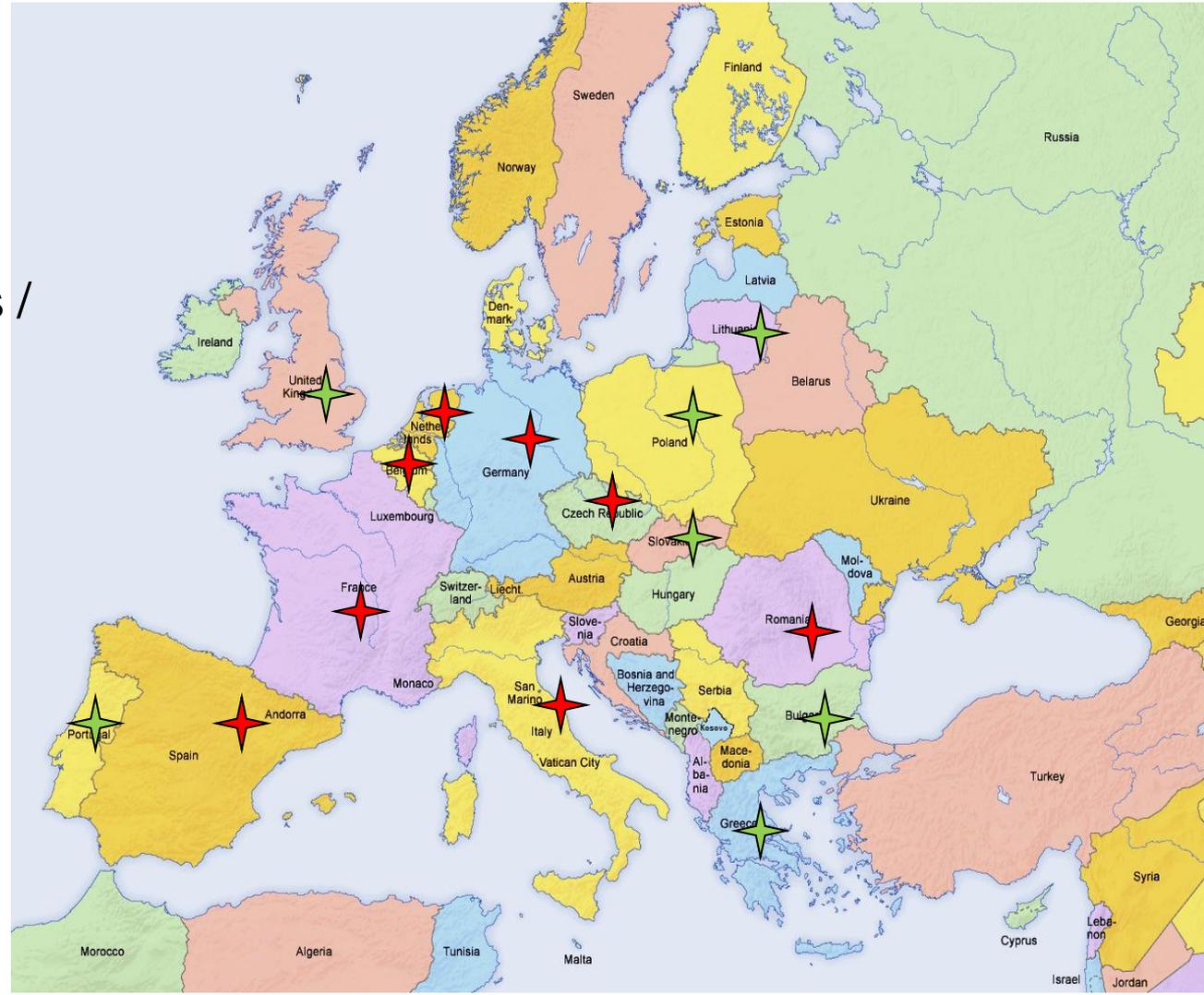
The Consortium



The Consortium

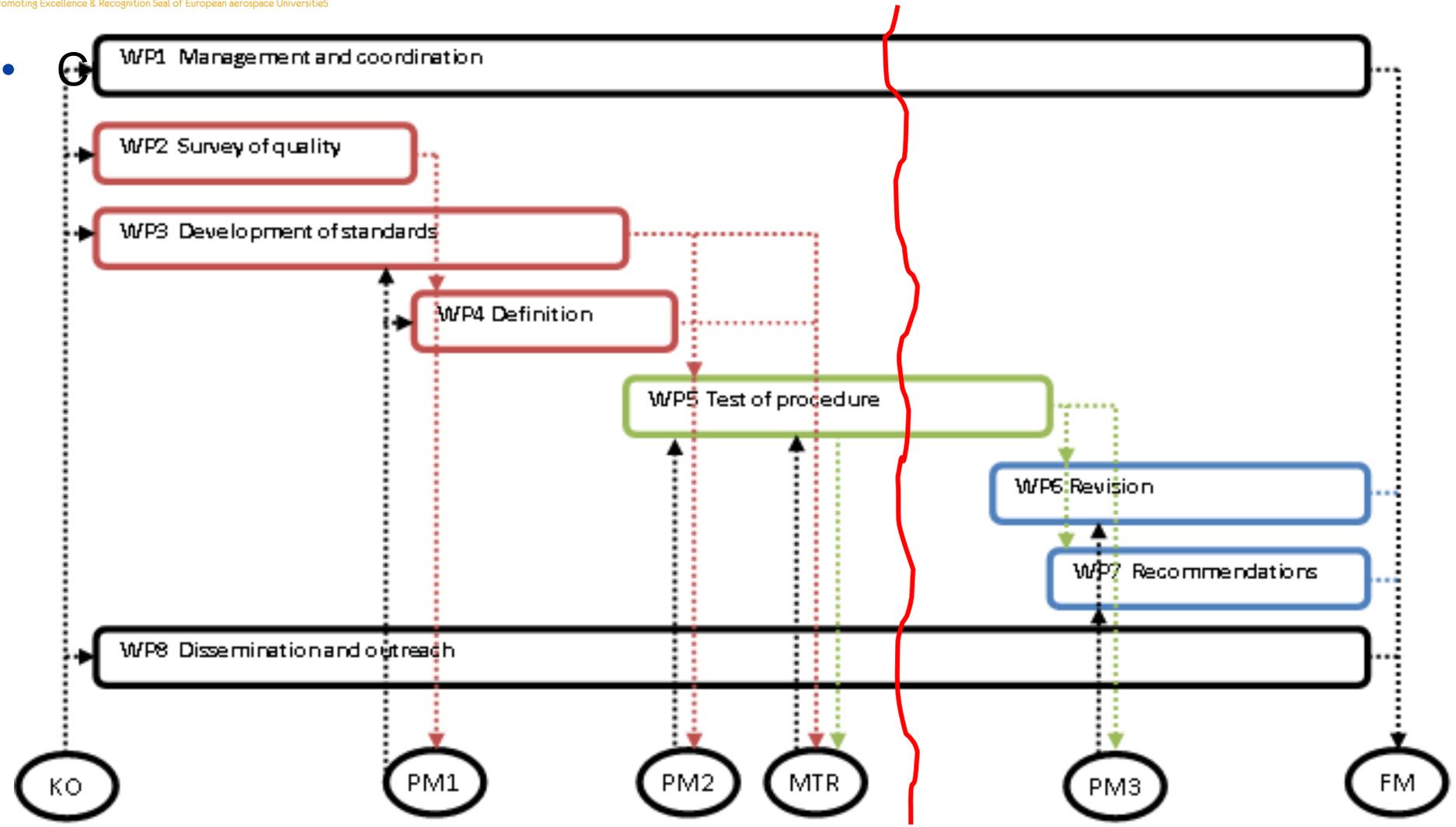
★ Consortium members /
Advisory Board

✦ Network of Experts



Current Status

Current Status



- Identification of 15 Aero-Engineering knowledge areas
 1. A/C Design, avionics and subsystems design / integration
 2. Flight dynamics, performances, flight operations and flight testing
 3. Fluid Dynamics, Aerodynamics
 4. Structures, materials
 5. Propulsion systems design
 6. Aerospace telecoms / CNS/ATM systems engineering
 7. Airworthiness/Aviation safety, A/C Ops & Product Life Cycle
 8. Aeronautical production and A/C maintenance
 9. Non-conventional / Rotary wing aircraft design
 10. Space technology
 11. Space applications
 12. Economic / Financial aspects of aerospace projects , Air Transport Economics
 13. Environmental aspects / Sustainable development of aerospace projects
 14. Configuration Management in Design and production
 15. Integrated and complex technical environment

Current Status

- Identification of 30 Learning objectives, 2 per knowledge area

KNOWLEDGE	LEARNING OBJECTIVES
1. A/C Design, avionics and subsystems design / integration	<p>1.1 Understanding the successive phases of airplane design, knowledge of essential parameters affecting airplane performance and handling qualities, knowledge of aerospace fundamentals to design specific airplane parts and systems</p> <p>1.2 Knowledge of systems, avionics, instruments and aids to navigation systems, their design, performance and integration, data processing and fusion, systems modeling, simulation and electronics implementation, special electronic trials, signal processing and ASICs</p>
2. Flight dynamics, performances, flight operations and flight testing	<p>2.1 Knowledge of the aircraft load distribution, typical manoeuvres and aircraft longitudinal and lateral derivatives, understanding the main parameters influencing the aircraft performances</p> <p>2.2 Knowledge of the aircraft certification flight testing, flight log preparation, instrumentation calibration, in-flight data acquisition and flight data reduction, ability to correlate experimental results with numerical-theoretical computations.</p>

- Identification of professional skills

CORE SKILLS & ABILITIES

A) Technical

Simulation and software proficiency / CAD-CAE-CAM

Writing technical specifications

Conducting a technical or economical study

B) Methodological

Analyzing and solving a technical problem

Managing a technical meeting

Managing a technical project/programme

Writing a synthetic report, final project report or technical document to be used as a reference by others

C) Interpersonal

Team working, team management

Working in a multicultural environment

Proficiency in English

Oral communication skills

Current Status

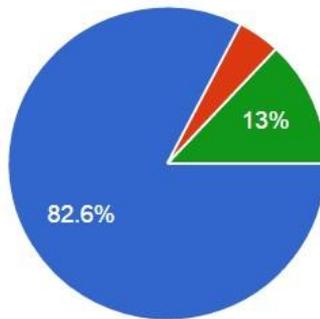
- Method to assess the achieved learning objectives of the programme, the PERSEUS Curriculum Description Table

Max level offered in program				Max level offered in program				List of courses that contribute to the learning objective / optional remarks
				None	Basic	Interm	Advanced	
None	Basic	Interm	Advanced	<i>Please tick max one box in each line</i>				List of courses that contribute to the learning objective / optional remarks
<i>Please tick max one box in each line</i>				List of courses that contribute to the learning objective / optional remarks				
		signal processing and ASICS						
		2. Flight dynamics, performances, flight operations and flight testing						
		2.1 Knowledge of the aircraft load distribution, typical manoeuvres and aircraft longitudinal and lateral derivatives, understanding the main parameters influencing the aircraft performances						
		2.2 Knowledge of the aircraft certification flight testing, flight log preparation, instrumentation calibration, in-flight data acquisition and flight data reduction, ability to correlate experimental results with numerical-theoretical computations.						
		3. Fluid Dynamics, Aerodynamics						
		3.1 Understanding the principles & theory of fluid dynamics, specifically aerodynamics, compressibility, viscosity, aeroacoustics ...						
		3.2 Modeling of complex internal and external flows, handling of numerical and experimental methods						
		4. Structures, materials						
		4.1 Having knowledge of the fabrication of lightweight structures, the choice of appropriate materials, the link between structural properties and mechanical behavior						
		4.2 Knowledge of experimental and numerical methods for prediction of deformation, stress, fatigue, damage, ...						

Current Status

- Survey of employers' requirements (23 companies across EU), with the same set of skills

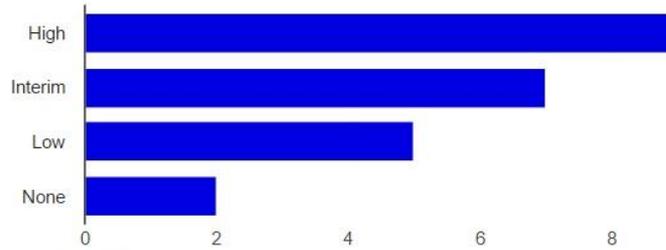
Profile of repondents



Technical	19	82.6%
Human resources	1	4.3%
Commercial	0	0%
Other	3	13%

1. A/C Design, avionics and subsystems design / integration

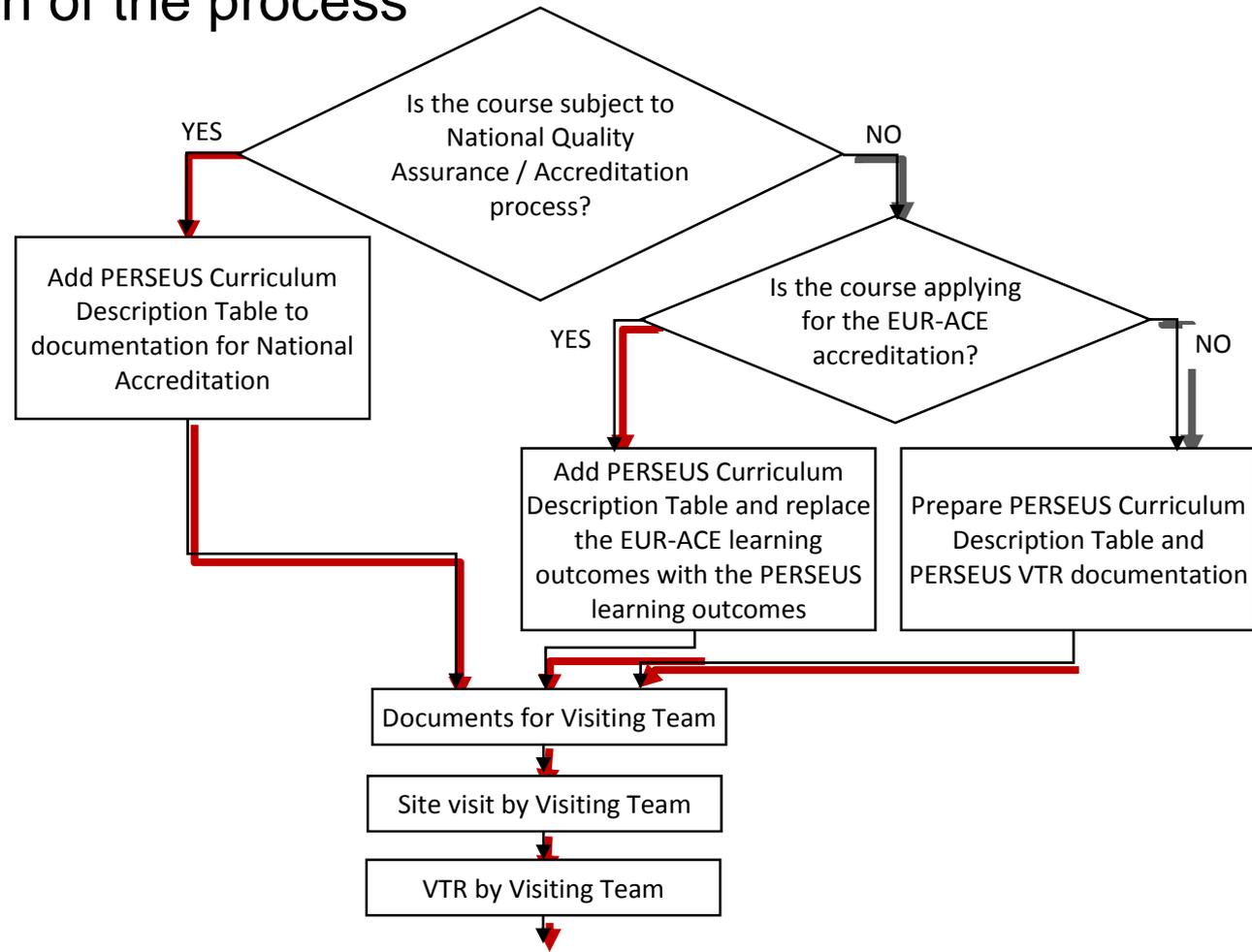
1.1 Understanding the successive phases of airplane design, knowledge of essential parameters affecting airplane performance and handling qualities, knowledge of aerospace fundamentals to design specific airplane parts and systems



High	9	39.1%
Interim	7	30.4%
Low	5	21.7%
None	2	8.7%

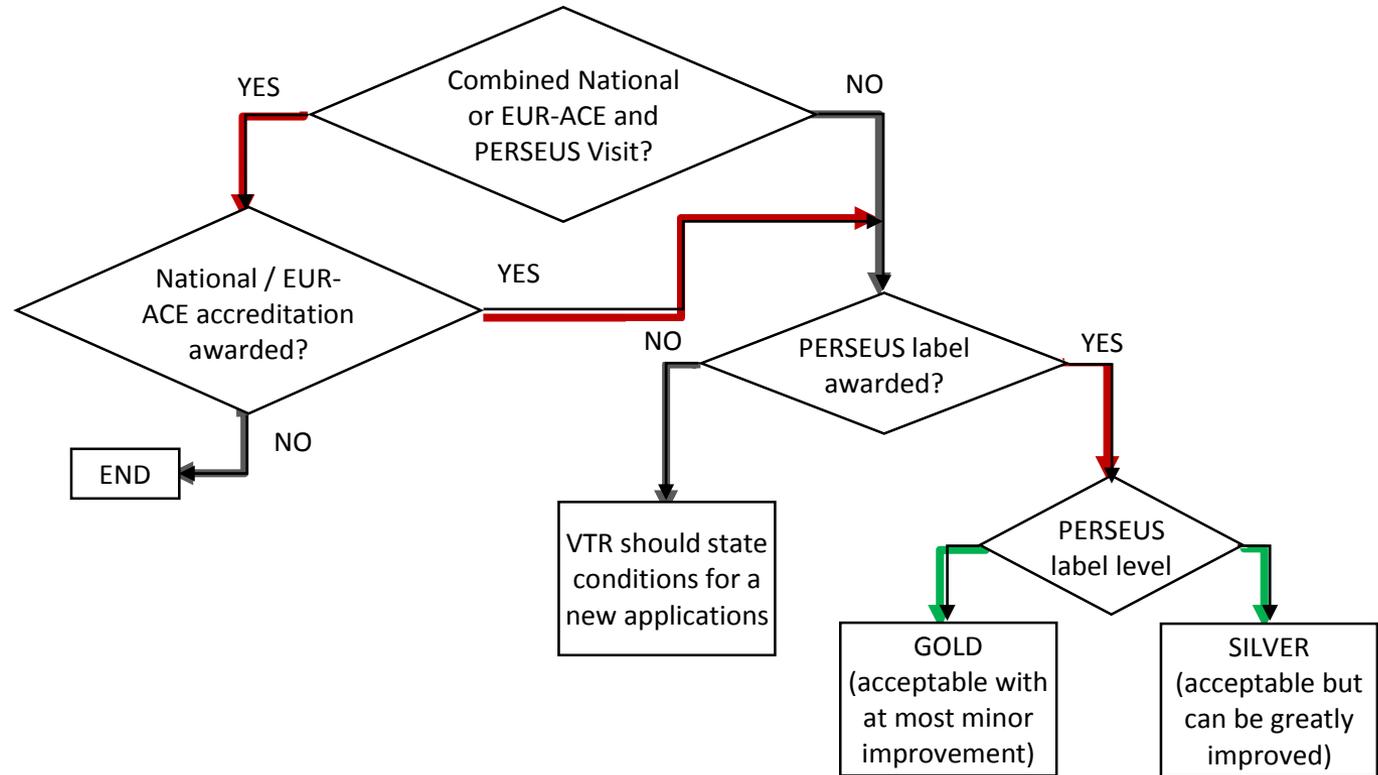
Current Status

- Preliminary definition of the process



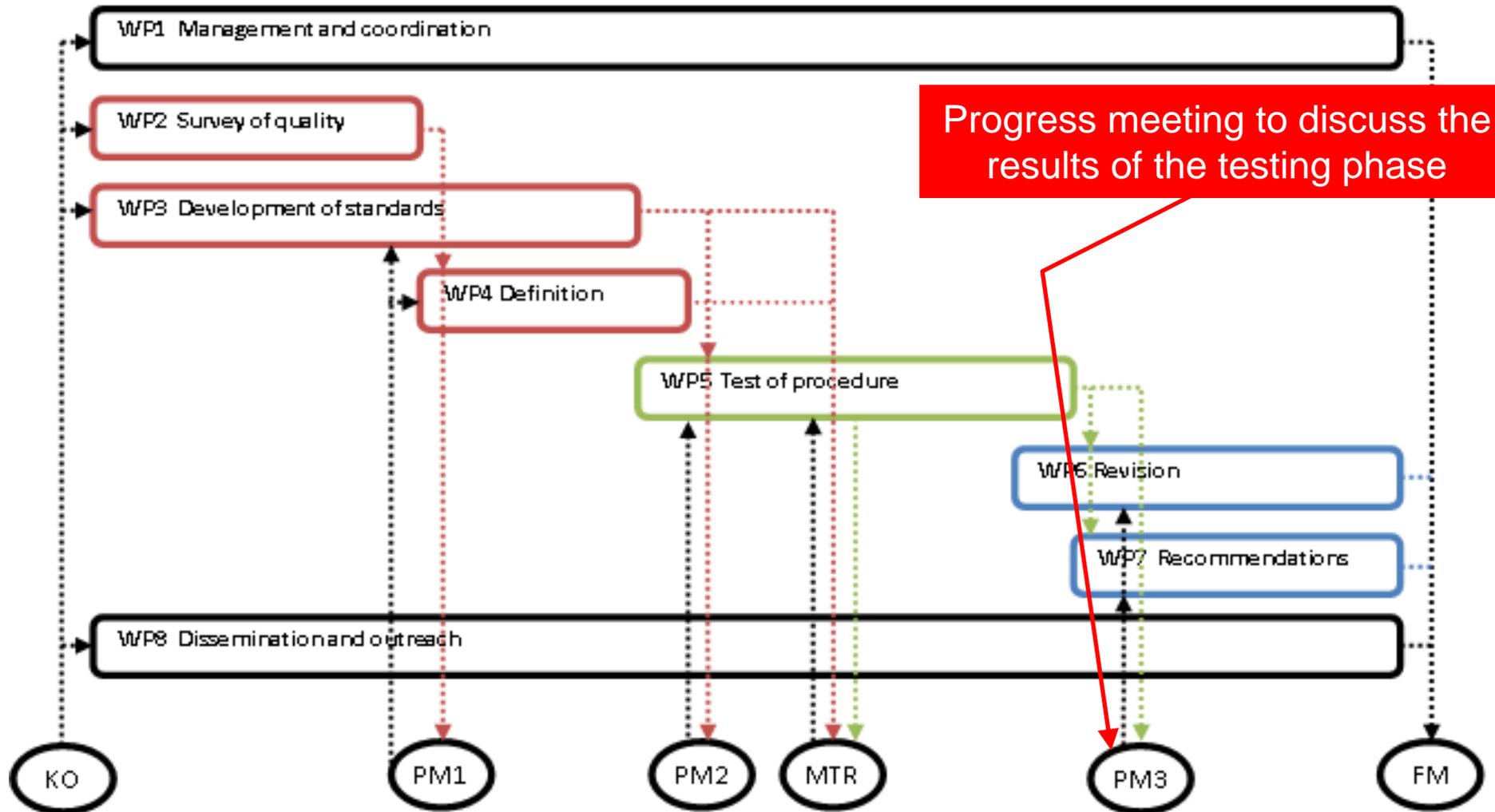
Current Status

- Preliminary definition of the process



Next Steps

Next Steps



Open Issues

- How often should the set of learning outcomes be updated?
- How often should the employers update their requirements?
- Clear definition of PERSEUS as complimentary to accreditation
- Try to avoid “accreditation”, PERSEUS should be a valuable addition to the regular accreditation, better use “quality evaluation”
- Discuss criteria for adoption of two levels of the labels: gold, silver?
- Identify roadmap for the continuation of the project even after its EC contractual duration. Some initial thoughts:
 - Connect PERSEUS to one or more accreditation agencies (EUR-ACE?);
 - Promote the adoption of the PERSEUS scheme via CEAS, the EU major aerospace society.
 - Connect PERSEUS also to an Aerospace University network, such as PEGASUS
- Extend approach to other sectors?

This document and all information contained herein is the sole property of the PERSEUS Consortium or the company referred to in the slides. It may contain information subject to intellectual property rights. No intellectual property rights are granted by the delivery of this document or the disclosure of its content.

Reproduction or circulation of this document to any third party is prohibited without the consent of the author(s).

The statements made herein do not necessarily have the consent or agreement of the PERSEUS consortium and represent the opinion and findings of the author(s).

All rights reserved.