The UK Intrastat web-form

(Extract from 'Web-forms for Intrastat, Eurostat, March 2000)

Overview

The UK Intrastat web-form is a Java applet which is downloaded by a user from the HM Customs and Excise website onto his or her own PC. It can then be used off-line to prepare Intrastat declarations, which are subsequently up-loaded to the HM Customs and Excise web-server, which passes them on to the mainframe statistical processors. It can also accept a CSV file produced by another piece of business software as input.

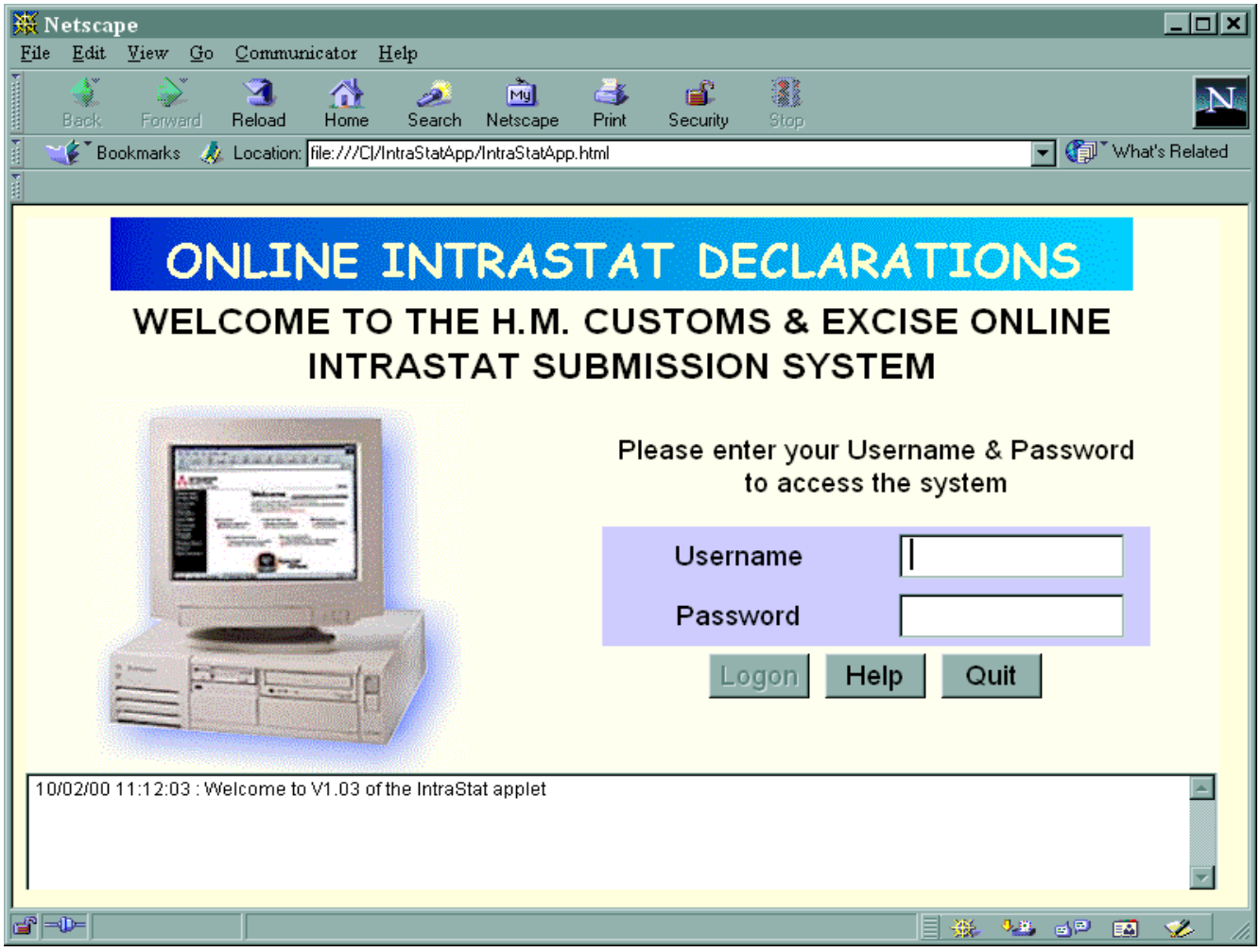

Figure 1: First page of the UK Intrastat web-form

Security is achieved by a system of direct person-to-person contact and registration, with the assignment of user names and passwords.

Implementation took a total of 2.5 staff.years over an elapsed time of less than a year. The system has been running live since January 1999.

The introduction of the form has been a great success and take-up by users has been rapid. About 1200 users registered to use it in the first 4 months of availability. By the end of May 1999 about 3% of the total number of items were declared using the web-form. By the end of 1999 the number of users had risen to 1735.

Functionality

The main functions offered are:

- user authentication,
- create a new Intrastat declaration (arrivals and despatches, or 'nil'),
- edit an existing or partially complete declaration,
- submit a declaration via the internet,
- import a CSV file and submit it as a declaration,
- on-line validation of data input,
- on-line help,
- updating of user information (VAT number, status, etc.),
- on-line validation that the user is using an up-to-date version of the software.

A more detailed description of these is given below.

The user's view

First information

The user can find information about the form via the HM Customs and Excise home page at http://www.hmce.gov.uk (or by following the link from the UK government home page at http://www.open.gov.uk). Links from this page take him to the Intrastat page and the 'Intrastat Supplementary Declaration via the internet' page. From here there are further links to pages for 'Off-line Electronic Form', 'Comma Separated Values (CSV) File' and 'How to use the Electronic Form or the CSV File'. Figure 2 gives an overview of the basic interactions in the system.

Registration

To get any further than the 'information' screens, the user must contact the Tariff and Statistical Office Help Desk by e-mail or telephone.

The Help Desk verifies that the applicant is a genuine registered Intrastat trader and assigns him a user name and password. The user name comprises the first three characters of the trader's name followed by his VAT registration number. The password is an eight-character string of their choice with at least one of the characters being numeric. He is also given instructions on how to obtain and use the form and the CSV file facility.

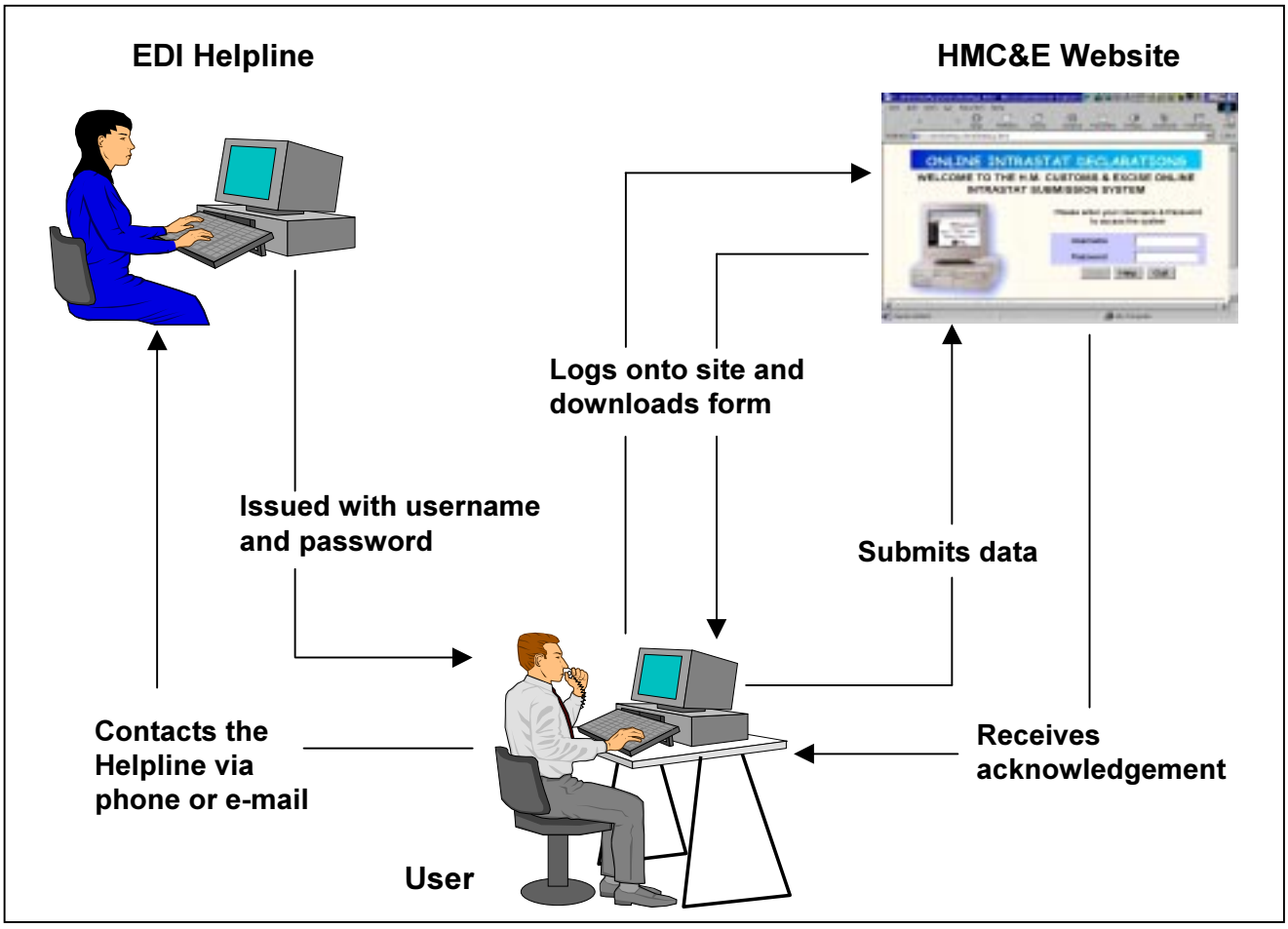

Figure 2: The user's view of the UK Intrastat web-form

Off-line electronic form

The off-line electronic form is a Java applet which is down-loaded from the HM Customs and Excise website to the user's PC. It enables the user to input their Intrastat declaration to an electronic form whilst not connected to the internet and then to connect to the internet and send the declaration. This minimises the cost of connection time for the user and reduces the load on HM Customs and Excise's web server.

Comma Separated Values (CSV) File option

The CSV file facility enables a user to up-load bulk data to the Intrastat web-form using a Comma Separated Values (CSV) file, again whilst not connected to the internet, and to later connect and send the declaration. This is of particular use to businesses using business software from which they can easily extract the data required for the Intrastat declaration as a CSV file.

The website gives a full definition of the structure of the CSV file which must be submitted.

Installation

Using the user name and password the user can download the electronic form from a different part of the website. The files are quite small (a total of 800KB), and this is quite quick. During this process the user is prompted to give permissions to the application to perform certain operations on his PC,

and a degree of risk is stated for each of these. If any of these permissions is not given, the electronic form can not work.

The downloaded file is a self-extracting application which installs itself on the PC. The user is encouraged to bookmark the login page (which is a file resident on their c: drive) in their browser. It is also advisable to set up a short cut so that the application can be run directly from the desktop. When this short cut is invoked, the application on the PC is started and the user is again asked for permissions. Again, to use the form these permissions have to be granted. There is an option to 'remember' the granting of permission, so that the user is not prompted every time the form is used.

Permissions

The permissions required are:

- 'Reading information stored in your computer, such as your user name' (low risk).
- 'Reading, modification or deletion of any of your files' (high risk).
- 'Contacting and connecting with other computers over a network' (high risk).

On-line help

A small Help window is provided to assist new users. The Help application is held on the PC so there is no delay for connection to the HM Customs and Excise server each time help is requested. A 'Help button' is also included on each screen.

Logging on

Before they can go any further, the user has to log on, giving their user name and password. At this point the application automatically connects to the HM Customs and Excise server via the internet and the server validates the user and checks that the version of the electronic form application resident on the PC is up-to-date. This is a very quick process. If the software is not up-to-date, a series of dialogues leads to the downloading of the latest version of the software before the declaration can be proceeded with. In this way, version control of the electronic form is ensured.

If the user name, password and version are correct control is returned to the Java application on the PC and the user can choose to break their internet connection and work off-line.

Functions offered

The user can now choose to create a new declaration, edit an existing declaration, submit a declaration or import a CSV file. There are also options for user administration (such as locking the application with a password).

When creating a new declaration the user specifies either Arrivals or Despatches and is presented with the appropriate input form (pink for Arrivals, green for Despatches, to mimic the paper forms) which permits lines of trade to be entered.

The user can save the declaration when it is partially complete and return at any other time to edit it and add further items. In this way, a return can be compiled daily if required during the course of the month, and submitted when complete at the end of the month. Declaration files are held on the user's PC in 2 folders ('Pending' and 'Processed') and can be kept for historical purposes for as long as needed, or returned to for correction later if necessary.

Validation

The Java applet permits a certain amount of validation of the input data for correct format and acceptable values, and for cross-field checks. Invalid fields are highlighted on the screen by colour and by a system message. An item containing invalid fields can not be saved and therefore can not be submitted.

The administration's view

From the administration's point of view there are a number of important features about this development.

The objective of the system could be stated simply as 'to increase electronic submission of Intrastat data'. But this expression includes a number of factors which are relevant:

- Submission via the internet was a facility being asked for by the users.
- The introduction of the facility has helped HM Customs and Excise to justify the removal of the facility to submit declarations as plain paper schedules.
- The increase in electronic transmission reduces the cost of keying Intrastat data for HM Customs and Excise. It is estimated that the system is saving about half a staff.year per month of keying resources. At this rate it will only take about 6 months to pay for itself.
- The validation function built into the system improves the quality of the declaration submitted by preventing invalid data from being sent.
- The system has been regarded as a pilot for other potentially much larger applications, such as the VAT declaration, which also come within the responsibility of HM Customs and Excise.
- The system solves the problem of version control and distribution of an electronic form.
- The nature of the technology involved made it possible to complete the development quickly and cheaply.

Technical view

The basic architecture of the system is best represented diagrammatically in figure 3.

Implementation language

The whole system is implemented in Java – there is no Javascript and no HTML. Normally Java runs in a 'Java virtual machine' (also known as the 'sand box') within the PC and can not perform any operations outside this. However, for a successful off-line form, the applet must be able to work outside the 'sand box'. For example, it needs to be able to create and update files on the c: drive and it needs to be able to connect to, and communicate with another computer over a network.

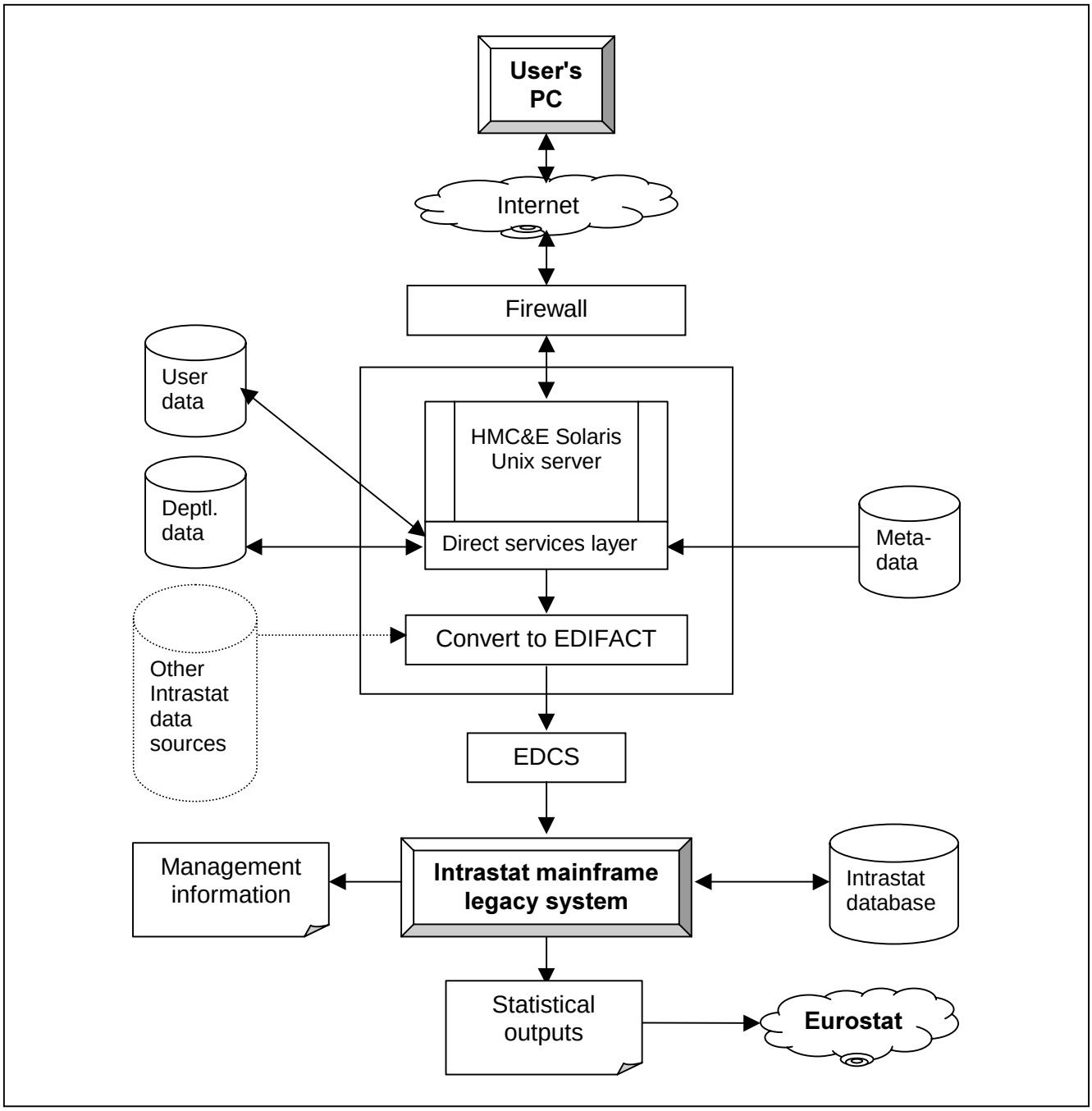

Figure 3: The basic technical architecture of the HMC&E off-line electronic Intrastat form

Minimum system requirements

The minimum system requirements to use the off-line electronic form or the CSV option are:

- 32-bit bit PC,
- Windows 95 (or above) or Windows NT,
- Internet access,
- Netscape Navigator version 4.5 (or above) or Internet Explorer version 4 (or above),
- a screen resolution of 800 x 600 (recommended minimum),
- if access is through a proxy server or firewalls, the port needs to be opened to 44544 as well as port 80.

HM Customs and Excise have consciously decided not to use the latest state-of-the-art hardware and software to make the form accessible to as wide a range of users as possible.

Trusted applets

The solution to this problem is 'applet certification'. The Java applets are approved and certified by Verisign. Verisign is a body which independently authenticates the source of the code and the *bona fides* of the deliverer (i.e. in this case HM Customs and Excise); they then issue a certificate certifying that HM Customs and Excise asserts that the content is safe. The Java applets are then known as 'trusted applets'.

It is important to stress that Verisign do not inspect the code. They only verify that it really does come from HM Customs and Excise, and that HM Customs and Excise say that it is safe. So, it really is a matter of trust – if the user trusts HM Customs and Excise, they will be confident that the application will not corrupt their PC and will decide to down-load it. If they do not trust HM Customs and Excise, they will decline to use the system.

Use of XML

XML is currently not used. The developers are considering how to use it for the European Sales Listing. They expect XML to be more useful for web infrastructure and interfacing with legacy systems (e.g. fetching the user's name and address from a mainframe system when a VAT registration number is keyed into a web-form).

They also expect it to be very useful for increased validation and credibility checking of input data.

Another potential application is external data passing, i.e. using XML instead of EDIFACT. This development is expected to be trader driven if it happens, rather than HM Customs and Excise driven.

Security

Encryption is not used and this has not caused any problems, either technically or with users concerned about the safety of their data. There are plans to implement SSL (Secure Socket Layer) security in a future release.

Validation

The Java application permits a certain amount of validation of the input data for correct format and acceptable values, and for cross-field checks. Invalid items can not be saved, and therefore can not be submitted. This means that returns submitted via this system are guaranteed to contain valid data (not, of course, guaranteed to contain correct data!). This validation is fairly limited though, and does not include reference to the CN8, for example. HM Customs and Excise intend to strengthen this aspect of the application in future developments and this is an area where the use of XML could potentially help.

The project view

Approach

The project has been run as a small-scale development by in-house specialists with some assistance from contract staff. From the start the volatility of the technical environment and the need to use rapid development methods was appreciated. The total elapsed time between starting the project and making the first version of the application available on-line was less than a year. Table 1 below gives a few key project milestones.

Initially the Intrastat web-form was developed by an external consultant under in-house management, on an *ad hoc* basis, in order to test the feasibility of the idea. This produced an electronic form as a Java-based application which could be transferred from machine to machine via floppy disk. The next stage was to convert this to a web-form, so that the Java applets could be delivered via the internet, and at this stage the project started to be managed on a more formal basis.

Resources

The project has used between 1 and 3 staff full time at different stages of the development. The total resources required for implementation were 2.5 staff.years. In addition, there is an ongoing requirement for 1 developer to work full time on further developments and enhancements to the service and on system maintenance. The breakdown of this is shown in table 1.

Project timetable and resources

Project milestone	Date	Resources
Start	February 1998	
Java version on floppy disc	July 1998	2 full time developers
Web version	December 1998	3 full time developers
CSV option	January 1999	
Live	January 1999	
Ongoing	Development and maintenance	1 full time developer

Table 1: Project timetable and resources (UK)

Take-up

The web-form was originally targeted at smaller traders, who already had a PC with internet access, but who were not large enough to have been able to justify the purchase of bespoke or off-the-shelf software to help them make Intrastat declarations. It was argued that the minimal cost of downloading the software would encourage many traders in this category to submit their returns electronically. The benefit to the user was seen as ease and convenience, while for the administration the advantages are a reduction in the cost of collecting the data (by keying) and an improvement in the quality of the data received (as a result of pre-submission validation checks).

Initially they have mainly targeted traders who were submitting plain paper schedules, of which there were about 6000. The take up by July 1999 was 1500. They do not plan to extend coverage to the other 25,000 potential Intrastat traders until they can be assured that they have a reliable system to offer, and that the mainframe gateway has sufficient capacity.

The implementation has been a great success and take-up has been good. In the early months there were more requests to register than the new Help Desk could process and there was therefore a waiting list of new users. By the end of May 1999 about 1200 users had registered to use the system. This represents about 3.5% of the total number of Intrastat traders, and therefore a higher percentage of the potential users, as the form is not targeted at all Intrastat traders. About half the registered users used the system to submit their Intrastat declaration in May 1999, totalling over 150,000 lines, or about 3% of the total number of lines received. By 31 December 1999 the number of users who had been given approval to use the system had risen to 1735.

The average number of lines submitted per user was about 260 and the highest number of lines under a single header was nearly 2900. This indicates a high use of the CSV facility and possibly also indicates that the system is attracting more relatively large traders than was anticipated.

Lessons learnt

The lessons learnt from this implementation can be divided into ‘technical’ and ‘non-technical’.

Technical lessons

The principal technical lesson which has been learnt concerns the port used for connection to the internet. The developers chose to use a specific dedicated port (44544) as a TCP/IP socket, rather than a standard HTTP socket (on port 80). The reason for this was that this is faster and more efficient for data transfer in volume.

While this has worked well for a user who is using a stand-alone PC with direct access to the internet, it has caused major problems for those who access the internet through a proxy server and firewall. Although these problems have been solvable on an individual basis, this single factor is thought to have been a major barrier to take-up.

Furthermore, the problem is not proving very easy to resolve – it is not easy to use HTTP for large file transfers!

The developers also found problems in writing code which took into account the frequent new releases of Java and net browsers.

Non-technical aspects

Apart from the technical implementation of the computer systems, there have been a number of non-technical impacts of introducing the new system.

Help Desk

The new system has required the formation of a completely new Help Desk to support it. This involved an internal re-organisation in order to make 3 staff available to run it, and these staff have needed training. A complication was that the load of the job was difficult to anticipate and as the Help Desk is responsible for registering all new users it is a potential bottleneck. However, as it is also the 'shop window' for potential new users it can therefore have a very important effect on the take-up of the system.

The daily workload of the Help Desk at the height of the promotion was about 30-40 phone calls, 20 e-mails and a few letters, but by the end of 1999 this had dropped to about one phone call and seven e-mails per day, and only about two letters per week. It was found that IT specialist staff were required. They need to have considerable knowledge of not only the e-form but also all other types of EDI, Intrastat and the internet. They are also finding that they are having to educate the traders in how to use software packages like Excel to enable them to use the CSV option.

Office procedures

The operation of the Help Desk and their liaison between the public, the information technologists and the statisticians, has required the development of new working procedures.

Publicity

A considerable publicity effort has been required to make sure that all potential users of the system are aware of the new facilities and their benefits. The project used mailshots, articles and advertisements in certain commercial publications, exhibitions, and information on the HM Custom and Excise website. Seminars, and now workshops, for the Outfield staff were also organised.

The most successful of these was the mailshot.

Need for an overall strategy

The Intrastat web-form is the first of its type developed by HM Customs and Excise (and possibly the first in UK government services). It has been regarded as a test bed for potentially far larger applications, such as the VAT declaration.

With a view to the likely future expansion of this method of offering services, HM Customs and Excise is trying to create a generic framework for e-commerce. This means generalising the technical architecture to make it extensible to cover other applications.

These investigations are exposing questions such as:

- The need for a common user interface – the Department wants to present a single face to the public, with a common 'look and feel'.
- The need for a single point of access, or 'front door', so that the public can easily find the service they need.
- The integration of e-commerce with e-publishing – for example, the help facility for an electronic form can be implemented as hyperlinks to guidance already published electronically elsewhere on the website.

This work is also indicating a number of core technical functions which can be implemented once and used many times, such as:

- log-on,
- security,
- archiving,
- audit trail.

Future plans

Plans for the immediate future include:

- to bring the system into line with future electronic systems, including the VAT100,
- to share common modules which will control aspects such as, security and archiving,
- to improve usability (e.g. provide a function to allow the printing of returns, and improve the retrieval of archived files),
- to implement an on-line form (announced on the website as 'coming soon'),
- to include validation against CN8,
- to give on-line access to CN8,
- to implement Secure Socket Layer security (SSL),
- to migrate the form to XML.

There are no concrete plans yet for:

- improved validation against data held in 'back office' mainframe systems,
- extending file input options to cover other file formats such as EDIFACT,

although these are all possible developments.

In the long term it is possible that they may drop EDIFACT entirely, since with the electronic form they know what data is coming in without needing the full EDIFACT protocol to identify it. But this would require a rewrite of the legacy processes which at present require their input data to be in EDIFACT format. However, it is worth noting that the next version of the electronic form for the VAT declaration is expected to be non-EDIFACT.