Case Management System Based on Wireless Telecommunications

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Introduction

At Statistics Finland the CAPI system was introduced in 1993 for the use of the Social Survey Unit (see Kuusela, 1995). Since then the system has been renovated several times. The most important change was in mid 90s when the Case Management System (CMS) was renewed from trivial (all interviewers had the whole sample) to an object based system (see Kuusela, 1997). The basic structure of the implemented CMS has proved to be reliable and enduring. The next major change took place at the end of millennium when user interfaces were designed anew applying the possibilities provided by the modern Windows tools (see Kuusela, 2001). The CMS of Statistics Finland CAPI system was renewed in 2008 - 2009 and it is currently operational.

In the previous system data exchange between field interviewers and office was based on traditional fixed telephone lines and modems. Modern telecommunications facilities provide new possibilities which did not exist few years ago. The new system is based on wireless telecommunications, Wireless Wide Area Network (WWAN). The WWAN system for data transmission makes use of mobile "modems" which connect a (laptop) computer to the Internet with a broadband type connection.

Technical set-up

Currently wireless 3G and UMTS networks[1] have wide coverage in most countries. They are mainly designed for the use of new mobile telephones but their use as a wireless connection to the internet in increasing rapidly. In Finland, for example, 3G/UMTS network covers the greatest part of country and GPRS[2] covers the whole country. Data transmission with UMTS network reaches the speed of fast wire broadband. For the needs of a CAPI information system GPRS is fast enough. The fast development of telecommunications technology brings up new and fascinating possibilities for designing a CAPI Case Management System (CMS).

The system which Statistics Finland took in use includes transfer rate of downstream on 5 Mbit and 2 Mbit upstream. This service has a fixed monthly price per user, independent of the amount of data transferred.

In Figure 1 is shown the technical structure of the new CMS. Communication is based on a secure file transfer protocol (SFTP). The SFTP allows file transfers over SSH using traditional FTP commands for downloading and uploading files. The communications is based on the idea of using objects. The system architecture was presented in the 4th IBUC (see Kuusela and Parviainen, 1997). All data that is transferred between interviewers and the office system is compressed in a single file called *communications object*. Compressing is used only for encapsulation. The reduction of file size is not important, anymore. A communication session initiated by an interviewer laptop may handle several objects, such as interviews from several different surveys, case transfers, pay claims, etc.

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[1] Universal Mobile Telecommunications System (UMTS) is one of the third-generation (3G) mobile telecommunications technologies. Currently, the most common form of UMTS uses W-CDMA (Wideband Code Division Multiple Access). W-CDMA is a high speed transmission protocol designed for mobile telecommunications networks. In theory, UMTS, using W-CDMA, supports up to 21 Mbit/s data transfer rates. In practice, transfer rates are much lower. UMTS is sometimes also called 3GSM to emphasizing the combination of the 3G technology and the GSM standard.

[2] General packet radio service (GPRS) is a mobile data service available to users of the 2G mobile communication systems for GSM and 3G networks. In the 2G systems, GPRS provides data transfer rates up to 114 kbit/s.
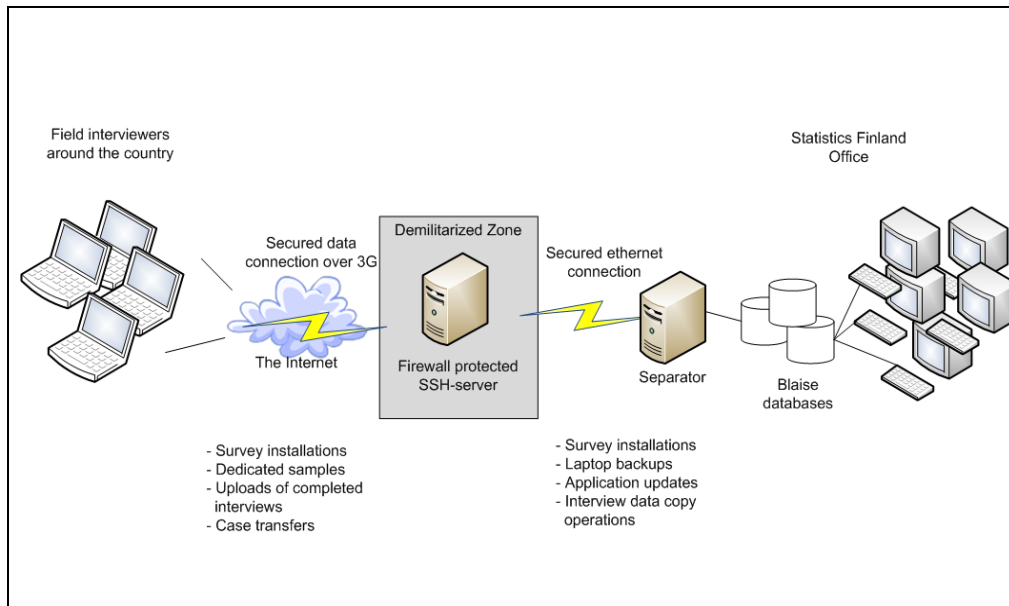
Figure 1: Technical design of the CAPI information system.

The FTP server at Statistics Finland is firewall protected on the demilitarized zone. In the office intranet, a dedicated server called *Separator* polls the FTP server, downloads the incoming files and extracts the data from communication objects to appropriate places. Survey specific data are place on appropriate survey folders, most of the case transfers from one interviewer to another are directed automatically by Separator (some go to supervisors).

Case Management System design

At Statistics Finland an important background factor for the system design is the fact that the Social Survey Units undertakes more that 30 different surveys each year, one of which is the monthly Labor Force Survey. A great number of these surveys are commissioned by clients coming out side of Statistics Finland and the clients pay a market price of this service. Occasionally the commissioned surveys are done with a very tight schedule which puts some pressure on the reliability and easy maneuverability of the system. Occasionally a survey has to be installed within few days and results have to ready on a given date.

At the same time with introduction of the new techniques also the software was designed anew. The existing concept had served well the operations of the field unit Therefore, the basic architecture of the new information system is close to the previous one. In the core there is object based design (see Kuusela, 1995).

The most visible change took place in the user interfaces which were designed anew. The previous functionality was retained but implemented in a different manner. In addition, the modern telecommunications and the Internet provide some fascinating new possibilities. such as possibility to view road routes and driving directions from the Internet map services, such as the Google Maps.

The use of fast telecommunications makes the design of some parts of the CMS more simple than it was earlier. A special feature in Finland is that samples are drawn from an updated Population Register and consequently the sample files include accurate contact information(e.g. names, address, etc.), in addition to some personal information (e.g. age, gender, education, etc.). Telephone numbers are searched from the telephone register. In the previous CMS, a sample was divided to interviewers by an application in the CAPI office system, and after that the dedicated samples were delivered to each interviewer. The main reason was to keep the amount of transmitted data as low as possible.

In the new system, the whole sample file is sent to each interviewer. In the sample file, each record also includes a field indicating the interviewer whom the case belongs to. This simplifies the case transfers essentially: it suffices only to change this field in both interviewer's sample file and the only information transferred is the identification of the survey and respondent id within this survey. Sample file (as nearly all other files) is in XML format. In the interviewer's interface on the laptop, only a view to the sample file (for the specific interviewer) is shown.

In the FTP server, there is an *inbox* and *outbox* for each interviewer. When interviewer opens telecommunications application, it sends automatically all data from outbox of the laptop to the inbox of the server. After that all data in the outbox of the server is copied to the inbox of the laptop. Everything happens automatically and interviewer only initiates the telecommunications process.

Computer as a telephone

The field interviewers of Statistics Finland also collects data by decentralized CATI. Therefore, each interviewer has a landline telephone paid by Statistics Finland. The new wireless application for data transfer includes also a voice client ("telephone"). Field interviewers are now able to use the laptop with a headset as a telephone.

Telephone client uses "normal" GSM network. i.e. calls are normal mobile telephone calls, not VOIP calls. Calls are charged by the same tariffs as the mobile phone calls. In Finland, the most expensive calls are from a fixed telephone to a mobile phone and calls between two mobile phones are only slightly more expensive than calls between two fixed telephones. Nearly 80% of interviews in Finland are done with respondent using a mobile phone. If interviewers call using mobile phone or the computer using mobile phone network, considerable saving may be obtained.

Discussion

The new technical set-up is based on new technical solutions and its introduction went smoothly. Data exchange is fast in nearly all cases. Only few interviewers get only GPRS type connection which is slow, but even that is considerable faster than the old modem connection. The experience so far have shown that the wireless telecommunications system is as reliable as the one using fixed lines.

In addition to the enhancements in Case Management System, few other new applications could be installed. Interviewers are now able to view the general information pages in the Statistics Finland intranet, and they are now connected as clients to the Statistics Finland email system. Both of these are using a VPN connection. Standard access to the Internet is naturally also possible. Interviewers actually use it a lot for example to search telephone numbers from public telephone registry.

Price of the telecommunication per user remains the same independent of the of the use. This fact brings along predictability on budgeting and it is expected that the total costs of data collection will drop considerable in the future. If the computer telephone client proves to be usable, the savings will be even more.

The computer works independently from fixed telephone lines everywhere where exists an operational mobile telephone (GSM) network. For the future development this provides exciting possibilities for CMS design. For example, it is possible to design a CMS which is based on a CATI system type of design. Actually, technically it would be possible at the moment but it requires careful consideration for the management point of view before it can be implemented.

References

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