Research is needed to develop innovative concepts and enabling technologies to reduce aero-engine noise at source. Fan broadband noise is a major aircraft noise challenge now and in the future will be even more important. Novel low-noise engine architectures, such as ultra-high-bypass-ratio engines and lower-speed fans, can help address jet noise and fan tone noise, but previous EC-funded programmes have shown they are unlikely to reduce significantly fan broadband noise without improved understanding of the source mechanisms. Furthermore, the advances in numerical methods, which have revolutionised tone noise prediction, have yet to make an equivalent impact on broadband noise prediction.

Proband addresses these issues with a major technical leap in providing industry with an improved understanding of the broadband noise source mechanisms, with validated broadband noise prediction methods, and with low fan broadband noise concepts.

Work package 2 (WP2) was dedicated to the development and validation broadband noise prediction methods. Once validated on non rotating airfoils in WP2, these methods were to be applied to fan configuration in WP3 and WP4. As a consequence, WP2 had a major role in the whole project. Moreover it was structured as a self-containing piece of work, where analytical and computational fluid dynamics (CFD) model developments could be compared to each other and to experimental data.

Work package 3 (WP3) was to provide a parametric study on broadband noise sources in a laboratory-scale fan rig. Advanced measurement and analysis techniques to achieve this were to be developed on this fan rig. The predictions of the broadband noise of the laboratory fan rig were to be evaluated numerically using RANS/semi-analytic methods and validated LES/DES models.

Work package 4 (WP4) was dedicated to the acquisition of detailed broadband noise and turbulence measurements on an industrial Fan-OGV stage rig at representative flow conditions, and to the demonstration and validation of broadband noise models and CFD
methods against this data. The WP4 work built on the model developments and validation in WP2 and on the evaluation of the methods against the low speed fan stage tested in WP3.