Using WebServices for integrating

forestry and agrifood solutions

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Abstract

One of the biggest problems in agrifood and forestry solutions is that solutions are fragmented and unable to exchange information with each other. This is consequence of missing standardization and isolated development by numerous players on this sector. Each organization has developed their solutions, layouts and database models from their own starting points. This is causing disadvantages for many user groups who has to deal with different solutions.

First bigger effort for solving these problems was done in Finland already in 1991. Advisory services organized a project which published a standard database structure for farm management on national level. This standard had some effect to development of solutions, but soon it revealed that following standard database structure was too limiting for independent software vendors. Result of this ‘standard’ was more likeness in database structures.

Moving solutions to internet and to centralized databases has offered a completely new way for integrating solutions from different organizations. Utilizing XML and webservices. Instead of following exactly predefined standard database models, solutions and components can use webservice interface for integration. Besides exchanging data, solutions from separated institutions can be really integrated to work as a one solution from end users point of view. Especially effective is to integrate mobile solutions, GIS solutions and e-commerce to centralized database solutions.

Key words

WebServices, XML, Service Oriented Architecture, Mobile solutions for agriculture and forestry, Mobile GIS, e-commerce.

Introduction

Purpose of this document is not to focus on used standards or methodologies on the subject area. Aim is to present what kind of practices and procedures service oriented architecture can offer for integrating solutions in agriculture and forestry sector. By using one real live example from agriculture and other from forestry environment.

Our approach is based on XML – technologies which offers platform- and database independent technology for exchanging data. At the first phase XML was considered only as a standard technology to present data in HTML. Standardization related to XML is expanding and step by step and offering more advanced technologies for system integrations. Besides

data transfer technology we can start to think XML & WebServices itself as a development environment!

Preconditions

1. Internet connection. Because we are talking about operations on the web, internet connection obviously is the first precondition. Common preconceived idea is that webservices can be utilized only with fast online connection. It is possible to use webservices also by standalone workstations and mobile devices. Connection is just created when service is used. For example with GPRS.
2. Identification and authentication. It sure is essential to have reliable system for identification and authentication. Common approach is to offer these services also as a webservice. It is also possible use some common service (like services from bank) for identification and rely this in the internal authentication.
3. Vocabulary, terminology and standard registers

3.1 Vocabulary & terminology. Especially in international environments a lot of misunderstandings and mess is caused from unclear terms. Also discussions between technical and subject people is often problematic because of the same reasons. One option to avoid these problems is to use wiki or corresponding open interactive service.

3.2 Standard registers. Effective and reliable solutions rely on relative databases where every value is identified by unique key. For example municipality code, plant code, product code etc. Often it is difficult to clearly define content and values in these registers. Contents of some registers are also changing frequently and needs a system for continuous updating. Ones again, webservices can be utilized.

3.3 Standard datastructures. One approach is prepare complete datamodel for FMIS. Farm Management Information System. Several attempts to create this kind of solutions has already been done. As a result from these we easile get a ‘bible’ and to follow all the details of it comes as hard as it is to follow ten commandments... Other option is kind of ‘evolution model’ where active players publish their structures and when they are accepted by others, they become as a standard. In this case question is more about agreements about rules of publishing and managing common structures.

4. Coordinator. When integration is done within one organization, it is typically clear that some IT-department is taking care of the management and coordination. When integrating systems from separated organizations, roles and responsibilities are not always so obvious. In very heterogenous cases it can be even sensible to create some ‘consortium’ or such for coordinating the evaluation of services.

Case WebWisu

New Finnish solution for plant production management. Built in cooperation with ProAgria. Completely centralized planning and monitoring system with full GIS-functionality. Offers a webservice interface for synchronizing farm data between advisers PC program. Webservice interface is also used for loading raster maps, soil analysis data and product quality data from food industry.

From farmers perspective this system brings all needed data and services to one desk as shown on image1. Farmers can access to his data account regardless of device or location.

By active use of centralized systems farmers also brings his/her farm and production closer to her interest group.

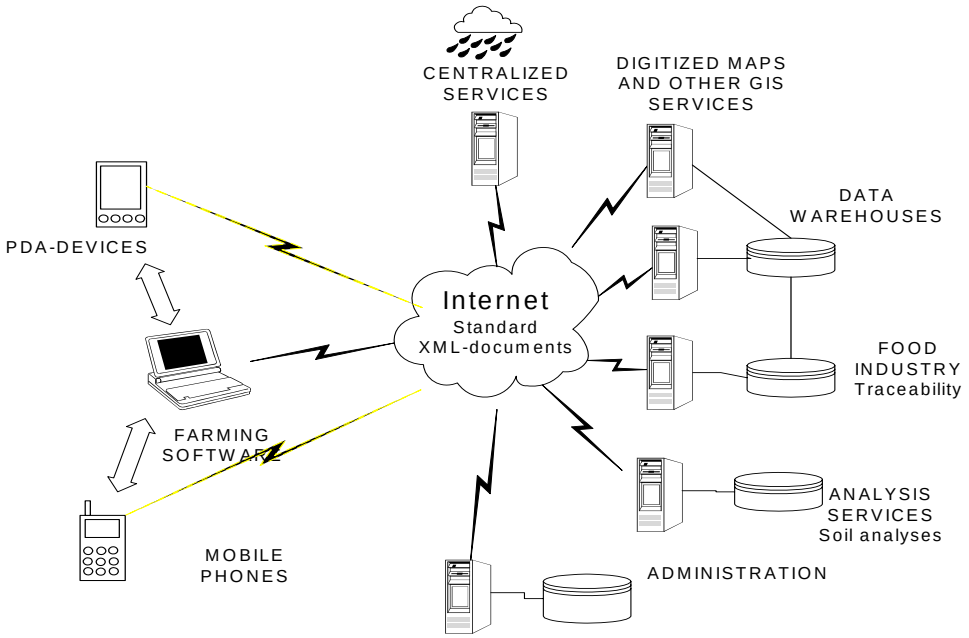
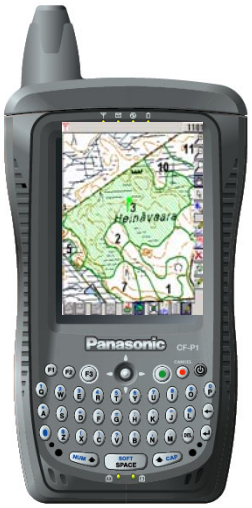


Image1: Open Agricultural information system on network

WebServices are helping users a lot. For example by offering very easy way to get raster maps from external map service without any file handling operations or need to buy own copies of map. On image2 there is introduced map component on web.

Case Bitmap

Fully mobile system for forest management. Built for forest company Tornator Oy for management of their 600000 hectares of forest. Users are working with rugged Pocket Pc which has GPS and GPRS integrated. Pocket PC has full GIS and GPS functionality Data exchange between server and Pocket PC is based on XML technologies and GPRS gateway.



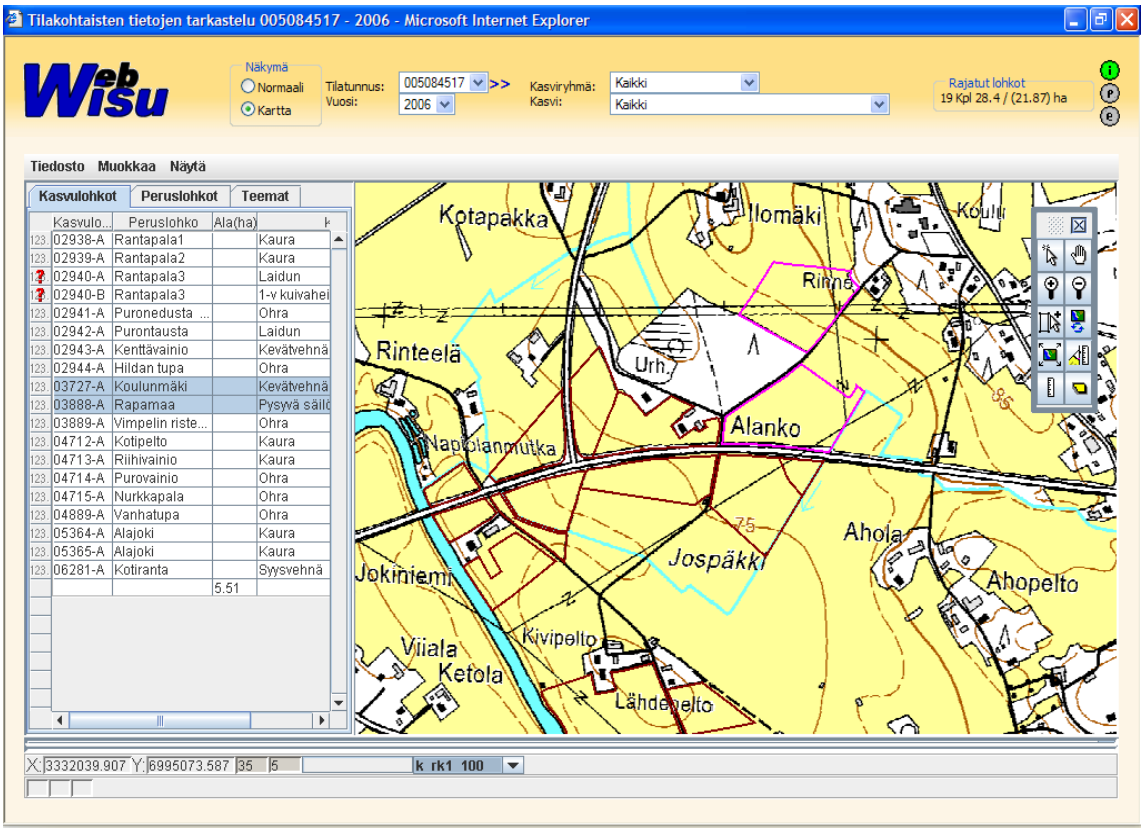


Image 2: Map component on WebWisu

Service models

Different organizations can deal with webservices in different roles. Depending on the functionality and the business model, different service models can be used. Some services can act as passive service providers that reply with result document to made requests. Service providers promote their interface by publishing service description commonly using Web Service Definition Language (WSDL).

Some services can act as service requestors that are comparable to client within the standard client-server model. Generally services can be groupped to following service models.

- Utility services. Encapsulated functionality that can be reused within and between applications. Basically question is about same ideas as building reusable components. These just can be accessed outside of platform boundaries. For example some heavy calculation, conversion, data delivery etc.
- Business services. Services designed to represent specific business function.
- Controller services. Service interacting with various other services to execute a business function.

Overall services share some common principles.

- Services share the formal contract that defines the terms for information exchange.
- Services abstract underlaying logic. Internal life of service is not important and it is not visible for other services. Only the part that is expressed in description.

- Services are discoverable. Human can understand their logic from description.
- Services are composable. Logic can be presented by combining services to a business service.

Conclusion

In areas like agriculture, where typically is a lot of players around one farmer in different roles, system integration can be very painfull. By utilizing webservices different organizations can join to common playground by offering just their own part of the functionality. And without changing or publishing internal life of their own system.

That’s why we believe that webservices technology can pull down many barriers and obstacles for common information systems.

Literature

[1] www.w3c.org.

[2] www.soaspecs.com