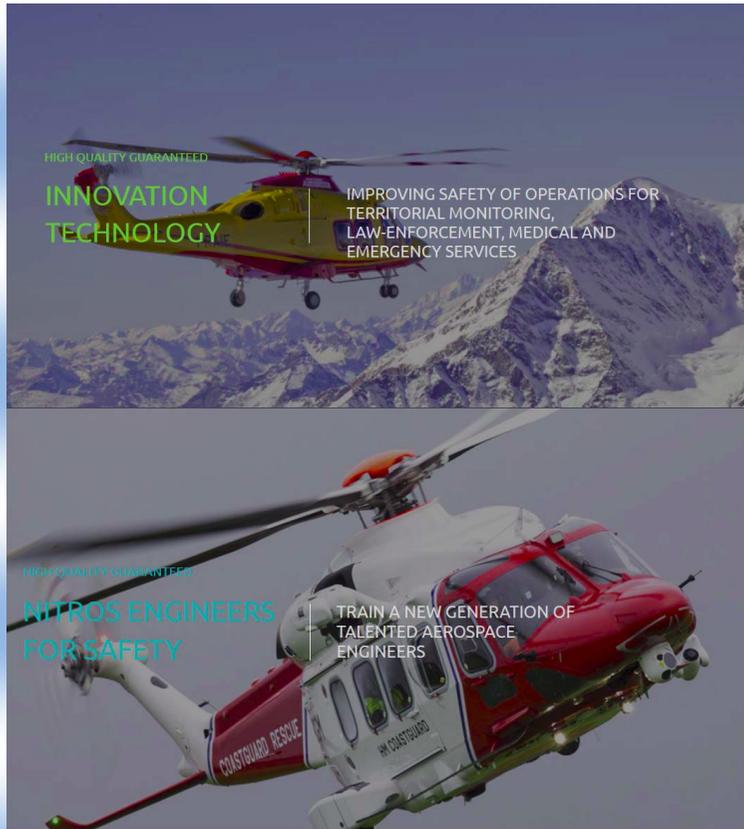




Network for innovative training in rotorcraft safety

## Second Training Event: Environmental Factors and Rotorcraft Safety



### 1<sup>st</sup> day – Monday, 4 March 2019

12:00-13:00	Arrival, welcome lunch
13:00-13:30	Opening- G. Quaranta (Politecnico di Milano)
13:30-14:00	Overview of the Glasgow School of Engineering
14:00-14:30	Plan for the training session – G. Barakos (Univ. of Glasgow)
14:30-15:15	Rotorcraft research at Glasgow– G. Barakos (Univ. of Glasgow)
15:15-15:30	Short coffee break
15:30-17:00	Tour of the UoG historic campus

### 2<sup>nd</sup> day – Tuesday, 5<sup>th</sup> March 2019

9:00-10:45	Brief introduction to rotorcraft - G Barakos (Univ. of Glasgow)
10:45-11:00	Short coffee break
11:00-12:30	Wake modelling I - G. Barakos (Univ. of Glasgow)
12:30-13:30	Lunch break
13:30-14:30	Wake modelling II - G. Barakos (Univ. of Glasgow)
14:30-15:30	Vortical flow modelling - R. Steijl (Univ. of Glasgow)
15:30 to 15:45	Short coffee break
15:45-17:00	Mini-project: development of a rotorcraft wake model
18:30-20:00	Summer School Dinner



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**3<sup>rd</sup> day – Wednesday 6<sup>th</sup> March 2019**

9:00-9:45 Icing on rotor blades -Lecture provided by LHD  
9:45-10:40 Rotorcraft brownout – Lecture provided by LHD  
10:40-11:00 Short coffee break  
11:00-12:00 Brownout research - R. Brown (Sophrodyne Ltd)  
12:00-13:00 Lunch  
13:00-14:00 Wake encounters simulation - Mark White (Univ. of Liverpool)  
14:00-15:00 Simulation of downwash and outwash - G. Barakos (Univ. of Glasgow)  
15:00-15:15 Short coffee break  
15:15-16:00 Ship wakes and rotor ship landing - R. Steijl (Univ. of Glasgow)  
16:00-17:00 HELIWAKE: adding helicopters to RECAT EU - G. Barakos (Univ. of Glasgow)

**4<sup>th</sup> day – Thursday, 7 March 2019**

9:00-10:00 Can we simulate rotor wakes in real-time? - M. Woodgate (Univ. of Glasgow)  
10:00-11:00 Wakes and air-traffic management – P. Tormey (CAA, retired)  
11:00-12:00 Helicopter rotor wake phenomena – R. Green (Univ. of Glasgow)  
12:00-13:00 Lunch  
13:00-15:30 Workshop: Preparing a wake for flight simulation

15:30-15:45 Short coffee break  
15:45-17:00 Workshop: Preparing a wake for flight simulation

**5<sup>th</sup> day – Friday, 8 March 2019**

9:00-10:00 Visit to the UoG flight simulator Daedalus 1  
10:00-12:00 Flying in turbulence using wakes computed by attendees  
12:00-13:00 Lunch & Departure



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#### NITROS OVERVIEW

Recent statistics show that, per flight hour, it is ten times more likely to be involved in an accident in a helicopter than in fixed-wing aircraft. The main cause for this lies primarily in pilot judgement and actions. But it is also related to safety culture management, i.e. the critical behaviours shared by helicopter operators in relation to safety. This also points to design solutions that can take greater account of safety of operations. NITROS is a multi-partner ITN which provides an interface between aerodynamics, structures, flight dynamics, stability, control, handling qualities and design and deals with innovative approaches to enhance the safety of present and future rotorcraft (helicopters and tiltrotors) from an engineering point of view.

The uniqueness of this project is that it will train future engineers to increase safety of rotorcraft operations by tackling this problem in an interdisciplinary way. At present, several key research programs financed by the European Union (EU) are exploring innovative vertical take-off vehicle configurations that may start the transport revolution long-sought by the pioneers of vertical flight and foreseen by ACARE's vision 2050 . In fact, helicopters, as well as other vertical flight vehicles, like tiltrotors, compound helicopters, hybrids, and the rapidly-expanding class of easy to fly vertical take-off personal vehicles, are expected to see widespread use in the future especially as means of transport.

#### KEY GOALS OF NITROS

- #1 — to train the next generation of European aeronautical scientists and engineers on this peculiar type of aircraft that have great potential to improve the effectiveness of the European transport network, developing the entrepreneurial attitude in them that is essential to introduce disruptive technological innovations;
- #2 — to train the next generation engineers to avoid overlooking the impact that their design choices may have on flight safety, fostering the investigation of safety issues on innovative vertical take-off configurations that may assume an important role in the future European transport network;
- #3 — to introduce innovations in rotorcraft design that will enhance the safety of helicopters, to obtain a significant reduction of the accident rate up to 20% especially for future rotorcraft designs and operations that will exploit the innovation generated by NITROS research;
- #4— to create a network of excellence of European research establishments and industry organisations dedicated to rotorcraft safety.



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