Final Report Summary - EPATS (European Personal Air Transportation System STUDY)

The EPATS project focused on the future highly customer oriented and time, and cost efficient air transport system. It aimed to fill niche between surface and scheduled air transport. Future mobility cannot be satisfied only through investments in hub and spoke, or rail and highway systems. This EPATS system is expected to provide a wide choice of transportation mode, and the wider use of small aircraft, served by small airports, to create access to more communities in less time. The goal of the EPATS proposal was to demonstrate the needs and potential of small aircraft business development and to propose recommendations for the introduction of this new European Air Transportation System (ATS) in the context of the European Research Area (ERA).

The SSA EPATS study project addressed the following issues:
- the potential new market for personal aviation up to 2020;
- the potential impact of this new way of transport on the European ATM, and airport infrastructures, as well as the environmental, safety and security issues involved;
- the EPATS general specification and research and development (R&D) roadmap.

Apart from the project management (consisting work package 6 itself), the project was structure in 5 work packages (WP) as follows:

WP1: European business and personal aviation data base
A literature and European and US GA databases review was done. Databases contents published on the web by various aviation institutions, offices and statistical centres were analysed (Eurostat, Eurocontrol, FAA and others). All available information on European airports and airfields was searched and analysed in terms of availability and possibility of use in EPATS system. Basing on the available sources personal and business aircraft characteristics comparison was done, out of which, a reference group was selected for EPATS. A basic characteristic of all existing airports and airfields in respective countries was prepared. The characteristics were analysed in terms of use in EPATS system. A comparison analysis of information sources on general aviation in Europe and the United States (US), in terms of data gathering methods and their analyzing, as well as capacity and fleet structure and usage indicators.
% The analysis performed in WP1 do not support the position, that the existing gap between the EU and the US in general aviation development is caused by differences in area, wealth nor surface transport infrastructure. The position was true when Europe was divided and there was no sign of common market and European sky. The fleet and volume of passenger-kilometre by general aviation in the US is nearly five times greater than the one of Europe, whereas the national income of the EU prevails over the gross domestic product (GDP) of the US, the distances separating outlaying regions are similar, and the land transport infrastructure comparable. The reasons behind the US general aviation favourable position can be found in conditions created in the US by the administrations and involvement of society and local public government for the benefit of local and personal air transport.

WP2: Market potential of personal aviation
Efficiency definitions used in air transport were verified and a new definition assumed for EPATS efficiency analysis was presented. The generalised cost of travel minimisation method based on international mobility development for EPATS aircraft demand forecasting was justified. The results of so far long distance mobility analysis in the framework of European programmes and their fitness for high-speed interregional transport development were evaluated. A simplified optimal transport mode choice model basing on generalised travel costs minimisation was created. The generalised costs model was assumed based on out of pocket costs and indirect costs that are the result of costs generated during travel. The volume of interregional flow was assumed for several different scenarios. The ESPON programme data were used as a source. Lack of full knowledge on flows structure caused the need for extra analysis and making assumptions on missing structure components (travellers value of time (income) categories, flow fluctuations over time (year, month, day)). The number of aircraft forecast and volume of expected air traffic of EPATS was calculated. The calculations were done using MS Excel and Mathcad.

The main results of WP3 were the following:
- when we are dealing with efficiency, definition and measurement level must be given;
- levels of measurement influence efficiency evaluation significantly;
- the shorter distances and larger aircraft, the wider differences;
- despite the fact, that larger aircraft have better weight ratio and energy consumption characteristics, it is small aircraft, which provide higher efficiency in particular situations;
- mode efficiency should be measured at the national / European economy level considering social efficiency;
- air transport is safer, environmentally friendlier and more energy and resource efficient than car;
- the greatest disadvantage of contemporary modes of high-speed transport (scheduled air, hi-speed train) are infrastructure development limitations, low nodes accessibility causing unbalanced regional development as a side effect;
- the EPATS keeping all advantages of air transport enables negative externalities limitation and contributes to a more cohesive territorial development of EU-27.

WP3: Impact on European ATM, airport infrastructure and general requirements
Inventory of the major consequences of the expected EPATS number of aircraft on ATM was developed, taking into account the typical personal use of those aircraft, the expected ATM and avionics technology and the projected routes to be flown. It is recommended to further analyse to what extent the current regulations are appropriate for certification of new designs and new technologies, production techniques and materials within EPATS. It is also recommended to encourage research into automation that supports safe single pilot operations, in particular flight envelope protection and further automation of flight in EPATS aircraft. In addition, further research is proposed into intuitive displays and the effect of cockpit design, automation and advanced avionics on pilot workload, decision-making, etc.

It is still an open question whether the countries in the European Union will be able to train and supply enough EPATS pilots (200 000 pilots during 20 years). It could be, however, attractive for business people to fly their own aircraft in business models like buy-in of hours or shared ownership.

WP4: Missions specifications for EPATS aircrafts
Operational cost calculation model for EPATS class aircraft using Mathcad software and MS Excel was prepared. A thorough cost analysis basing on present, averaged material, equipment, fuel, services and labour prices was conducted. Respective aircraft and flight profile impact on unit cost were done, what will allow estimating EPATS aircraft requirements more rationally. Fuel consumption analysis according to basic aircraft parameters and flight profile using a model and software was completed.

The analysis showed that affordable personal transport is real and the most suitable for the mission are pistons and turbo props.

However, several actions must be taken to reach this goal:
1. Airplanes must be fitted to needs in terms of their:
   - Size (range, comfort, speed);
   - Performance (airport accessibility, operating cost, fuel consumption);
   - Available airspace (flight performance);
2. Operating must be optimised (to reduce DOC):
   - High utilisation intensity;
   - Low indirect cost fraction;
3. Technical and production improvements are needed:
   - Lower design, production and operating costs (e.g. excepted CESAR results);
   - Avionics needed to fly into future airspace (SESAR requirements).

WP5: Recommendations for framework programme and roadmap
A roadmap outline of ‘EPATS roadmap vision’ was prepared and sent to all participants and the EC officer.

It is expected that the EPATS results will encourage both new business models in Europe and new products. The new business models that may emerge from EPATS could be focused on a wide spread European air taxi business with a new operational concept.

It is expected that the EPATS report will stimulate the manufacturing industry in Europe to develop new generations of GA aircraft that will satisfy the needs identified in the EPATS report. The technologies for these aircraft could be acquired via participation in the EU framework programme. Novel configurations of GA aircraft may be developed that can compete with the next generation of GA aircraft in the US. There is a potential for a large market of GA aircraft that could be filled by European products.