



e CAMOS

PROJECT REPORT

**CAMOS – CENTRALISED ARTAS
MAINTENANCE & OPERATIONAL SUPPORT**

**The Service behind Europe's most used
Surveillance Data Processing System**

COMSOFT

2000

COMSOFT starts building up ARTAS experience



2001

Start of CAMOS Service
COMSOFT 1st Industrial Partner for CAMOS



2002

V6B2 (DS10 Alpha Platform)
Automatic ARTAS Installation Procedure



2003

ARTAS Platform Update Study
V6Co Development
100 ATR corrections

2004

V7A0 (HPDS15)
DAP Store & Forward
CAT 62, ADS-B Prototype
20 ACPs implemented
5 operational ARTAS users



2005

V7A1 (HPDL380G4) ARTAS on Linux
ARTAS for Aircraft Derived Data
40 ACPs implemented
10 operational ARTAS users



2006

ARTAS V7 Safety Assessment
V6B2 EOD Version
Start ARTAS ADD Evaluation
Start ACS Development
ATR 1000 processed
15 operational ARTAS users

2007

CAMOS II
COMSOFT reselected as Industrial Partner for CAMOS
V7A1 PS1 (HPDL380 G5)
V7A0 PS1



2008

V7A1 PS2
ARTAS on ACS Prototype



2009

V8A Prototype
V7A1 PS3
V8A FAT
ARTAS for WAM & ADS-C
600 ATR corrections
90 ACPs implemented
23 operational ARTAS users



2010

27 operational sites
15 test sites
17 planned sites

INTRODUCTION

EUROCONTROL's ARTAS, the European ATM Surveillance Tracker and Server, is one of the core elements of current ATM systems and can look back on an outstanding success story in the last decade. By now ARTAS is the most often operated Surveillance Data Processing System in Europe, it has evolved to Europe's standard tracker. The success of ARTAS is undeniably linked with EUROCONTROL's centralised maintenance service: CAMOS. ARTAS and CAMOS belong to the best breed of successful European ATM projects, the powerful application kept at the frontier of technology and the efficient support service are available to the ECAC administrations and have already rendered so far unknown return of investment. COMSOFT was initially awarded first industrial partner for CAMOS in 2001. Meanwhile, COMSOFT and its team have contributed to the success of ARTAS and CAMOS for nearly nine years.

The success can best be shown by illustrating the number of ATC sites, which are using ARTAS operationally or are in the process to take their system into operation. In parallel to the increasing number of users, ARTAS has also experienced constantly growing demands regarding functionality, quality and safety, as well as an ever-increasing diversity of software versions enhanced accordingly in order to meet the challenges of the future.

CAMOS: FROM PAST TO PRESENT

The first ARTAS system was developed by EUROCONTROL on behalf of its member states back in the 90's. It went operational in Schiphol, the Netherlands in June 1998. In early 2001, EUROCONTROL launched a call for tender to select an industrial partner for maintenance and support services around their ARTAS product. After a long and thorough selection process, COMSOFT was awarded a five year CAMOS contract in August 2001. Starting from September 2001 services have been rendered in order to support ARTAS users in Europe, including the areas of problem resolution (ARTAS Trouble Reports), change requests (ARTAS Change Proposals), hotline support and on-site support. In parallel to the CAMOS service, COMSOFT was also entitled to perform turnkey supply of ARTAS systems, including system procurement, integration, training and tuning at the ANSP's premises.

In 2001 – with three operational and nine test sites – ARTAS was still in its fledgling stage. This situation changed significantly within a short time. From the start ARTAS was subject to a multitude of corrections, improvements and enhancements. In 2003 already more than 100 patches correcting troubles reported by ARTAS users had been provided, and the number of implemented change proposals increased beyond 20 in 2004. In parallel to this COMSOFT also was entrusted by EUROCONTROL to implement new software baselines for ARTAS, introducing major functional enhancements.



Development of ARTAS installations
(as of 02/2010)

ARTAS V7Ao introduced store-and-forward of Downlink Aircraft Parameters and support of the new ASTERIX category 62. With ARTAS V7A1 full support of ADS-B ground stations and Mode-S radars, including enhanced surveillance, was made available. Also the ARTAS platform side saw major steps towards an open system platform, including the change and validation of several hardware platforms (from the old DEC workstations with Alpha CPUs to HP servers with IA32 CPUs), as well as porting of the complete ARTAS software to LINUX. In this context COMSOFT also introduced an efficient and repeatable installation procedure, tremendously reducing the time needed to install new ARTAS systems.

In 2006 the number of ARTAS versions in use had increased to 3. The End of Development (EOD) milestone for ARTAS V6B2 was reached with the release of the V6B2 final development version. During this year a programme was launched to assess ARTAS against the new European safety regulations, followed by an action plan to show ARTAS compliance with the latest safety standards.

Also in 2006, EUROCONTROL once more invited tenderers to propose for the prestigious CAMOS contract. This second call for tender and the subsequent contract award was a significant milestone in the ARTAS history of COMSOFT. The selection was executed using a rigorous technical and commercial evaluation catalogue and involved the participation of major European administrations. COMSOFT again convinced the tendering authority in this highly competitive period. EUROCONTROL's decision was strongly welcomed by the ARTAS User Group (AUG), the body of close to 30 European administrations that currently enjoy COMSOFT's ARTAS service. Finally, in 2007 the successful partnership between EUROCONTROL and COMSOFT was reinforced by the CAMOS follow-up contract awarded to the German ATC/ATM supplier.



September 2003, AUG 18 in Karlsruhe



ARTAS air situation display

Since that time the pace of ARTAS improvements and enhancements has even increased. Major functional additions have been implemented, including the full support of multilateration data sources, the usage of input received from ADS-C on track services, and a long list of change requests enhancing existing functionality on behalf of the ARTAS users. Support of ADS-B is constantly refined keeping track with the evolution and standardisation of ADS-B technology. ARTAS is one of the key applications within the EUROCONTROL's CASCADE testbed.

On the platform side validations of several IA32 platforms running Linux were performed. An other major step forward is the ongoing refinement and further development of the middleware functions used by ARTAS, introducing ACS (ARTAS Common Services). As a part of this activity ARTAS will be „re-hosted“: the number of physical nodes required for a fully redundant ARTAS system is reduced from 10 to 2 servers, which represents a further simplification of the system architecture and significant reduction of the hardware costs for ARTAS.

In the meantime the CAMOS service is mastering constantly increasing demands: in the beginning of 2010 there are 4 major ARTAS software versions in use in Europe, 5 different hardware platforms and 4 different operating system versions.

Within the time span since 2001 a large number of ANSPs has decided to rely on ARTAS to head their surveillance infrastructure: Today ARTAS is operational in 27 ATC centres, in 19 countries. Test sites included, the number of ATC centres using ARTAS already exceeds 30.

CAMOS ELEMENTS

Cornerstone: ARTAS the surveillance data processing system

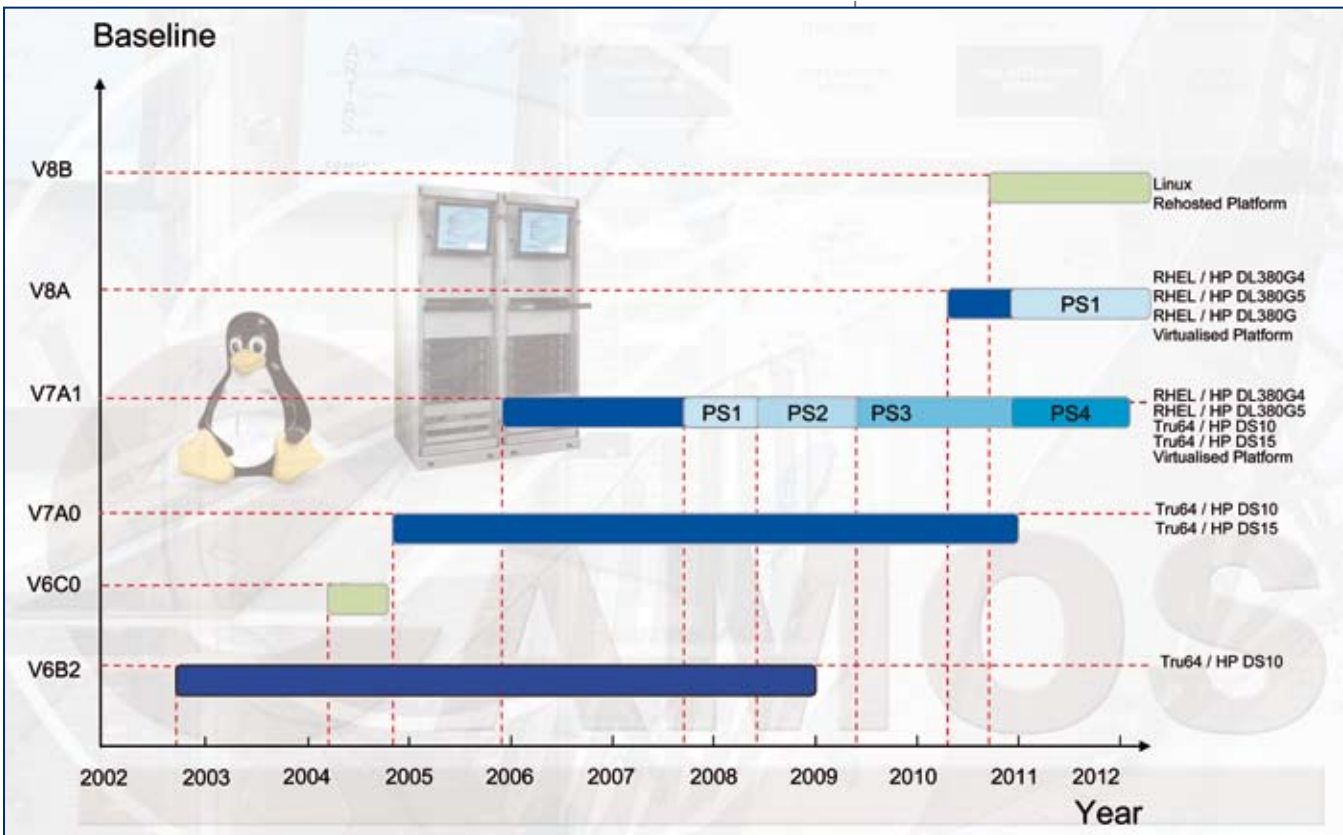
ARTAS is a cornerstone of ATC systems of more than 20 European air navigation service providers. It is employed both for civil and military purposes. As a state-of-the-art multi-sensor tracking system its purpose is to make use of all available sensor input data and to provide an up-to-date and accurate air situation picture to its users. Based on the universal exchange format ASTERIX, ARTAS processes surveillance data sources, such as classical radars (PSR, SSR, CMB), Mode S (elementary and enhanced surveillance), ADS-B, ADS-C and Wide Area Multilateration (WAM) systems.

ARTAS VERSIONS AND PLATFORMS

The following figure gives an overview of the current ARTAS software versions & platforms.

CAMOS HIGHLIGHTS

- Centralised maintenance & support service
- ARTAS Trouble Reports: Troubleshooting, work-around problem solution
- Implementation of ARTAS change proposals
- Integrating ARTAS users' change requests into upcoming releases
- Providing a central support hotline for all ARTAS users
- Delivery of turnkey installations of new ARTAS systems and integration into target environments, including basic and fine tuning



STRUCTURE AND ACTIVITIES

CAMOS support is organised around a service level agreement (SLA) between the ARTAS users and EUROCONTROL, which defines scope and volume of work as well as response time for user requests. ARTAS users maintain a LAMOS (Local ARTAS Maintenance and Operational Support) team which addresses the EUROCONTROL CAMOS team (ECAMOS), located in Maastricht and Brussels. ECAMOS is responsible for initial analysis of requests, and assignment of priorities. COMSOFT's CAMOS (CCAMOS) team performs required actions, including troubleshooting, problem resolution or implementation of ARTAS change requests. Priorities are assigned and tracking of status of each assigned task accompanies the troubleshooting process when resolving a problem.



CAMOS Structure

The ARTAS User Group (AUG) oversees all CAMOS activities and manages corresponding actions and developments. In particular, AUG is a representative body of EUROCONTROL member states interested in the continuous development of ARTAS. Meeting three times a year, the group decides on a global level about future developments and strategic decisions around ARTAS. CAMOS activities are an integral part of each AUG meeting and are reported in regular intervals.

CAMOS Service	Service Description
Problem Resolution	ARTAS users may raise trouble tickets for systems in test, pre-operational or operational use. Priorities are assigned and status tracking accompanies the troubleshooting and resolving of the problem. A central baseline and patch repository is accessible to the user from an FTP server.
Change Management	ARTAS users can raise Change Requests that are embodied into the system with the next upcoming release.
Hotline	CAMOS manages a central hotline for all ARTAS users.
On-Site Support	To support ARTAS users CAMOS will visit the site for dedicated trouble shooting, problem resolution or software maintenance.
Documentation	CAMOS maintains ARTAS user and lifecycle documentation. All documentation can be downloaded from a central EUROCONTROL FTP server.
ARTAS Delivery, Installation and Integration Support	As part of the tasking component of the CAMOS contract CCAMOS was entitled to deliver turnkey installations of new ARTAS systems and their integration into the administrations' target environments.
ARTAS Basic Tuning and Fine Tuning	In the same contractual framework CCAMOS delivers tuning services for new sites taking into account the complex interrelationships of external and internal ARTAS parameters.
ARTAS Training	This includes ARTAS Courses for various types of operational and engineering users.

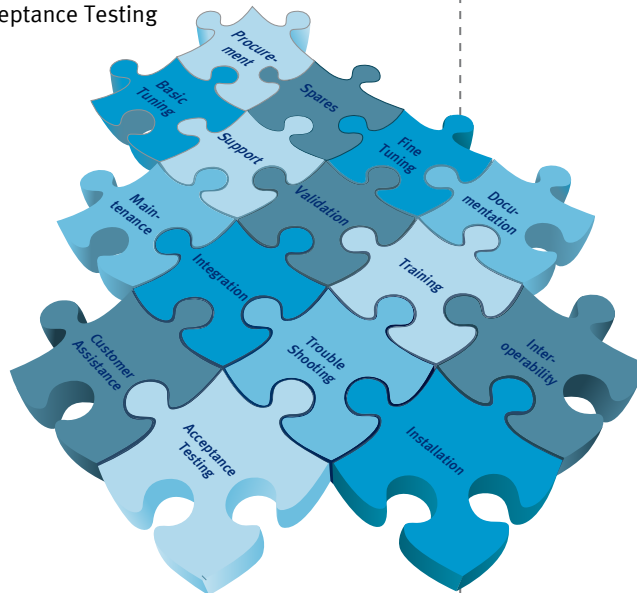
SERVICES AND DEVELOPMENTS

Today, the provision of CAMOS services shape up to a more and more complex mission, due to the increasing number of ANSPs involving ARTAS in operational or test environments. On top of that, the service team encounters an increasing number of software versions, hardware platforms and supported development and system environments. A challenging task is now to keep the quality level of the centralised service high, satisfying the needs of the ARTAS users while being as efficient as ever with respect to product maintenance and evolution.

COMSOFT maintains a strong team of surveillance experts, software development and testing specialists as well as system integration engineers, who work under the rigid quality and safety regime. The scope of offered services is not limited to software maintenance but also incorporates turnkey supply of ARTAS systems, including system procurement, training and tuning at the ANSP's premises in order to assist them with their continued successful use of ARTAS. The offered services include standardised and field-proven training suites, addressing different types of end-user and expert levels, including management, maintenance and LAMOS staff. Training is carried out at the customer's premises by a team of senior ARTAS specialists, all of which are backed by several years of experience in ARTAS development and ARTAS maintenance.

The Services available to ARTAS users:

- Corrective Maintenance: processing of ARTAS trouble reports
- Adaptive Maintenance: processing of ARTAS change proposals
- On-site and off-site support for ARTAS – related support requests
- Setup, installation and commissioning (hardware and software) according to baseline definition and customer configuration requirements
- Delivery and On-site installation, On-site integration and testing
- COTS adaptation and problem solving
- Factory Acceptance Testing, Site Acceptance Testing
- ARTAS Basic Tuning & Fine Tuning
- ARTAS Training & Documentation



ARTAS team



Certificate of training



CAMOS ENTERS A NEW SERVICE AGE

In order to meet the demands of the constantly growing user base and the changing requirements on modern air traffic operations the future focus has to be put on keeping the level up high and even improve the CAMOS service. Additionally and as a result of the growing number of ARTAS installations in combination with an increasing number of operational system platforms, the amount of ARTAS user needs is multiplying. COMSOFT has already induced actions to offer more customised support programmes tailored to the requirements of the ARTAS users, while at the same time extending the flexibility of the support framework.

An important milestone for ARTAS is the development of a new middleware component based on the ARTAS Common Services (ACS). ACS is a library that introduces a collection of middleware services and replaces the predecessor OTS middleware of ARTAS. The ACS development represents a significant improvement of the efficiency of maintenance and development work in the future. An additional benefit is the use of ADA for ACS and the compliance to SWAL 3.

A further important ongoing activity is the evaluation of new platform technologies for ARTAS V8B: it will include the re-hosting of the ARTAS components onto only two physical machines, thus simplifying the ARTAS system and further reducing the ARTAS costs regarding hardware and COTS software investments.

The quality and safety requirements for the ATC community are of paramount importance for ARTAS and are being followed consequently. EUROCONTROL has introduced a plan to ensure ARTAS' conformance to SWAL 3 by 2011.



*Costas Christodoulou, EUROCONTROL:
„As for every product it is not only the functionality, that convinces, but most important are the people, the framework and the services around the product that decide on success, stagnation or failure.“*

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