Implementation of the web-based data collection channel
eSTAT for economic entities

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Abstract

The paper presents the functionality and implementation process of the web-based system of Statistics Estonia called eSTAT. eSTAT is designed for economic entities (enterprises, state and local government agencies, non-profit organisations, sole proprietors) for compiling and transmitting statistical reports within the framework of conducting official statistical surveys. Within Statistics Estonia eSTAT serves as a part of customer relationship management system, where contacts with respondents are held and recorded.

eSTAT was launched in February 2006 and in the same year eSTAT was declared the Best Innovation in the public sector of Estonia by the State Chancellery of Estonia.

The working language for eSTAT is only Estonian.

Keywords: electronic data collection, web-based survey, response burden

1. Presentation of Statistics Estonia and its data collection system

The task of Statistics Estonia is to reflect the environmental, demographic, social and economic situation in Estonia and changes occurring therein. To this end, it conducts official statistical surveys, i.e. collects and processes data and publishes official statistics in accordance with internationally acknowledged principles and quality criteria (European Statistics Code of Practice 2005).

For the purpose of producing official statistics, data have for years been collected from economic entities (enterprises, state and local government agencies, non-profit organisations, sole proprietors, hereinafter enterprise) mainly on the basis of mail-survey. Statistics Estonia sent the questionnaires to enterprises where they were completed and thereupon sent back to Statistics Estonia. For some time already enterprises have enjoyed the possibility of submitting statistical reports by forms in the MS Excel format to be downloaded from Statistics Estonia’s web site. In 2006, in addition to the above two variants, another channel for data transmission was taken into use — a web-based system for compiling and transmitting statistical reports called eSTAT.

eSTAT is designed for enterprises whom Statistics Estonia has informed of their obligation to submit official statistical reports within the framework of conducting official statistical surveys. This target group has had a possibility of using e-tax board already since 2001. The main difference of eSTAT lies in the fact that while all enterprises have to submit data to the Tax and Customs Board on annual basis, then only part of them are liable to submit reports to Statistics Estonia because, with a view to reducing response burden, sample surveys are used in official statistics. This means that in each economic activity within each enterprise size group, data are collected only from those enterprises that have been included in the sample. Such a list of enterprises is drawn up anew for each year. While big enterprises mostly find themselves to be included in the sample, then medium-sized or small enterprises may be subject to submitting a statistical report to Statistics Estonia in a particular year, but not necessarily the following year.
Therefore, only the enterprises that have been informed by Statistics Estonia of their obligation to submit statistical reports have the possibility of using eSTAT as a data transmission channel.

Since August 2004, Statistics Estonia has centralized the data collection tasks of the value-chain of production of official statistics into a specific unit, which serves all subject matter units with raw data (Generic Statistical Business Process Model 2008). The aim of the central unit is to collect data from individuals and enterprises, and to enter data from all types of statistical reports into a raw database. The data collection unit is an owner of eSTAT system and responsible for its development according to the needs of external and internal users.

For a long time, service to respondents at Statistics Estonia was report-based, i.e. in case of questions about a particular statistical report, a respondent could contact a specialist in the relevant statistical domain. This way, a highly professional service concerning one particular report was guaranteed. In 2005, the operation principles for the user support centre as a part of data collection unit were worked out at Statistics Estonia. In February 2005, operation of the centre was tested with two employees. In connection with the implementation of eSTAT, Statistics Estonia’s exchange system was supplemented with an integrated call centre and the number of front line staff was increased. Today, the respondents can call at 625 9100 and e-mail to klienditugi@stat.ee for questions and information about all the reports to be submitted by enterprises irrespective of the domain (e.g. construction, trade, wages and salaries, etc.).

2. Functionality of eSTAT for external users


For joining eSTAT, an enterprise shall present an identifying application which can be downloaded from the opening page of eSTAT, printed out and mailed back or compiled and signed digitally right at the same place.

eSTAT enables the external users, i.e. respondents, to do the following:

1) to view the list of statistical reports, which the particular enterprise has to present to Statistics Estonia during the current year;
2) to view deadlines for presenting these statistical reports;
3) to order reminders, which notify by e-mail about upcoming deadlines;
4) to compile statistical reports, i.e. to fulfil cells on the Net with data;
5) to run controls, i.e. check whether they have compiled the statistical report as required;
6) to correct statistical reports immediately upon compilation thereof;
7) to submit statistical reports to Statistics Estonia;
8) to look at all earlier statistical reports submitted to Statistics Estonia via eSTAT by a respondent concerned;
9) to print out a paper copy of a compiled statistical report;
10) to administer users, i.e. to create, change and cancel rights and access;
11) to accept or correct one’s contact information.

Since 2009, an additional function is available which allows a respondent to download from eSTAT a statistical report as a csv-fail, fulfil it with the data from the respondent’s bookkeeping or personnel recording system and upload it again via eSTAT. That function is particularly meant for large enterprises with a big number of records such as the Intrastat statistical report and some statistical reports on wages.
Although a respondent is an enterprise, only a private person has the right to log on to eSTAT. One person (a contact person) can submit reports of several respondents (e.g. an accountant working with an accounting company) and, reports of one respondent may be submitted by several persons (e.g. an accountant, personnel executive and company manager complete different reports). An official representative of an enterprise shall determine who specifically can submit and amend statistical reports on behalf of the particular enterprise. In order to enable the contact persons of enterprise to submit data via eSTAT, Statistics Estonia will create the so-called main user for the enterprise. The main user in turn has the right to create users. The use of eSTAT by only authorized persons ensures that each user sees only the data needed for his/her work.

Figure 1. Opening page of eSTAT

eSTAT enables secure data transmission. The security is guaranteed by the implementation of modern means of IT security measures. As Figure 1 shows, one can log on to eSTAT either through the Internet Bank (Swedbank, SEB or Sampo) or by using the ID-card. The connection between a computer and eSTAT will be encrypted.

For security reasons, the eSTAT session closes down after a while upon a respective notice when a respondent has forgotten to do it after ending work with eSTAT.

3. Functionality of eSTAT for internal users

eSTAT at the disposal of Statistics Estonia’s specialists enables the following:
   1) to describe statistical reports in the system, i.e. to add them;
   2) to define controls for statistical reports described in the system;
3) to follow inflow of statistical reports and to send reminders;  
4) to register contacts with respondents;  
5) to see the time and the content of contacts with respondents;  
6) to see and correct contact information of enterprises which can deliver reports via the system;  
7) to compile statistical reports (e.g. when receiving them by phone);  
8) to view and correct statistical reports compiled by respondents;  
9) to administer external main users and internal users;  
10) to create empty statistical reports in pdf-format for printing out or saving them as a file for different administrative purposes.

Resulting from the functionality, eSTAT is used by different units within Statistics Estonia. Methodologists or similar specialists physically describe statistical reports by rows and columns in the system, define controls to them, link concrete questions with necessary classifications from the metadata base, etc. As, after a statistical report has been described in the system, there also exists a data entry programme for that report, the data from statistical reports received by Statistics Estonia on paper are keyed into the eSTAT-assisted digital format by the data collection unit. The same unit also follows the inflow of reports and records contacts with respondents. The subject matter statisticians mainly receive raw data from the system, but may also get reports on the inflow of statistical reports or overviews, and record contacts with respondents.

Figure 2 witnesses that the working language for eSTAT is only Estonian, for both external and internal users. In case an external user needs, the front line staff may supply him/her with prompt translation.

Figure 2. Opening page of eSTAT for internal users
4. Technological description of eSTAT

eSTAT has three layers: database (Oracle DataBase), application layer (BEA Weblogic Java EE application server), web-based user interface (HTML, AJAX, JavaScript).

Figure 3. Architecture of eSTAT

Figure 3 presents the architecture of eSTAT which consists of five components.

1) ADF is a two-layer component, programmed in Java SE, for describing statistical reports (number of rows and columns and their content) to be submitted by economic entities. These reports are described by generating Java Server Pages. Controls are also defined when describing reports. These controls apply each time when an external user (data supplier from an economic entity) confirms its statistical report. In addition, ADF enables to convert statistical reports into the pdf-format.
2) UNSI is a two-layer application, programmed in Progress, for data entry into the database of eSTAT from statistical reports received on paper.

3) ARU administers information on submission of statistical reports, contacts and reminders;

4) EVE administers data of economic entities (linked to the statistical business register);

5) META administers classifications (linked to the meta-data base).

On 21 January 2009, the total size of the database was 208 GB.

The outsourced development of eSTAT cost 9.9 million EEK (ca 0.6 million EUR) in total during 2005–2008. The biggest challenge for developers has been to make the structure of eSTAT as simple as possible and navigation for data suppliers therein as easy as possible. Besides, the ADF component has been redesigned for three times already in accordance with the development needs related to switching from the paper-based data collection to the collection of digital data only.

5. Implementation process of eSTAT

The initial implementation of eSTAT was organised as a project which lasted from 25 August 2005 to 31 March 2006. The main project team and altogether 14 sub-teams responsible for sub-projects were involved. eSTAT was launched on 8 February 2006.

Each year about 40,000 enterprises have to submit statistical reports to Statistics Estonia. A respondent has an obligation to submit about 2–3 statistical reports, in most cases 1, rarely about 30.

In 2006 a total of 21 different statistical reports could be submitted via eSTAT. Given that in eSTAT primarily those reports were included which number of respondents was higher, then about half the enterprises (17,000) could join the system and transmit at least one statistical report via eSTAT. In practice, more than 3,500 main users joined eSTAT within the first ten working months. This accounts for 20% of those who in 2006 had the possibility of submitting at least one report via eSTAT. 60% of the joined entities were relatively small with up to 19 employees. 75% of those who joined were enterprises, thus the private sector was a more active joiner than the public sector.

In 2007 already 77 different statistical reports could be submitted via eSTAT, but in 2008 eSTAT was already used for the electronic data collection of all 178 statistical reports meant for enterprises irrespective of the statistical subject matter area. As a result of that, already 35% of statistical reports of enterprises were presented to Statistics Estonia via eSTAT in 2008 and about 33% of potential main users had joined the system.

Thus, more main users have joined the system and an ever increasing number of statistical reports have been presented via the system (see Figure 4).

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of main users as of 31 December</th>
<th>Number of submitted reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>3,500</td>
<td>23,400</td>
</tr>
<tr>
<td>2007</td>
<td>6,700</td>
<td>53,600</td>
</tr>
<tr>
<td>2008</td>
<td>13,200</td>
<td>100,600</td>
</tr>
</tbody>
</table>

Figure 4. Main users and submitted statistical reports
Aside from the growing number of statistical reports described in the system and the concomitant growing number of main users of the system, the functionality of eSTAT has been rapidly developing. Also, the working routines within Statistics Estonia have been considerably changed. The three major changes have been:

1) no more mailing empty statistical reports on paper to enterprises for fulfilment and mailing them back;
2) creation of statistical reports in pdf-format from eSTAT.
3) cancelling of acceptance of statistical reports fulfilled in MS Excel and submitted by e-mail or similar.

Creation and mailing of statistical reports on paper was cancelled at the end of 2007. It meant that instead of a thick envelope with statistical reports for the whole year, enterprises got thinner envelopes with the list of statistical reports they had to submit for producing official statistics. That change was initiated by respondents’ surveys which showed that respondents were reluctant to join eSTAT because they had been used to receive paper-based forms from Statistics Estonia. That action saved about 1.7 million EEK (more than 100,000 EUR) due to exclusion of paper and printing costs, but hopefully also some 100 trees were not cut down. The Estonian society welcomed that action and Statistics Estonia got an award as an environmentally friendly institution. Contrary to what had been initially expected, the action did not influence the response rates of enterprises at all.

In 2008 measures were adopted to create statistical reports in pdf-format from eSTAT. These files can be used for all kinds of administrative purposes, such as presenting for approval or publishing on the web, but also as a print-ready original if needed. Due to that, Statistics Estonia could stop the process of manual creation of statistical reports in pdf-format, which was a parallel process to describing statistical reports in eSTAT. Consequently at least one man-year of technical staff could be directed to other tasks. Not to mention the man-power of staff who has no more need to compare whether all statistical reports which have been made during two separate processes were identical.

The change, mentioned under the third item above, was prepared in 2008, but its influence will be seen in 2009. Particularly, the software was developed in 2008, but respondents could use it starting from 2009. The aim of that change was to structure the channels of submission of statistical reports by enterprises as described in Figure 5. 30% of statistical reports were still submitted in MS Excel in 2008. For Statistics Estonia it has meant manual data entry. By directing statistical reports received in MS Excel to eSTAT as csv-files, the office is expecting to decrease resources for data entry, but as eSTAT allows checking the data before submission, an increase in data quality is also expected.

![Figure 5. Statistical reports by channel of submission in 2008](image-url)
6. Main findings of the implementation process of eSTAT

The aim of creation of eSTAT was:

1) to make the submission of data user-friendlier (respondent’s benefit);
2) to decrease the share of manual data entry at Statistics Estonia (SE’s benefit);
3) to improve Statistics Estonia's image (SE’s benefit);
4) to improve the quality of submitted data (benefit of SE and user);
5) to decrease the number of calls to respondent for the purpose of data adjustment (benefit of SE and respondent);
6) to decrease the costs related to printing and posting of paper-based questionnaires (benefit of SE and respondent, environmentally friendly).

All these objectives have been more or less reached.

Statistics Estonia has put relatively big resources into the development of software. It has been a success among respondents. The environment has been extremely supporting for the electronic data collection. It has been suggested even by the European Commission (European Statistics Code of Practice, 2005). But probably the major lesson which Statistics Estonia has learned has been that implementation of eSTAT takes time because potential users have to get used to that. In spite of the facts that most Estonian enterprises use internet banking on daily basis and 80% of them declared all taxes on the Net already in the early 2006 when eSTAT was launched, the product assimilation curve, originating from the marketing science, in Figure 6 still applies. It is amazing that in the third exploitation year, eSTAT has 33% of the potential number of users, i.e. as many as the product assimilation curve allows to have.

![Figure 6. Product assimilation curve (Vihalem 1996)](image)

The second lesson learned proceeds from the first lesson and states that communication is essential. There can never be too much communication! One shall listen to users of the system and communicate their needs to the developers of the system and afterwards communicate new
features back to the users and persuade them to use the developed features. And coordination between different actors around the system is of no less importance.

The third lesson learned states that the new software might influence the working routines by initiating dramatic and rapid changes within the office, but not so rapid changes in the habits of external users. But at the same time, the software itself is not enough, usually organisational changes are also needed.

7. Future development of eSTAT

Development of eSTAT started in 2003, but the system is in a continuously evolving process. The rapid spread and popularity of the Internet gives reason to believe that eSTAT will become and also remain popular.

As during recent years eSTAT has been developed into as ultimate user-friendly tool as possible for submission of statistical reports, not much further development is foreseen therefore in this aspect. The next objective is to develop eSTAT into a communication environment functioning between enterprises and Statistics Estonia. It means that eSTAT will obviously develop into a channel of the official statistics dissemination as well, apart from the one for submission of statistical reports. Each enterprise will have the possibility of viewing statistical products that are of interest specifically to the respective economic activity or enterprise size group. Already in the early 2009 it was planned to present in eSTAT the financial key ratios to the enterprises that have submitted the respective reports on time. In a longer perspective, in case of extra voluminous statistical reports, a possibility will be added to generate reports directly from the enterprise’s accounting system and transmit them via eSTAT to Statistics Estonia. But this development requires a major methodological change: a shift from collecting the subject matter based statistical reports to collecting statistical indicators not depending on subject matter.

References


http://www.unece.org/ceci/platform/download/attachments/4293084/GSBPM+Aug_08.doc?version=1