Charles Lindbergh would have loved enhanced and synthetic vision systems (EVS/SVS). The sensor-generated, real-world EVS view would have guided the famed aviator to land in darkness or poor weather, or both. The artificial world view created by SVS would have compensated for non-existent forward visibility from the cockpit of his Ryan NYP monoplane.

Yet Lindbergh foresaw the need and, having neither technology, proclaimed that "aviation will never amount to much unless we learn to free ourselves from the mists". Little wonder that his warning, along with Kollsman and Honeywell's "we see through the fog", are favourite quotes of staff at Rockwell Collins Advanced Technology Center. The team is one of several looking at combining EVS and SVS into one system that provides the best of both worlds: improved safety as well as real operational benefits - a vital driver towards wider adoption and development.

Today's efforts build on the pioneering work undertaken by Gulfstream, which, along with Kollsman and Honeywell, became the first to receive US Federal Aviation Administration certification for an EVS in 2001 on the GV. Since then, Gulfstream says, more than 100 EVS-equipped aircraft have entered service, including retrofits and new-delivery G550s, where EVS is standard equipment. The system, which projects infrared imagery from a nose-mounted Kollsman 1-5µm cooled single-channel forward-looking infrared (FLIR) on to a Honeywell 2020 head-up-display (HUD) and a co-pilot auxiliary head-down display (HDD), will also be standard on the forthcoming G450.

Sales of this and other EVS systems under development by CMC Electronics, Max-Viz and Thales are being stimulated by an FAA requirement for RNP (required navigation performance). "We looked at symbology declutter, and 'highway in the sky' or tunnel-type displays," says NASA Johnson Space Center-based SVS test pilot Rob Rivers. "It included how you fly through the tunnel and workload issues. There's a lot more work to do on this."

The evaluation included a HUD (a video-capable Rockwell Collins Flight Dynamics(HGS-4000 in place of the standard Honeywell 2020), with the computer-generated terrain overlaid, and a hybrid display on the primary flight display. Although originally tested in full photo-realistic mode, Rivers says: "The problem is if a picture is taken in winter, when there's no vegetation, the terrain may look different in summer. We have found a photo-based generic hybrid image mixed with the database is best."

Related simulator tests of the hybrid display against a standard blue sky/brown ground navigation display and terrain awareness and warning system (TAWS) showed a "big preference for the hybrid display" among a group of 16 experienced airline pilots. Tasked with a tricky approach to a mountainous airport in a large aircraft with one engine failed, and the TAWS audio disabled, the test was to see "if the information available was enough" to prevent a controlled flight into terrain (CFIT). Prevention of CFIT is a primary mission of NASA's SVS research. All 12 of the pilots