SIXTH FRAMEWORK PROGRAMME
PRIORITY [Aero_3.e]—ACTIVITY AERONAUTICS & SPACE
SPECIFIC TARGETED RESEARCH INNOVATION PROJECT (STREP)

www.landing-eu.eu

"LANDING"

Landing s/w for small-medium aircraft on small-medium airfield

EC Contract No.: EC-FP6-AST5-CT-2006-030905

Project Abstract

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ABSTRACT

The product

LANDING delivers a low-cost software and hardware product assisting pilots of a small-medium aircraft to safely land on small-medium and poorly equipped fields under bad-weather and low-visibility conditions. The LANDING Consortium delivers the system as a pre-industrial product and as an add-on for safety that can be installed on portable or embedded aircraft h/w navigation technologies (Figure 1).

The pilot can use LANDING for additional guidance during all three phases of the landing process: (1) The "approaching" phase in the far field or wide area of the landing field, (2) The "tunnelling" phase), (3) The "runway" phase (Figure 2).

Figure 1: Hardware (IABG, 2006); Simulated LANDING output for guidance (TUM, 2006)

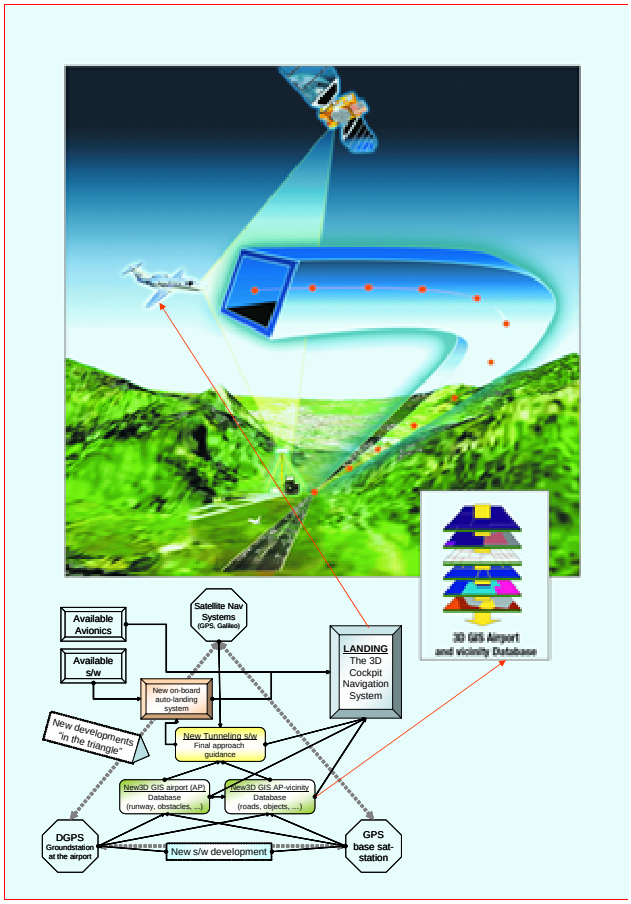

Figure 2: The LANDING Concept

Components & approach

LANDING integrates seven s/w and data components: (1) The geo-referenced position module of the aircraft operational with satellite and other data; (2) The Stage-1 SW, operational with input from digital information of the ambient space; available through commercial of-the-shelf (COTS) 3D digital maps, satellite data and elevation data; (3) The Stage-2 SW, operational with medium resolution input of the larger field vicinity; (4) The Stage-3 SW, operational with high resolution 3D geodata including all obstacles as input of the closer field vicinity; (5) Software modules for the integration of the above components, that provide and link the aircraft with the digitally represented space; (6) 3D-visualization SW linking the integrated flight guidance information to the hardware (HW); and (7) Other SW integration and 3D-database components.

The project is accomplished via 7 workpackages: WP1—Project management, WP2—Product needs, WP3—The SW package, WP4—SW and HW integration, WP5—Testing and verification, WP6—Applications and validation, and WP7—Dissemination, promotion, closure.

Hardware, software, data, technology development

LANDING components run on COTS on-board HW: (1) Portable or panel mounted computing equipment (e.g., pen-PC) delivering fast rendering; and (2) Display for 3D-visualization.

The SW is platform-independent. The 3D-terrain and other airport-, or field-, or terrain-data, is pre-installed on the HW.

The pre-industrial product is tested, applied, verified and validated by avionics companies, an aircraft company, two airport authorities, and a pilot training centre and school. The final product is interfaced into existing products of the EU industry for further testing and exploration, and the material needed for certification of the database component will be compiled. It is the first international product aimed to assisting pilots to landing via 3D-GIS visualization combined high precision satellite positioning technologies, and fast computational rendering.

LANDING is cost-affordable and targeted to small or business aircrafts, hydroplanes and helicopters, and delivers s/w technology, applications, dissemination, and material for future certification. The cost of a ready to use product (h/w, s/w, and data) is in the range of €15-20.000/unit/aircraft (release of 2009).

Development

The software consists of several modules and data components, with a powerful rendering for high-fidelity real-time data visualization of 2D/3D. The man-machine interface is realized by a graphical user interface (GUI). The tunnelling and predictor modules offer guidance in an easily understandable way. Software and hardware for positioning and attitude determination are based on EGNOS/GALILEO technology.

The airport and vicinity database consists of 2D-approach data and 3D-geodata, whilst 3D-data is produced via LIDAR and laser-scanning technology. A database in a standardized aerospace data format is produced for the predefined flight-test areas. The airport-and-vicinity database provides details linked to the software functionality, airport and airfield architecture. The integration is based on MS Windows Operating System. The fully integrated s/w is tested via a research flight simulator, and is integrated into industry hardware. The beta0 product is flight-tested for the airports of Bolzano (IT), Lugano (CH), Skiathos-island airport & harbour pier (GR).

Figure 3: Airport of Bolazno

Figure 4: Airport of Skiathos

Delivery

The project features a pre-industrial delivery and is disseminated and promoted worldwide via the delivery of prototype material & documentation useful for certification, flight-tests upon request, and other activities. Partners are exploiting the s/w and database technology, as well as the patented production for its commercialization.

Up to the end of this reporting period, the consortium has completed the development of the system software and has initialised testing. In addition the consortium has started the integration of the hardware and software components (concurrently) and has assembled the system hardware as a prototype less the visual display unit.

Investment

LANDING is produced in 6 EU countries (AT, CH, GR, DE, IT, NL) by 12 organizations: 6 SMEs, 1 aircraft manufacturer, 2 university aerospace research centres, 1 airport authority, 1 airport management authority, and 1 pilot training centre/school and aero-services business.

LANDING requires investment of 180 person-months in 24 months, and an investment of €1.7 million, whilst the European Commission will provide a 50% investment of the cost in the years 2007-2008.

Information

The project site is www.landing-eu.eu. Details are provided by Prof. Marc Bonazountas Tel.:+302106898615 bonazountas@epsilon.gr and Prof. Jörg Schaller Tel.:+49816668680 j.schaller@esri-germany.de

Partners

Epsilon GIS Technologies SA (GR)—*Project Coordinator*: EPSILON is a GIS consulting- engineering- and product development organisation specialising in GIS technologies (**www.epsilon.gr, www.epsilon-eu.eu**). The company is currently engaged in the production of the GIS-GPS/SBNS Tele Atlas vehicle navigation systems, GIS technologies in boat and marine tracking, the GIS of the Hellenic Falk navigator, Air navigation GIS, and the GIS of numerous EC GIS projects.

Aerolabs AG (DE): Is a leading technology company (**www.aerolabs.net**) which provides quality software solutions. Its three business units supply leading companies and research organizations from all technological fields like aerospace, automotive and shipping industries.

Aeroservices SA (GR): Aeroservices (**www.aeroservices.gr**) is the largest private organisation of Greece representing EADS/Socata aircraft with business in the representation and importation of aircraft and helicopters, private transportation services, training school for aviation and flight licences, cartographic and other services upon demand, as well as aircraft service facilities.

Airport Authority Lugano (CH): The airport of Lugano (**www.lugano-airport.ch**) is one of the best organised airports of Europe, and features facilities for aircraft business accommodation. It is located in a hilly area, and thus is an excellent site for the LANDING tests.

Aschenbrenner Elektronik GmbH (D): The Company (**www.aschenbrenner-elektronik.de**) develops hardware platforms suitable for Digital Map System, and will provide HW for the SW integration, testing and applications.

Delft University of Technology (NL): The TUD (**www.tudelft.nl**) MGP-section's expertise includes GNSS positioning equipment testing and data quality control. The latter is the aspect of integrity of navigation realized by procedures for data validation, based on statistical methodologies.

Diamond Aircraft Industries SA (AT): Diamond (**www.diamond-air.at**) is a composite aircraft manufacturer with offices and operations worldwide. Innovative aircraft solutions, of the highest level and quality are produced for flight schools and private operators. The company's expertise in advanced composite technology is being used to develop products for aerospace and defence applications which are in use worldwide.

ESRI GeoInformatik GmbH (D); ESRI Geoinformatik GmbH (**www.esri-germany.de**) is the largest GIS technologies s/w house in Europe, representing and supporting GIS technologies of ESRI Inc, the largest and most reputable GIS technologies of the world, known as the ARCINFO organisation.

IABG GmbH (DE): IABG GmbH (**www.iabg.de**) develops and produces aeronautical navigation systems based on moving maps with presentation of the actual position received by GNSS on air navigation map background.

Südtiroler Transport Strukturen AG (I): The Airport of Bolzano (**http://www.sta.bz.it**) is among the best organised in Italy and features facilities for aircraft business accommodation and private air transport carriers. Furthermore, the airport is located in a rich relief terrain that makes it a suitable site for the project tests.

Technische Universität München (D): *The Munich's Technical University Institute of Flight Mechanics and Flight Control* (**www.tum.de**) performs research in various fields of aeronautics, including an innovative cockpit display for the guidance and control of aircraft. It provides the pilot with 3D information of the command flight path and current and future aircraft positions as well as a visual presentation of the terrain.

TopoSys GmbH (D): The Company (**www.toposys.de**) was founded in 1995 as a spin-off of Dornier GmbH, an air- and spacecraft manufacturer of worldwide repute. Through its dual role as an established sensor operator and ALS system manufacturer, TopoSys ensures a broad base of expertise that is unparalleled by any competitor.