Mobile phone solutions in Finnish milk recording

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Summary

ProAgria presents to its customers a mobile phone service for electronic data capture directly in the cowshed. The solution is based on a very simple web page whereby the cows are chosen and milk yields entered. It allows the use of electronic data capture irrespective of the milking and recording technology used. This solution is supported by a web page for checking the data and correcting errors, as well as a text message service to remind the farmer of the testing.

***Key words**: Milk recording, Mobile phone.*

Introduction

In Finland, farmers have for decades been responsible for testing their own animals, and nowadays approximately 97 % of the ProAgria customer farms have a do-it-yourself milk recording scheme. More than 90 % of them also own the recording equipment utilised in this. Taking into account the existing situation and the fairly long distances in the country, attempts in launching expensive electronic milk meters have not proven successful. Yet there is a great demand for easier milk recording, and also a need for a quicker data transfer. There are also a number of farmers who sometimes fail to test in time to have official records.

Mobile phone technology turns out to be the key to these problems. Most new mobile phones are capable of taking an internet connection, and almost all Finnish dairy farms are within reach of a mobile network. By creating a possibility to enter data to the database directly from the cowshed by mobile phone, we can offer to every milk recording customer a paperless and more modern way to test. We can also remind them of the recording and its details by and SMS scheme where the time of the next message depends on previously input data in the database.

Technical approach

Currently there are two main approaches to design and implement mobile software which has to communicate with a central system. First, one could create *installable software* for specific mobile phone or mobile phone platform (for example, the Series X- platform or Microsoft Mobile Windows operating systems) and create an endpoint to the server which needs to be contacted. In the second scenario, one could create a *web application designed specifically for mobile devices*. In this section we first discuss the benefits and drawback of both approaches and the represent the selected one in more detail.

Installable software for specific mobile phone operating system has several advantages. The software can take advantage of the phone's special abilities. The user interface for instance is dramatically different in for example Apple's iPhone and Nokia's N-series as both have their own ways to handle user input, providing navigation between and within programs etc. If a software was designed and implemented for specific phone model and application framework, it could integrate fully with other applications in that environment. It is also quite often possible to save data in the phone itself which allows the program to operate even when Internet connection is not active. This allows offline working scenarios, which are critical in some cases.

The drawbacks for installable mobile software are evident. If the customers have a variety of different mobile phones from different manufactures, then a service provider would have to create the software for many different platforms and with different programming languages and architectures. The development and maintenance costs could be huge, as well as it could be very difficult to spread new versions of the software. In addition, one would have to create a separate server-side endpoint which would handle the data transfer between the main IT system and the mobile phone. Even a minor change to this endpoint could make the earlier phone software installations obsolete and therefore cause a lot of additional work.

Web application designed for mobile application provides different benefits and drawbacks than installable software. First of all, when basic web controls are used, the software will work well with variety of different mobile phones. If you have a mobile phone which can connect to the Internet and which has a basic web browser, then you most likely are able to use the software. No installations, no extra memory or processing capability requirements. The web server which runs the application would contain all the necessary business critical rules, do validation to user input etc. The software also could be used with a normal computer as the service is actually a very simple web application. In addition, for service provider the maintenance of the software is a lot easier as the improvements installed to the web server are immediately available for every customer.

The drawbacks of a web application are quite intuitive. First of all, you cannot use the software if the Internet connection is not active. This means that offline operations are quite limited and usually non-existent. In addition, if connection failures occur, in worst cases some of the data that user typed in could be lost. A web application is usually unable to store data on the user's device or phone, mainly due to security reasons. This causes problems as there is no local storage for user preferences, or for earlier, unsent inputs. However, most of these issues can be addressed by using special software design patterns and using server-side data storages.

The number of potential users for ProAgria's mobile services is great and the farmers a large number of different mobile phones. There is no single application framework to build on and no single programming language and environment to use. This reality practically dictated that the second approach, the web-based application designed specifically for mobile software was our choice. The system was

implemented with Microsoft .NET 3.5 –framework under which the ASP.NET –web programming section has special routines and controls for mobile phone –based application development. As the input abilities with a mobile phone a quite challenging (usually you have only numeric keyboard), the amount of written text was reduced to minimum and faster controls like dropdown -lists were used.

The following picture (Figure 1) sums up the technical framework and solutions. The users connect to the Internet with their mobile phones or devices and the endpoint is a plain web application running on a Microsoft IIS –based web server. This web server uses services from business logic servers which contain the software components meant for calculation and validation purposes.

The backbone of the system is a central Microsoft SQL Server 2005 database which contains all the necessary data for successful interaction with the actual application and integration to other systems and application on data level.

The practical solution

It was established at an early stage that the practical mobile solution will have to be very simple and very easy to use. Yet in the first pilot version, there was e.g. a question about test milking date which in practical testing caused some misunderstanding and errors. The test milking date can easily be deduced from the

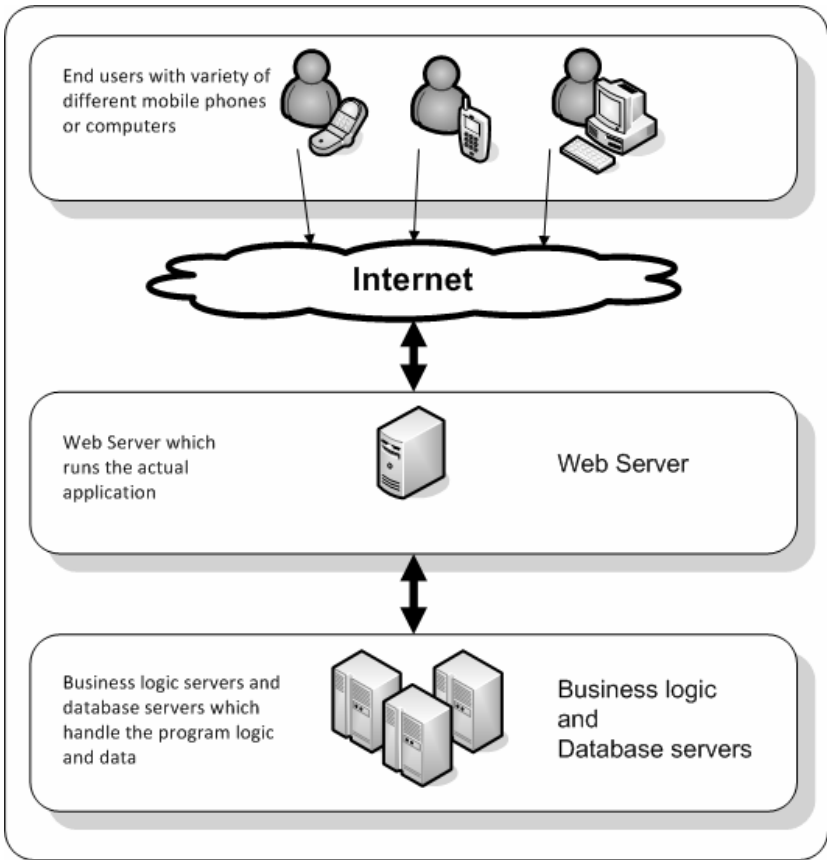

Figure 1. Web-based application architecture

time when the first set of data comes in. It is also crucial that all data goes to the database immediately, so nothing is lost if the phone is lost or suffers breakdown during milking.

The solution used only asks for user (and herd) identification, and then goes on to ask if this very milking is sampled. After that, it produces a list of cows that are in the herd and are not reported to be dry or to already have a recorded milk yield within the last 4 hours. As the milking progresses, cows are chosen from the list and milk yields assigned to each one. Cows thus disappear from the herd list, and the milking ends either when there are no cows left on the list, or when the farmer reports the milking finished. Upon doing that, he receives a list of reported yields. He can correct the data on the ProAgria website whenever necessary.

Another minor addition to this solution is the ProYield Reminder service that sends four kinds of SMS-s to the farmers who order the service. At 28 days, it reminds him of the necessity to test, as well as whether and how to take samples. At 40 days, it reminds him again that if he will not test now he is going to have unofficial results, and if he already has tested, then he should report it. At 60 days, it reminds the farmer again that if no data comes into the database, there will be no further reminders. In the end of November, it recalls the number of test milkings necessary before the end of the year in order to have official records.

These solutions are entering the market in summer 2008. We believe them to make our milk recording database more real-time by making electronic data capture easier.