

Mobile Access to Information in the Agrarian Sector

P. Šimek, M. Stočes, J. Vaněk

Faculty of Economics and Management, Czech University of Life Sciences in Prague, Czech Republic

Anotace

Příspěvek se zabývá analýzou možností zpřístupnění webové aplikace agrárního WWW portálu Agris pro mobilní zařízení různých platforem. Hlavními požadavky na mobilní verzi aplikace jsou možnost fungovat offline, implementace všech základních modulů (články, ceny, avíza) a konzervativní vzhled. Na základě analýzy možností zpřístupnění obsahu agrárního WWW portálu Agris pro mobilní zařízení byl navržen koncept, kdy bude vyvinuta nativní mobilní aplikace pro platformu Android, hybridní mobilní aplikace pro platformy Android, iOS a Windows Phone 8 a optimalizovaný validní webový výstup pro mobilní webové prohlížeče (responsive layout). Nativní a hybridní aplikace umožní uživateli pracovat v online i offline režimu, přístup pomocí webového prohlížeče bude vyžadovat trvalé připojení. Uvedené řešení mobilních verzí serverové aplikace agrárního WWW portálu Agris představuje obecné řešení problematiky mobilního přístupu k informačním zdrojům, kdy venkovské regiony jsou nedostatečně pokryty vysokorychlostním bezdrátovým připojením k internetu, avšak v kontrastu s velkým rozšířením moderních mobilních zařízení.

Klíčová slova

Mobilní aplikace, mobilní web, Android, iOS, Windows Phone, Agris, responsive design.

Abstract

The paper treats the analysis of possibilities how to make web applications of the agrarian web portal Agris accessible to mobile devices of various platforms. The principal requirements for the mobile version of the application are: a possibility to be functional off-line, the implementation of all basic modules (papers, prices, warnings) and a conservative design. On the basis of the agrarian web portal Agris analysis we postulated a concept when a native mobile application for the Android platform, a hybrid mobile application for the Android, iOS and Windows Phone 8 platforms and an optimal valid web output for mobile web browsers (responsive layout) will be developed. Native and hybrid applications will allow users to work both in online and off-line modes. The access via a web browser will require a permanent connection. The proposed solution of mobile versions of the agrarian web portal Agris represents a universal solution of problems with mobile access to information sources when rural areas are not adequately covered with a high-speed wireless connection to the Internet, in contrast to a large extension of modern mobile devices.

Key words

Mobile applications, mobile web, Android, iOS, Windows Phone, Agris, responsive design.

Introduction

Our contemporary society has been characterized not only by a permanently growing number of information sources but also by an access to these sources from various client devices and platforms. An enormous growth has been recorded especially in the area of single-purpose or multi-purpose mobile devices. There exists an inexhaustible number of mobile devices using several platforms from which users connect to the server sources

of information. The most frequently used platforms are Android and iOS even though they are rather different.

The significant aspect of the regional development is accessibility and transferability of the information and service development based on the network technologies and the net economy (Jarolínek and Ulman, 2014). The situation seems to be the same in the area of agriculture, forestry, water supply

and distribution, countryside, food industry etc. For the obtaining of information more and more users employ smart mobile phones or tablets made by a lot of producers. From the users' point of view there is one major obstacle – the data connectivity. As soon as users leave with their device the high-capacity wireless connection (either with a partial or full mobility), their work with a mobile application is often spoilt by time-consuming data downloading.

Although the Digital agenda Strategy Europe 2000 emphasized (among other things) the importance of a wideband connection installation in the form of both a fixed connection and wireless networks (European Commission, 2010), the current situation is substantially different, especially in the Czech Republic. In rural areas users can often rely on the GPRS (General Packet Radio Service) or EDGE (Enhanced Data rate for GSM Evolution) connections only. Even under ideal conditions these connections allow only 80 kbps (kilobit per second) or 236 kbps respectively.

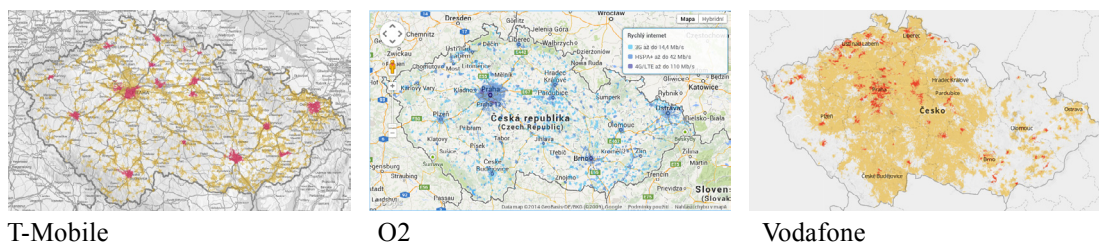
For the creators and operators of web or server applications there emerges a problem how to (under these conditions) provide for their customers a cheap, fast and effective mobile access. A server application cannot effectively provide its content and cannot function as a purposeful source of information unless there is a native client application provided for the mobile platform. This native client application must be adapted to the platform or to the intelligent responsive design (layout) of the web output, or perhaps to both. The orientation of native applications to concrete platforms puts serious obstacles in the path of the utilisation of different development environments, technologies and API which inevitably leads to waste of time and effort including higher expenditure on maintenance (Xanthopoulos and Xinogalos, 2013). Therefore there is a dilemma if to produce costly but (thanks

to the optimization) fast native applications with a difficult implementation of data synchronization (Miravet at al., 2014), or if to produce a response output of the content itself which can also become more expensive (taking into account users' habits). Nevertheless, in the web access there are usually a lot of compromises, in comparison with native applications (Harrington at al., 2013). The whole process of the development of web applications, which use the native functions of a mobile device, should be based on the architectural MVC model (Model View Controller) (Francesse at al., 2013).

For the applications aimed at a user interface it is appropriate to use jQuery Mobile, for intermediate and the most complicated applications it might be more appropriate to use Sencha Touch (Heitkötter at al., 2013). As a certain compromise might also serve the utilization of a hybrid framework which – thanks to the utilization of a nucleus for the processing of web technologies – shows certain qualities of a web access.

One of the options of development can be the utilization of cross-platform tools in the frame of one code base. For the development of business applications a hybrid framework might be the best (Vitols at al., 2013), nevertheless it might not be suitable always or in all cases (Klima and Selinger, 2013). The utilization of hybrid frameworks for the development and maintenance of applications across various platforms also bears some safety risks (Singh, 2013). It is necessary to eliminate safety threats of mobile applications as much as possible but this work is not easy at all.

According to Heitkötter two frameworks (PhoneGap, Titanium Mobile) can cover the gap between the development of web and mobile applications (Heitkötter at al., 2012). There is another possible approach – the utilization



Source: T-Mobile, O2 and Vodafone

Figure 1: Maps showing the coverage of the Czech Republic with the mobile high-speed Internet.

of PIM (Platform Independent Model) in MDD (Model Driven Development) (Choi at al., 2009).

Modern information sources in the agrarian sector have to react flexibly to current tendencies in technology and to users' demands. In order to keep their quality level they have to offer at least an optimum output for the browsers of mobile devices, or perhaps both a native and a hybrid mobile application.

Materials and methods

One of the most frequently visited information sources of the agrarian sector in the Czech Republic is the agrarian WWW portal Agris. The main aim of the agrarian WWW portal Agris is to create a unified on-line information space on the Internet for the area of the agrarian sector (agriculture, food industry, forestry, water supply and distribution) and rural areas. The task group of users consists of enterprises' managers, managers from state and local administration, students, all consumers of food and inhabitants of rural areas. The development and implementation of the current version of the agrarian sector web application took place from 2010 to 2011. It was created with the use of the most modern trends as a flexible and robust web application (Šimek at al., 2011) serving in full to users accessing primarily from personal computers. For the efficient identification of individual papers, their administration, sorting and distribution, the individual papers are described by metadata in the DC (Dublin Core) and VOA3R Metadata AP (Virtual Open Access Agriculture and Aquaculture Repository Metadata Application Profile) format which was especially developed for the description of agricultural data and information (Šimek at al., 2013).

From the long-term outputs of the Google Analytics application follows that more and more users access the agrarian portal from mobile devices (ca. 10% of almost 30 thousand visitors a month), first of all from the Android and iOS platforms. Therefore it is necessary to make for them an effective access to the content of the portal with the utmost reduction of time needed for downloading of the content itself into mobile devices.

Ensuing from the analysis and design of the optimum access from mobile devices, the requirements on the mobile application of the agrarian WWW portal Agris are as follow:

- possibility to be functional off-line

(the batch downloading of new papers for the extra off-line work with papers);

- the implementation of all basic modules of web application
 - papers – the display of news information
 - prices – the possibility of going through the prices of agricultural commodities and graph generation
 - warnings;
- „A conservative design“ based on a web application.

When analysing the used methods of mobile applications' development, the following parameters for individual kinds of mobile access were chosen:

Native application

In the case of a native mobile application there is the need of development for each platform separately - using various tools and technologies including the creation of updates. With the increasing number of platforms the length of needed time grows, too; and so do the costs of mobile applications' generation and maintenance. Nevertheless there is the advantage of an optimum result in the form of stable and fast mobile applications with a possibility to work off-line.

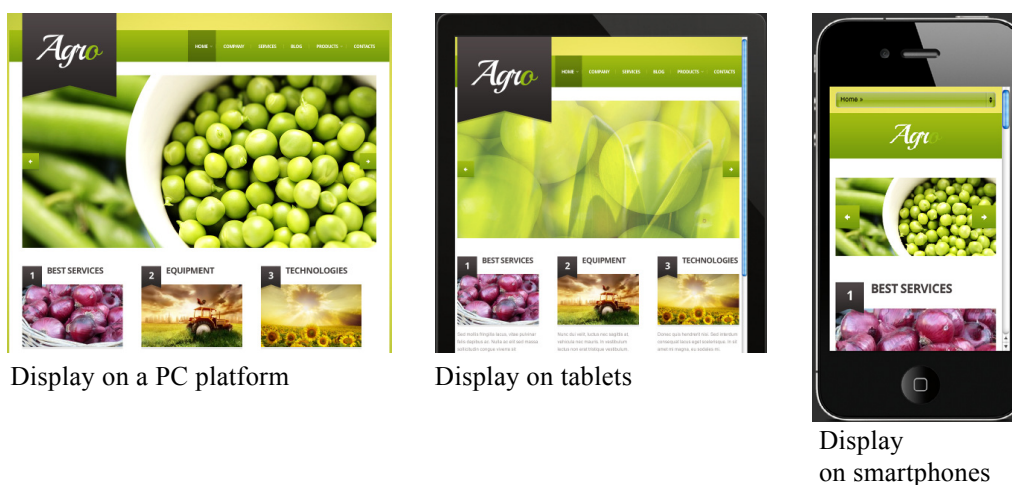
Hybrid application

The advantages of hybrid applications lie in the fast development, fast updates and relatively easy extension of application. The opposite could be a non-optimum result.

Web mobile application

The major advantage of the mobile web application is an easy and very fast implementation with the help of an intelligent distribution of cascading style sheets for a web browser. Even though the result could be an effective responsive design of classic web application, users mostly use the permanent Internet connection for their work with a mobile application.

The above described three approaches to the creation of a mobile application and web will be consequently applied to the agrarian WWW portal Agris. Nevertheless the whole issue is of general nature because the coverage of rural regions with the high-speed wireless Internet connection is insufficient which is in contrast to the wide spread of modern mobile devices. Even though users have at their disposal a tool for working with information sources, they



Source: TemplateMonster.com

Figure 2: An example of a responsive design.

don't have at their disposal transmission capacity for the access to the information source. The whole issue could be efficiently solved by a native or hybrid application, or perhaps by a mobile web, with the possibility to work in an off-line mode.

Results and discussion

After a detailed analysis of rather very conservative users' preferences of the agrarian WWW portal Agris and after the analysis of possibilities of the creation of mobile access to the content of the agrarian WWW portal we moved to the creation of following types of mobile access:

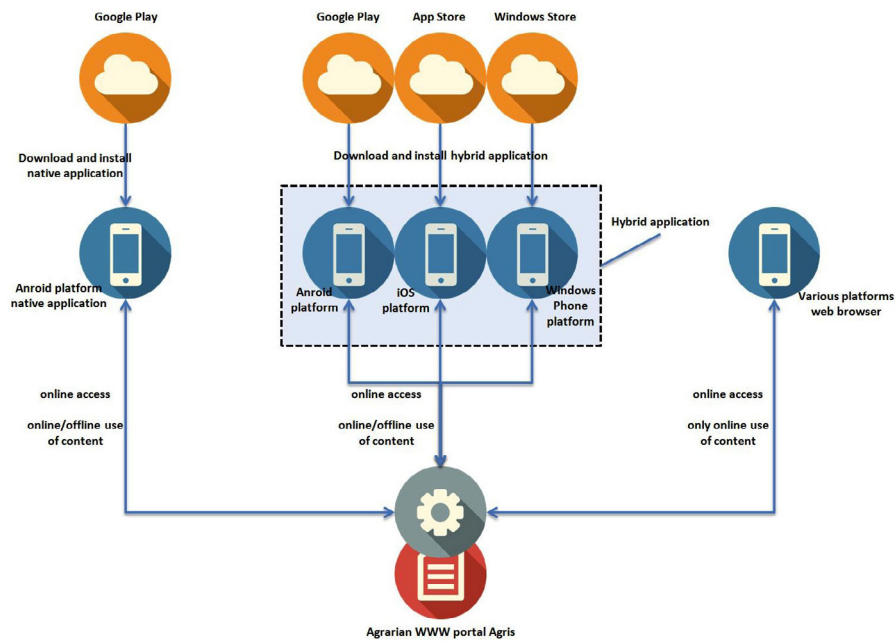
1. native application for the Android platform;
2. hybrid application for platforms:
 - a. iOS
 - b. Android
 - c. Windows Phone 8;
3. layout for mobile devices (a responsive layout).

This proposed concept will cover the greater part of mobile devices' users who access the agrarian WWW portal Agris (Figure 3).

The final native application for the Android platform will be distributed via Google Play and the web interface of the agrarian WWW portal Agris. This way users can easily access the application and they can install it into their mobile devices. The installed application will make for them accessible the content of the agrarian

WWW portal in a user-friendly form. In the case of a high-quality and high-speed connection to the Internet they can work with the application in the online mode. Nevertheless, they can download the most up-to-date or chosen content into their application and consequently work in off-line mode, outside the high-speed connection: for example in the open ground, in plants etc. The final application was proposed so it would be easily sustainable. The sustainability is defined as the ability of the software product to be modified. The modifications include error corrections, improvements, adjustments owing to changes in the environment (individual OS versions), changes of requirements and changes of functional specification.

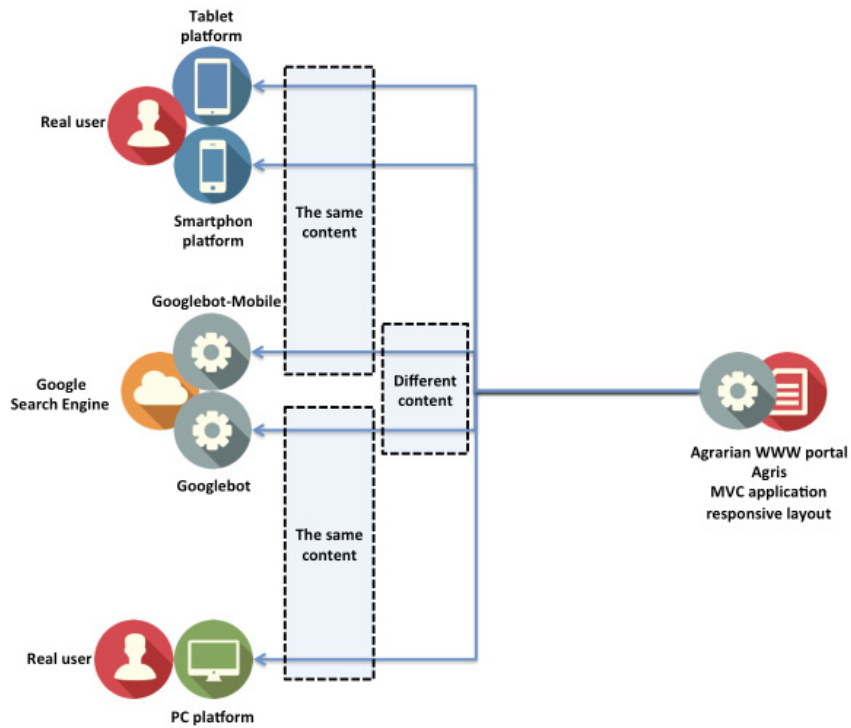
The hybrid application will be created with the help of PhoneGap platform. Thanks to this environment it is possible to create mobile applications which work on various mobile devices and platforms. The user interface of the emergent hybrid application is being developed with the use of web technologies such as HTML5 (HyperText Markup Language), CSS3 (Cascading Styles Sheets) and JavaScript. The developmental tools Phone Gap then transform the final files of HTML code, CSS and JavaScript into installation packages which are different for each platform. In the case of the agrarian WWW portal Agris the hybrid applications for Android, iOS and Windows Phone 8 platforms will be distributed via Google Play, App Store, Windows Store and the web interface of the agrarian portal. Users will be able to work with the portal content in both the online mode



Source: authors' own research

Icons source: IconArchive, Icons author : Pelfusion, <http://pelfusion.com/>

Figure 3: The proposed concept of the distribution of the agrarian WWW portal Agris content to various mobile platforms.



Source: authors' own research

Icons source: IconArchive, Icons author : Pelfusion, <http://pelfusion.com/>

Figure 4: The distribution of the content for mobile platforms with the help of the responsive layout technology.

and off-line mode. The final applications are not only sustainable but transferable as well. By the transfer we mean the application transfer (export) from one environment (of a different operational system) into another one.

For the access from mobile web browsers the layout of the agrarian WWW portal Agris was redesigned in such a way that it is automatically formatted for the user depending on the display dimension and the differentiation of the final mobile unit. The big advantage is that the implementation of the responsive layout is fast and thanks to the existing architecture of the agrarian WWW portal Agris rather undemanding. For an optimum output users need a random web browser which is able to process valid HTML and CSS code. A disadvantage might be the need of permanent connectivity to the Internet which means that users can work with the content online only. The version for desktops and mobile is run on one URL address but the content and format are fully adapted to the employed user agent.

The whole agrarian web portal is configured in order not to be considered as masked (by for example a full-text Google browser) because that would lead to the elimination from search results. The main condition is for the same content to be submitted to the mobile Google robot (Googlebot-Mobile) and to the mobile browser used by the real user (Figure 4).

Conclusion

The innovation of the agrarian portal functionalities occurs thanks to the identification of users' habits while using the most utilized mobile Android and iOS platforms and thanks to the identification of the possibilities of the agrarian WW portal Agris. Thus, this innovation fills an information gap in the area of the mobile access to an important information source from the agrarian sector. The whole concept of the future solution is described in detail in figure 3: to cover all three possible ways

of access from mobile devices we moved to:

- the creation of a native application for Android platform;
- the creation of hybrid applications for Android, iOS and Windows Phone platforms;
- the creation of an intelligent responsive layout of the agrarian portal web application where (depending on end devices) relevant cascading style sheets are used for the formatting of the final design with an optimum layout of control elements.

Native and hybrid applications will allow users to work in off-line mode, too. And in this mode they will be able to download the chosen content of the agrarian WWW portal Agris into their devices.

Even though the web access from a mobile web browser will allow users to work with the agrarian portal application in an optimum form including displays, control elements and functionalities, it will be possible in online mode only. Users are completely dependent on their connection to the Internet. This drawback will be eliminated after the implementation of a full coverage with wireless high-speed connection (for example LTE – Long Term Evolution) by mobile operators and a complete offer of mobile devices supporting such a connection. This proposed solution of mobile versions of the agrarian web portal Agris represents a universal solution of problems with mobile access to information sources when rural areas are not adequately covered with a high-speed wireless connection to the Internet, in contrast to a large extension of modern mobile devices.

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Corresponding author:

Ing. Pavel Šimek, PhD.

*Department of Information Technologies, Faculty of Economics and Management,
Czech University of Life Sciences Prague, Kamýcká 129, 165 21 Prague 6, Czech Republic*

Phone: +420 2 2438 2050, E-mail: simek@pef.czu.cz

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