SVETLANA

Safety (and maintenance) **Improvement**
Through Automated Flight Data Analysis

CONTEXT

The SVETLANA project is an EC-Russia cooperation in the field of aviation safety and maintenance improvement. The project is aimed at improving the capabilities of flight data monitoring programmes for civil aviation by using the EC-Russian synergy.

ED48 Sagem's flight recorder, on which can be plugged either a classical storage media, or an advanced wireless emetter (WEFA) which allows direct sending of flight data to ground.

The aviation industry is continuously challenged to even further improve the aviation safety record. An important instrument in this field is expected to be the introduction of new advances in flight data monitoring programs.

Over the recent years the volume of recorded flight data has increased so significantly that analysis tools are challenged to keep up with all the data available.

Although the Flight Data Monitoring (FDM) systems of today allow operators to gain a good understanding of their flight operation, the full potential of the available data can often not be released due to limitations in analysis capacity.

Especially, deeper analysis of each flight has proven to be: the need for an important amount of expert involvement, the lack of analysis standards and the current practice of using predefined analysis models.

SVETLANA OBJECTIVES

In response to these challenges the SVETLANA project has been initiated with the objective to develop an advanced flight data analysis philosophy. The main objectives are:

- **To improve flight safety.**
  SVETLANA will design an automated and standardised flight data management cycle that is capable of processing routinely large amounts of data from various sources in order to improve flight safety evaluation.

- **To improve maintenance support.**
  The customisation of the FDM cycle expects additional benefits to support smart maintenance processes, as airline operations and maintenance departments will be informed about a potentially unsafe situation and how to detect it.

- **To analyse more flight data to a more extensive level.**
  This will lead to the reduction of expert involvement by qualifying the singularities detected automatically (and not preselected by experts). As a result, human intervention will be used only to validate critical decisions for flight safety and maintenance enhancements.

- **To provide feedback to inform stakeholders and improve FDM process.**
  SVETLANA will refine the search of singularities that have

not been selected for immediate risk mitigation. The most appropriate parameters to monitor will be selected and, when possible, confirm the event.

- **To update FDM process to enhance flight data analysis.**
  This method is a real innovative approach as it develops the FDM process to adapt to new trends.

Use of AGS software to analyse flight data (charts and 3D) in the case of a landing following a go-around.

AN INNOVATIVE PROCESS

SVETLANA will use automated flight data processing tools based on advanced algorithms for knowledge extraction from the data. These algorithms will be designed to analyze data and will be able to identify fault signature and to predict abnormal behaviour. In addition, SVETLANA will introduce a proposal for standards in support of the analysis process. By introducing these results significant gains are expected in the field of flight safety but also in field of maintenance-related data processing.

The SVETLANA concept is based on a **two-steps methodology**: a highly **automated flight data analysis** phase, followed by a short expert assessment when abnormalities are detected. The first phase of analysis will use intelligent algorithms with self-learning capabilities, able to analyse all available flight data and at a deeper level. SVETLANA will then allow significantly **more flight data** to be processed with same or **less human effort**.

By providing a proposal for the **introduction of standards**, the implementation of SVETLANA will **ease flight data analysis** and enable a **comparison of results** between peer groups of operators. Sharing of such results and knowledge is impossible today with too different analysis methods.

In addition, SVETLANA will be designed to include a **feedback loop** that aims at **detecting future events more efficiently**. By introducing a close loop approach, the FDM process will be updated on the **bases of previous findings** from the flight data analysis. By closing the cycle it is assured that the FDM process is up to date to cope with **new emerging changes in operations or safety**.

The SVETLANA **data mining** processes can be applied at a **higher frequency** compared to classical FDM processes used today. SVETLANA aims at reducing the FDM process to a **single phase** of automated analysis followed by a human expertise assessment in case of abnormal events. This will shorten the time before **feedback to relevant stakeholders** is provided.

This process will allow the introduction of other programmes to **improve flight operations** on the basis of flight data analysis. The potential areas where advanced flight data analysis might **bring economical viable improvements** are expected to be e.g. fuel consumption optimisation, training programme update, training programme effectiveness assessment, etc…

The concept of SVETLANA will be designed to be **adaptable to the existing FDM systems** (like Sagem's AGS) by providing a **modular architecture** to introduce the **new flight data processing capabilities**. With this approach, SVETLANA technology can be implemented with a minimum of additional investments in training and integration. The SVETLANA innovation aims at providing **new standards** to the FDM process, with a complete and systematic data processing allowing **100 % analysis of all flight data**.
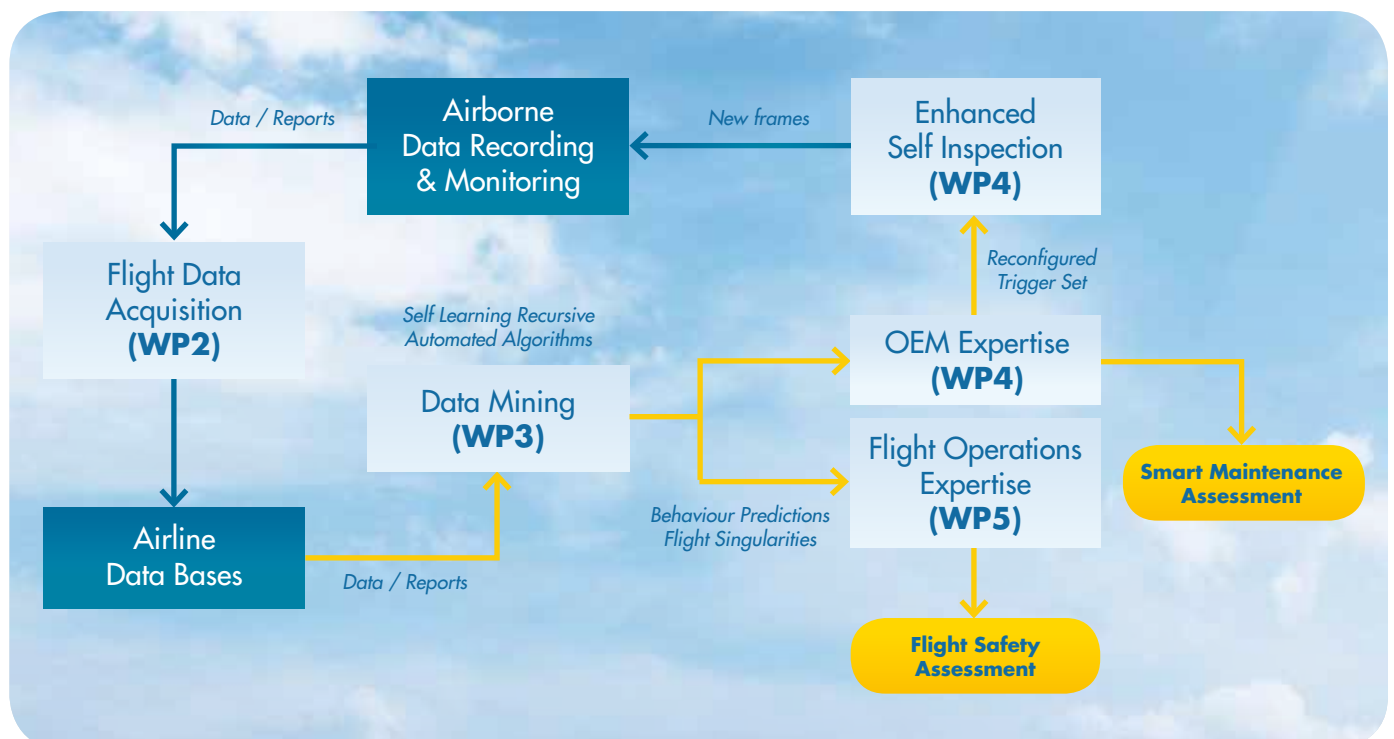
Consortium

The SVETLANA consortium is composed of 4 European and 3 Russian partners. The SVETLANA project brings together a wide scope of industrial and scientific specialists in various fields of aeronautics:

Sagem Défense Sécurité (SAGEM - France):
Project coordination, expert in FDM and information systems for airlines.

Stichting Nationaal Lucht - En Ruimtevaartlaboratorium (NLR - Netherlands):
Expert in the field of aviation safety.

Lancaster University (LANC - United Kingdom):
Specialized in time data mining and extraction of knowledge from data streams.

Joint Stock Company United Aircraft Corporation (UAC - Russian federation):
Aircraft manufacturer.

Joint Stock Company Concern Avionica (CA - Russian federation):
Expert in information monitoring (Flight Data Recorder).

Federal State Unitary Enterprise "Institute Of Aircraft Equipment" (NIIAO - Russian federation):
Specialized in Russian civil aircraft equipment design.

ALMA Consulting Group SAS (ALMA - France):
Project management, communication and dissemination.

Acknowledgement

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