ABSTRACT:
This Nikolsky paper on rotorcraft handling qualities has been written under the enduring influence of a community of very dedicated engineers and pilots. The author looks back nearly 70 years and highlights particular events that reflect the continual growth of the handling qualities discipline and brought us to where we are in 2012. We at a point where designers have, within their grasp, the performance standards, criteria and test techniques, the understanding of rotorcraft aeromechanics and control and the design tools to ensure that handling deficiencies never again have to define the boundary of the operational flight envelope. The tension between flight performance and flight safety is properly managed by ensuring that Level 1 handling qualities are there for pilots throughout missions, including degraded environments and hazardous operations. This paper tells the story of how our industry has arrived at this point. Looking forward, we now need to strive for super-Level 1 handling quality, a state where pilot errors, in any shape or form attributable to deficient flight characteristics, are things of the past.

BIO:
Gareth Padfield received his BSc in Aeronautical Engineering from the University of London in 1969 and PhD in Flight Dynamics at Cranfield College of Aeronautics in 1976. In-between he held a position at Westland Helicopters as a stability and control engineer. He joined the Royal Aircraft Establishment in 1977 where he specialized in helicopter flight research, engaged in flight test, modeling and simulation, handling qualities and flight control developments; he was appointed Rotorcraft Chief Scientist (Air Systems) in 1995. Padfield took up the James Bibby Chair in Aerospace Engineering at The University of Liverpool in 1999 and was Engineering Department Head between 2004 and 2010. While at Liverpool, projects under Padfield’s supervision have included developing the handling qualities and load alleviation functions for the European Civil Tilt Rotor, the design of novel control, display and guidance concepts, simulation fidelity, particularly the aircraft-ship dynamic environment and aircraft/rotorcraft-pilot couplings. Padfield chaired GARTEUR action groups on simulation fidelity and was a member of three AGARD Working Groups/Lecture Series - Helicopter Aeromechanics (1985), Rotorcraft System Identification (1991) and Operational Agility (1994). He was a member of the US DoD JSHIP Accreditation Council and UK Focus Officer for TTCP (flight simulation, handling qualities and flight control, 1985-99), receiving a TTCP achievement award in 1995, along with colleagues at the US Army Aeroflightdynamics Directorate, Hoh Aeronautics and the Canadian Flight Research Laboratory, for the development of Aeronautical Design Standard ADS-33 – Handling Qualities Requirements for Military Rotorcraft. Padfield is a Fellow of the Royal Academy of Engineering and a Fellow of the Royal Aeronautical Society. He is an honorary member of the AHS Modeling and Simulation and Handling Qualities Technical Committees, and a member of the Safety and Education Committees. Padfield was appointed a member of the UK Defence Science Advisory Council in 2011.