

ESA's Financial and Invoicing System (EFIS)

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EFIS history

Over the past several years, ESA has been developing and implementing electronic solutions for the management of its financial business, especially in its relationships with industry. Constant progress has been achieved by exploiting new electronic tools as the technology has advanced. In the area of electronic invoicing, the Agency started a pioneering project in 1987 whereby Industry could send invoices directly to the Agency using a commercial network. This evolved through development of the Agency's own system, and in 1991 a further major evolution took place when it was agreed with Industry that the Agency's Electronic Invoicing System (ETIS) would also be used by sub-contractors

involved in the Agency's development contracts. By the use of routing tables per contract, sub-contractors' invoices could be put into higher tier contractors' electronic mailboxes simultaneously. Furthermore, there was then full visibility of the status and progress of those sub-contractor invoices. The great advantage over the circulation of paper invoices was immediately apparent, reducing the approval time in Industry by, in many cases, months. The system was further refined and made even more user-friendly, especially to smaller companies, by the introduction in 1999 of Web-transmitted ETIS invoicing.

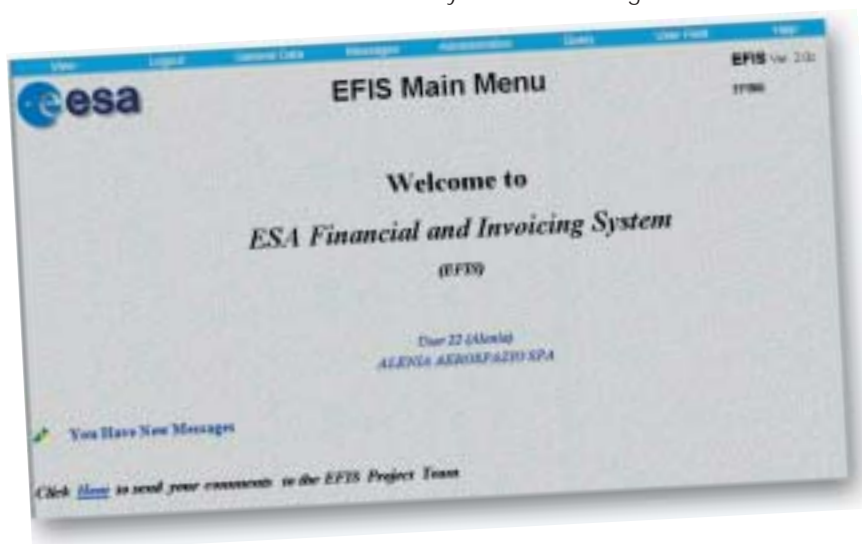
In parallel with the purely invoicing side of the business, financial-management systems for project control have also been evolving, notably FCS, the Financial Control System created for the electronic handling of all contractual and financial data for the Agency's larger Programmes, particularly in the context of the Manned Space Programme and Earth Observation, but also used for smaller projects, such as in the Microgravity area. FCS was also designed to receive invoice and payment data from ETIS, although the two systems were essentially different products. In the late 1990s it was decided that, given the stability of the two systems, the next logical evolution was the complete integration of the FCS and ETIS systems to create EFIS, which would:

The putting into operation of the ESA Financial and Invoicing System (EFIS) marks an important step for the Agency because it introduces a modern tool for end-to-end financial process and contractual management, both in ESA and in Industry. With the introduction of EFIS, which exploits the efficiency of Web-based technology, ESA brings two important aspects of its day-to-day business much closer together:

- **the external relations with Space Industry, which becomes seamlessly connected to ESA across all of the financial processes relating to contracts and payments**
 - **the internal relations between project management and financial management where, thanks to EFIS, the technical progress achieved by projects can be translated immediately into financial planning.**
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- be a pan-European tool for Industry and the Agency for all ESA contract/financial planning and invoice management, being easy to utilise from the largest development contract down to the simplest small contract and purchase order
- provide the basis for all planning, principally milestone payment planning, and invoice status information, and thus for payments and treasury predictions
- replace reliance upon paper transmission and reduce the residual paper requirements to negligible proportions.

Development work on EFIS began early in 1999, the contractor being Datamat Ingegneria dei Sistemi of Italy, under the technical direction of ESA's Informatics Department. The functional management was entrusted to ESA's Finance Department, with full support from a team of experts representing the Agency's Programme and Support Directorates, and Astrium representing European Space Industry. The team has overseen the satisfactory development of the user and system requirements, and the necessary intensive testing activities.



Version V.1 of EFIS was delivered last summer and, following successful testing, the first formal invoice was transmitted by Industry to ESA in September 2000. Migration of existing contracts from ETIS to EFIS for invoicing purposes has proceeded steadily, being completed in May 2001. Development and testing of Version V.2, incorporating the FCS part of the new system, has been completed and migration of existing contracts from FCS to EFIS has commenced in mid-2001 with the GOME and MetOp projects.

EFIS – an integrated E-business tool

For projects, EFIS is an integrated E-business tool for the administration of all financially relevant processes and data during the full life-cycle of an ESA obligation, and provides appropriate levels of visibility and access

privileges for all parties concerned, e.g. ESA, prime contractors, subcontractors and suppliers. It is used by project managers/controllers and contracts officers both in ESA and in Industry to support and maintain all of the financial aspects of the contractual administration, focusing especially on:

- use of a common and consistent methodology and best practice for the financial administration of ESA obligations throughout the entire industrial consortium through the definition of common business processes
- establishment and maintenance of the financial part of the contractual baseline over the full life cycle of a contract
- handling of the complete invoicing and payment administration
- establishment and maintenance of a common data repository for all parties involved in the financial business processes, including querying, reporting and archiving capabilities.

EFIS covers and supports electronically the following key methodology aspects and business processes:

- the preparation and maintenance of the industrial contract structure, reflecting the hierarchy of industrial contracts related to each ESA obligation; the hierarchy information is used to identify the scope of visibility and access privileges of each supplier inside each obligation, and facilitates a unique numbering and coding system
- the setting-up and maintenance of the contract price data, including the associated relevant information like price types, contract subject, subsystems and geographical-return information; this information is stored in EFIS at the level of Milestone Payment Plans (MPPs)
- the preparation and maintenance of MPPs and Development Cost Plans (DCPs), both in terms of financial information and schedule-related aspects, i.e. milestone amounts and milestone dates
- the planning and control of progress achievement and incurred expenditures through the electronic creation and approval of Payment Milestone Achievement Certificates (PMACs), thereby providing the basis for financial forecasting
- the complete cycle of invoice creation and approval throughout the industrial consortium, including the payment process via the interface to the ESA accounting system, AWARDS; this provides visibility of the invoice status information at all contractual levels and at the earliest possible point in the process
- recording and tracing all financial impacts of the contractual change process, thus providing consistent and up-to-date financial status information, including traceability of the contractual baseline and history

- flexible configuration and setting-up of application functionality, e.g. using PMAC, allowing the distribution of responsibilities and user roles in electronic form; this facilitates the sharing of financial administration between ESA and Industry in accordance with the needs and requirements of individual projects, and enables Industry to assign obligation, contract and invoice administration roles to the various parties concerned, i.e. prime, higher tier, and sub-contractors, thereby eliminating the need for independent databases.

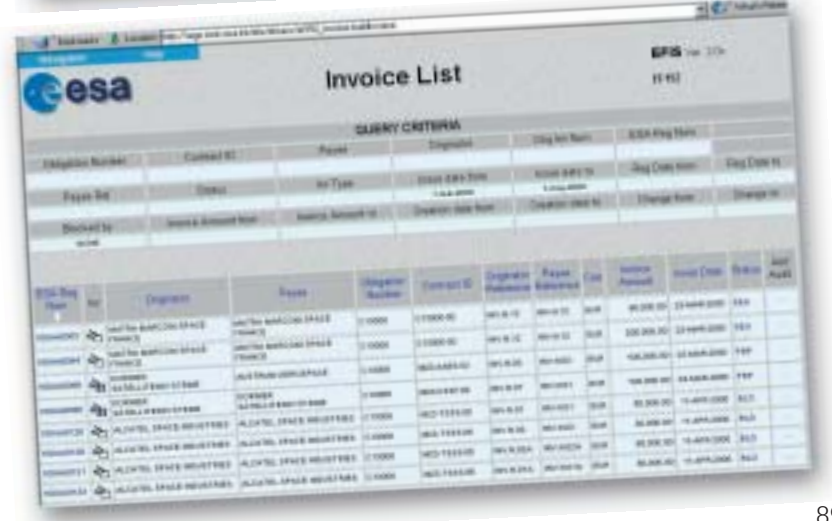
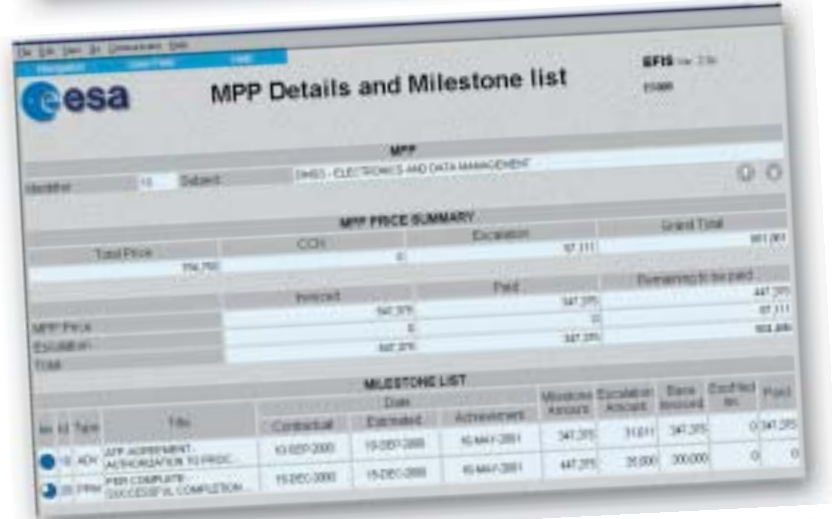
EFIS – benefits and synergies

By using EFIS, an integrated financial administration tool for *all* ESA obligations, there are many benefits and synergies for the users in the contractual and financial administration disciplines in ESA and in Industry:

- The use of a common methodology and a common data repository for all parties involved in the financial administration of contracts avoids significantly the duplication of effort both in ESA and Industry, improves the data coherency and data quality, and thus increases the efficiency of the financial administration.
- EFIS covers the entire financial data life cycle of an ESA obligation, from the Authorisation to Proceed (ATP) until the contract close-out, including the recording of all financial impacts of contract changes, in a single integrated application.
- EFIS provides an automatic and systematic linking of the invoicing and payment process and the related information to the contractual data set, such as milestones, escalation, contract change notices and riders, etc., thus linking the financial information to project information. This not only eliminates queries and possible rejections, but also speeds up the processing with commensurate cash-flow improvements, both in predictability and actual performance for ESA and Industry, the former providing essential support for the Agency's Budget Management System.
- EFIS provides an instant and common view for all parties involved of financial and contractual status, including the related history and planning.

EFIS as part of the ESA MIS architecture

The 'heart' of the EFIS system is a major component of the ESA MIS (Management Information System) architecture (Fig. 1). It is one of the satellite systems of the Financial Ledger, interfacing with the AWARDS components (namely with Payables) and being the natural gateway to external systems used by ESA and Industry.



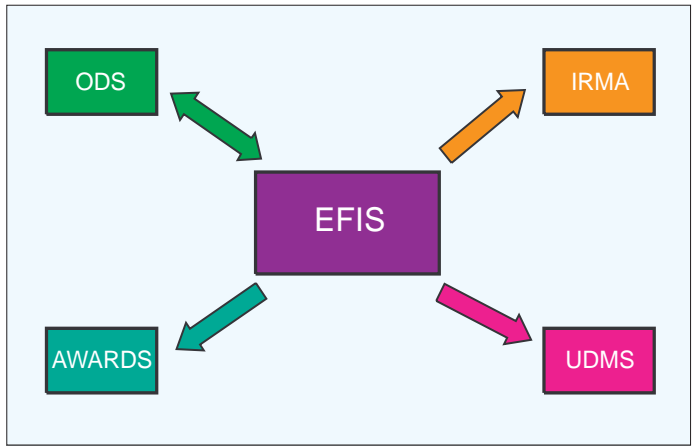
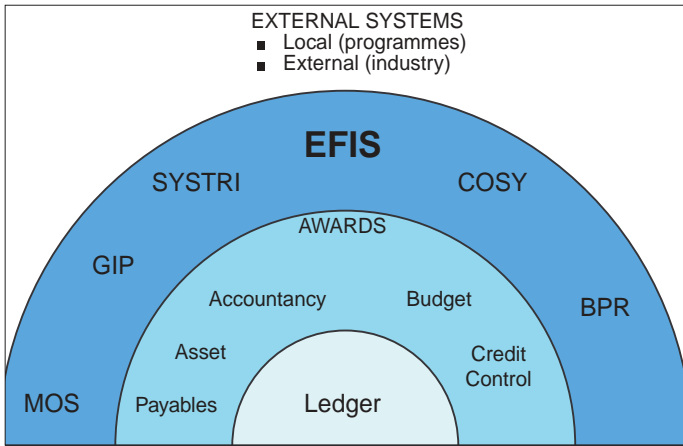


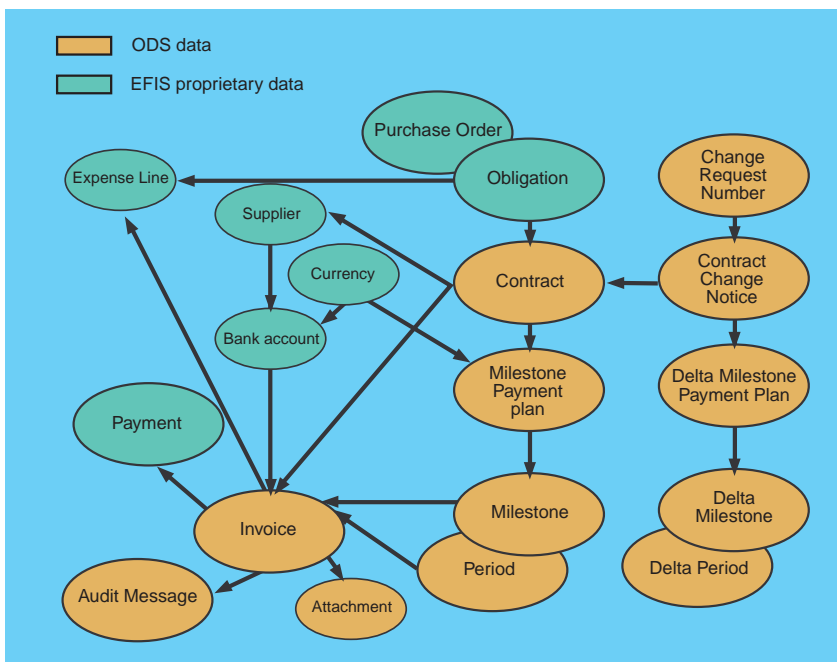
Figure 1. EFIS, a core component of the ESA Management Information System

Figure 2. EFIS at the centre of ODS, IRMA, UDMS and AWARDS

EFIS has several connections with the other MIS components, namely (Fig. 2):

- ODS (the Operating Data Store), which is the source system for ESA corporate data (Fig. 3): obligations, suppliers, bank accounts, country/currency codes, budget-line codes; all of these data are automatically imported into EFIS on a daily basis.
- AWARDS, which is the ESA financial system where payments are authorised; invoices entered in EFIS are sent to AWARDS as soon as they become registered on a daily basis.
- UDMS (the User Data Management System), which is a system for user definition and authentication; it is used by EFIS and by most of ESA MIS applications (e.g. ETIS, COSY, EMITS); users already logged-in to an ESA application through UDMS can reach EFIS without performing a new log-in.
- IRMA, which is a system used to access ESA corporate data through a Web interface: ESA users, starting from ODS data imported into EFIS (e.g. budget-line codes), are allowed to follow hyperlinks (URLs) to the IRMA system (e.g. budget-line details).

Figure 3. The ODS tree



The architecture of EFIS system is based on the most modern technologies; it is a Web application accessible on the ESA Intranet for ESA users and via the public Internet for users in Industry. The central database (and the application) is built with Oracle and is located at ESRIN.

The high-level EFIS system architecture is outlined in Figure 4. At this level of detail, we can distinguish the following components or groups of components:

EFIS Web Client

The EFIS Web Client module provides access to financial and invoicing functions for users who wish to access EFIS services via the Web. It is based on a standard Web browser (i.e. Netscape or Internet Explorer) and the EFIS Web application is completely hosted on the central server site.

EFIS Java Client

The EFIS Java Client module allows users accessing EFIS from an Intranet connection to browse, enter and modify EFIS data using a Java-based application, providing more flexible and more user friendly access to the information.

EFIS Web Servers

The EFIS Web Servers are located outside the ESA firewall for Industry users and inside the firewall for fast access inside ESA. They are standard Oracle Application Servers (OASs), responsible for handling connections between the clients and the central database using the HTTP protocol.

Query, Reporting and Data Analysis Module

This module is built using a commercial off-the-shelf (COTS) package, configured specifically for EFIS needs, in order to cover the query, reporting and data-analysis areas. The COTS package used (also as the corporate tool) is WebIntelligence/Business Objects; this product is the leading query, reporting, and analysis

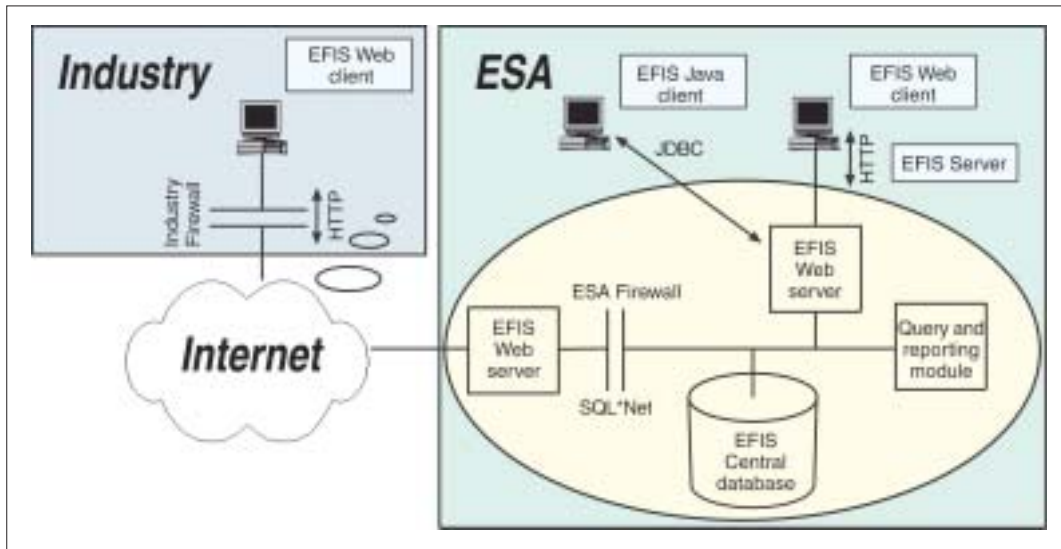


Figure 4. The EFIS high-level system architecture

solution for the Web. In particular, WebIntelligence enables users to access, analyse, and share corporate data using a simple browser as their interface, whilst still maintaining tight security in terms of data access. This module is used to produce printouts, to generate interactive reports in which users can 'drill-down' from aggregated amounts to individual elements, to generate ad-hoc queries, and to produce graphical charts that also include drill-down capabilities.

EFIS Central Database

The EFIS central site, which is the core of the system, is an Oracle 8i database that stores all the EFIS data (and related constraints to ensure data integrity and consistency) and procedures that include the implementation of the business logic behind the database transactions. These procedures dynamically generate the HTML pages and provide them to the EFIS Application Server.

EFIS security

EFIS contains delicate commercial/financial data, which is therefore protected and accessible only to authorised persons. Any user requiring access to EFIS has to have a log-in password provided by the ESA help desk. The authentication mechanism is the same as for other ESA applications (i.e. DODIS, EMITS, COSY), allowing authorised users to have only one log-in account for several systems. Once logged in, data visibility is governed by a strict view/modify access-right policy, according to the different roles assigned to each authenticated user. A data-ownership check is made every time a query, insert or update command is submitted to the system.

Security is further enhanced by locating the database server holding the sensitive data inside the ESA firewall. External users (Industry) access the data via the Internet

through a dedicated front-end that is outside the ESA firewall and contains only the Oracle Application Server component and not the data. The Secure Socket Layer (SSL) protocol will shortly be installed in this server to facilitate encrypted data traffic.

Financial transactions related to the payment of invoices are not executed in EFIS, but in the totally separate ESA accounting system (AWARDS) and then only by authorised ESA Finance Department staff. Similarly the master database for bank accounts is not held in EFIS and changes can only be made in AWARDS first, and when accompanied by written/signed authorisation from the appropriate supplier.

EFIS – a tool for the present and the future

EFIS is now operational, with invoices being routinely transmitted. All remaining ETIS contracts are migrated to EFIS. The first full migration of the technical, FCS, part has begun and EFIS is well on the way to being the pan-European tool so desired by the Agency and Industry, through whose joint collaboration this very ambitious project has been realised. The next phases involve consolidation and expansion, extending the economic and efficiency benefits to all contractual parties, no matter how large or small, be they Prime Contractors, Small and Medium-sized Enterprises (SMEs) or simply purchase-order contractors. For ESA in particular, this tool offers the possibility to redesign in a more efficient way the processes related to the physical handling and approval of the financial part of contracts and of the invoices. It is reasonable, therefore, to look further ahead to a common and efficient tool for all, providing an entirely linked electronic contractual/financial planning, processing, approving, paying and archiving future!