

LBS-Mobile - A New Way of Handling Data

Martina STOCKER and Peter DUETSCHLER, Switzerland

Key words: Location-Based Services; Mapping; Mobile Devices; Data Management

SUMMARY

Location-based services (LBS) can be defined as services that integrate a mobile device's location or position with other information so as to provide added value to a user. It is the combination of the three basic components Internet, GIS and mobile devices while also integrating the user's position into the application. Object data (points, lines, polygons) with attributes which is stored in a database and visualized on a web map, can be accessed through the internet anytime. This concept meets the increasing demand of more flexible and real-time data availability.

Many location-based services only serve as an information provider. LBS-Mobile is a newly developed application which also allows object data to be registered, edited and managed. It is suited for a wide range of applications with geospatial data (field controls of existing data, updates of current statuses, general data management, obtaining new data or provide a base for decision-making) and runs on all commercial mobile devices.

The GPS functionality of smartphones and tablets leads the user to the nearest object or point of interest (POI). Through the user interface objects can be checked and directly edited. New objects can be registered based on the user's current location.

In order to increase the accuracy of the built-in GPS-receiver in smartphones and tablets, a method has been developed to connect a high-end survey GPS-receiver to the mobile device. Instead of using the internal position the external one is considered which can be measured with an accuracy of less than 5 cm. This results in a significant increase of the data quality.

Since the application is a web-solution all data is always accessible to all users in real-time. LBS-Mobile is independent of proprietary formats and ensures smooth data exchange to and from a wide range of sources and other programs.

ZUSAMMENFASSUNG

Location Based Services (LBS)-Mobile ist ein Dienst, um Objekt-Daten orts- und zeitunabhängig zu erfassen, bearbeiten und verwalten. LBS eignet sich für diverse Anwendungen raumbezogener Daten und ist auf allen handelsüblichen mobilen Geräten nutzbar.

LBS verknüpft die bestehenden Komponenten WebGIS, mobiles GIS auf proprietären Geräten und mobiles Internet zu einem neuen Ganzen. Als entscheidende Neuerung wird dabei der Standort des Nutzers in die Anwendung miteinbezogen.

Objekte werden mit ihren Attributen und Beziehungen in einem WebGIS verwaltet, welches dank der geeigneten Oberfläche auch für die Nutzung auf mobilen Geräten optimiert ist. Die interaktive Karte zeigt nebst den Daten auch die aktuelle Position des Benutzers, was die Orientierung vor Ort und das Auffinden der Objekte erleichtert. Damit wird LBS-Mobile den wachsenden Ansprüchen an eine flexiblere Datenverfügbarkeit und -nutzung gerecht.

Viele LBS-Dienste bieten nur Bezug von Daten. LBS-Mobile beinhaltet auch die Option, Daten direkt im Feld zu überprüfen, bearbeiten und erweitern, oder Daten neu zu erfassen. Unverändert bleibt indes die Einbindung des Standorts des Nutzers, der sich zum nächsten POI (Point of Interest) führen lassen kann oder seine Position verwendet, um die Koordinaten neuer Objekte zu erfassen.

Da die GPS-Genauigkeit von Smartphones und Tablets den Ansprüchen bei Aufnahmen oft nicht genügt, wurde eine Verknüpfung für high-end GPS-Empfänger entwickelt. Anstelle des integrierten Empfängers wird die externe Position verwendet, welche eine Genauigkeit von wenigen Zentimetern aufweist. Dadurch wird eine erhebliche Qualitätssteigerung der Daten erzielt.

Durch die Web-Lösung sind die Daten jederzeit für alle Benutzer in Echtzeit verfügbar - sowohl unterwegs als auch im Büro. Weiter gewährleistet LBS-Mobile den Datenfluss von und zu anderen Programmen.

LBS-Mobile - A New Way of Handling Data

Martina STOCKER and Peter DUETSCHLER, Switzerland

1. INTRODUCTION

Location-based services can be defined as services that integrate a mobile device's location or position with other information so as to provide added value to a user. [1] LBS-Mobile is an application with which object data can easily be registered, edited and managed. It is suited for a wide range of applications with geospatial data and runs on all commercial mobile devices.

Now that most analogue maps have been replaced by digital information systems a new development has emerged: data access should be more flexible and available anytime – and anywhere. Therefore the focus is now shifting from desktop solutions to mobile applications resulting in the benefit that data can be edited directly in the field. All these requirements are met by the newly developed application LBS-Mobile.

2. LBS FUNCTIONALITY

WebGIS applications, mobile GIS on proprietary controllers and mobile internet on smartphones are widely in use. LBS combines these components into a new concept. The significant improvement hereby is the integration of the user's current position into the application.

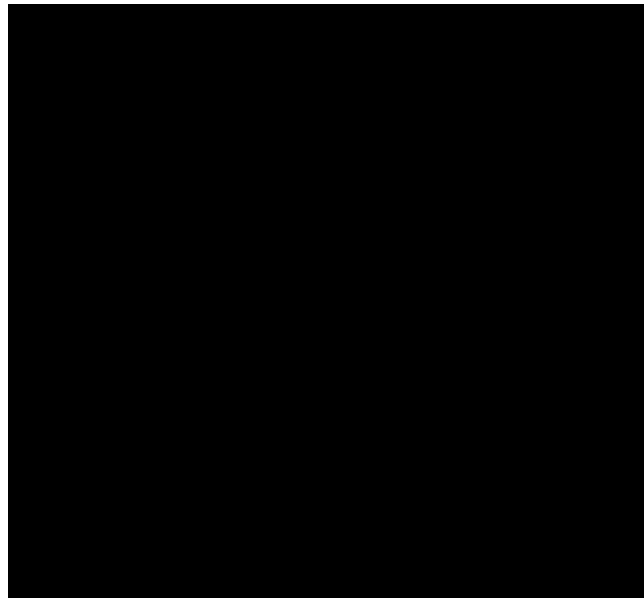


Fig. 1: LBS combines Internet, GIS and mobile devices while integrating the user's position (after [2])

3. MULTIDIMENSIONAL DATA FLOW WITH LBS-MOBILE

Many location-based services are only an information provider. LBS-Mobile also facilitates checking and editing data, adding new attributes or pictures to objects, or even registering new data.

Unchanged remains the concept of including the user's position to lead him to the nearest point of interest (POI) or create a new object based on his coordinates.

4. EXAMPLE PF USE – INVENTORY OF NATURE CONSERVATION OBJECTS

A nature conservation inventory consists of objects of varying type and geometry. There are points, line objects and polygons, all comprising of different attributes.

We will consider trees under protection as point objects, safety fences for amphibians as line objects and unobstructed forest for polygons.

These objects will be modeled in a WebGIS including their attributes and relations. The desktop of the LBS-Mobile solution is optimized for use on mobile devices. Besides the actual data the map also displays the user's current position, assisting in the local orientation and locating of objects.

A tree under protection is now registered as a new object based on the user's current position. All attributes will not be recorded on a paper but directly into the database. There is no need to draw a sketch of the situation, and pictures can directly be uploaded and assigned to the right object.

In contrast, safety fences for amphibians need regular maintenance. LBS-Mobile assists in planning and documenting this task. The already existing objects can easily be located by the help of the smartphone or tablet. After the required structural alteration has been put in place the status of the fence can directly be updated and needs no further documentation later on. Specific remarks can be added to an object including a date for follow-up.

Areas of unobstructed forest are checked yearly by recording the occurrence of indicator plants. The number and type of the plants is directly recorded into the database and needed maintenance work ordered. Again, the completion of the maintenance work later on will also be documented in the application.

5. CENTIMETER-LEVEL PRECISION

Since the accuracy of the built-in GPS-receivers of smartphones and tablets often does not meet the requirements of data acquisition, a method has been developed to connect a high-end survey GPS-receiver to the mobile device. Instead of using the internal position the external one is considered which can be measured with an accuracy of less than 5 cm. This results in a significant increase of the data quality.

6. WORKFLOW

Because the application is based on a web-solution all data is always accessible to all users in real-time. Not only from mobile devices but also from desktop PCs in the office.

LBS-Mobile ensures furthermore smooth data exchange to and from other programs. If needed, data can also be used in LBS-Mobile for a limited time only, for instance in a verification process, to then be exported again into the original GIS.

7. FUTURE PROSPECTS

The current development of cheaper and lighter GPS-receivers (such as Piksi [3]) will result in a more wide-spread availability of precise positioning and enhance the quality location-based services.

Equally will the targeted improvement in indoor-positioning contribute to a significant growth of application possibilities of location-based services.

REFERENCES

- [1] Schiller J., Voisard A., Location-Based Services, 2004, Elsevier Inc.
- [2] Brimicombe, A.J., 2002. GIS - Where are the frontiers now? In Proceedings GIS 2002, Bahrain
- [3] swift-nav.com/piksi.html

CONTACTS

Peter Duetschler
ALPGIS AG
Fliederweg 11
CH-3601 Thun
SWITZERLAND
Tel. +41 33 224 0430
Fax + 41 33 225 4060
Email: p.dueetschler@alpgis.ch
Web site: www.alpgis.ch