The role of smart GIS technologies in supporting and controlling EU farmer subsidies in Austria

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Abstract

AgrarMarkt Austria (AMA) is responsible for controlling EU agricultural payments to farmers in Austria. In 2003 the organisation first contracted Hexagon Geospatial to develop a system which would allow the management of funds and payments based on geographic data. The resulting Integrated Accounting and Control System (IACS), was implemented built on ResPublica Intranet GIS Software. This was the predecessor to Hexagon Geospatial’s current GeoMedia Smart Client software. The system has been in regular use for over ten years during which time the GIS software was regularly updated by Hexagon Geospatial.

Keywords

GeoMedia Smart Client, ECW, workflows

Introduction

In September 2013 Hexagon Geospatial was contracted to undertake a major upgrade of the IACS-GIS system at AMA. The client’s objectives were to modernise and extend the capabilities for farmers to capture parcel extents and attributes via a web portal. The GIS platform selected for this was GeoMedia Smart Client. This not only provides the functionality for capturing and editing the field boundaries and associated data, but also allowed the AMA development staff to build the optimised, map-based workflows that simplify the process of maintaining the agricultural data.

The upgrade project was completed in March 2015, with an initial roll-out to a select group of farmers followed by a second phase in May 2015 which brought in more farmers and institutions. The system is now fully productive and serves up to 600 concurrent users.

Hexagon Geospatial’s GeoMedia Smart Client software is used to provide the workflows and tools for digitising, splitting, merging, and measuring agricultural parcels. Orthophoto data is provided as a backdrop using ECW streaming from Apollo Essentials server software. This highly optimised form of raster delivery manages 5.5 TB of orthophotos covering 100% of Austria, enabling 120 000 farmer-users to digitise 4-million agricultural land use areas.

In addition to the provision of the GeoMedia Smart Client software and Apollo Essentials, Hexagon Geospatial also provides GeoMedia Web Map Advantage to facilitate the production of 500 000 A3 colour prints twice a year. Until 2015 these were utilised by farmers and inspectors to check the data held on the system is accurate by inspection on the ground. In the next phase AMA will use A3 colour prints on demand for controlling purposes. So they will produce only a few thousand a year.

The upgrade project for IACS-GIS delivered the following Hexagon Geospatial Software:

- GeoMedia Smart Client professional workgroup
- GeoMedia Web Map advantage workgroup
- Apollo Essentials
- GeoMedia Professional

Dates during which work was carried out (planned and completed are the same):

Start: Sep 2013
Completion: May 2015

Cost of project:

- Software: €100 000 (this is the upgrade cost from existing licences)
- Services: €60 000

Development

AgrarMarkt Austria manage approximately €1.8-billion of subsidies and, given the nature of the data, the requirement was for AMA not only to own the system but also to be able to manage the system itself rather than have it managed by an outside company. For this reason it was important that the development of workflows be done by AMA’s internal
development team, since they fully understood the needs of their user base: the farmers who would be utilising the system.

Hexagon Geospatial provided training to the AMA developers, who were already skilled in JavaScript, XML and .NET programming, to be able to configure and develop the GeoMedia Smart Client workflows needed to achieve the goals of the project.

AMA identified a typical workflow from the many required and this was used as the learning exercise for the AMA development team using the principle of “learning by doing”. The initial training session was of two days duration, during which all the key principles of workflow development with GeoMedia Smart Client were covered.

Following the initial training event Hexagon Geospatial provided on-site support, spending one day per week with the customer’s development team, to assist with progress by helping to optimise the workflows, assist with specific issues etc., this continued for between three and four months. After this time the need for on-site support steadily reduced as the development team became largely self-sufficient.

Implementation

During project implementation a project meeting between Hexagon Geospatial and AgrarMarkt was held every two weeks, the frequency being increased to weekly during key phases of the project.

In terms of building environments and installation of software, once again it was important to the customer that their team own these tasks, as far as possible, following initial instruction. Hexagon Geospatial therefore had one application engineer onsite doing the initial installation on a test server. AgrarMarkt staff were taught how to install and configure the software “out of the box”.

It was AgrarMarkt’s decision to maintain five environments: development, test, integration, regression and live systems. Hexagon Geospatial recommends at the very minimum separate test and live environments, with others being useful depending on the customer’s development, test and support practices. AgrarMarkt’s system is integrated with its web portal and other systems so that is tested on the integration environment. After the initial training session all the environments were built and are maintained by the AgrarMarkt team with Hexagon Geospatial supporting by assisting with issues where necessary.

The Apollo Essentials installation followed the same pattern. In the original system orthophotos were delivered using GeoMedia WebMap, which provided sufficient functionality and adequate performance for the original number of users. This was upgraded to Apollo/ECW streaming in this project to provide the much higher performance necessary to enable farmers to digitise data over the internet. GeoMedia WebMap is still used by AgrarMarkt for producing the A3 printouts.

AgrarMarkt maintain a single data centre but this is highly secure with resilient servers. Backups are managed by the AMA IT staff. AgrarMarkt already had load balancing in place for the older application and were able to keep the infrastructure for the new system. There had been no problems with performance in the old system running three load balanced servers and so, after consultation with Hexagon Geospatial, the new system was built on the same architecture, although a licence for a fourth server has now been acquired to cope with anticipated future growth in demand.

System support and maintenance

AgrarMarkt have a standard maintenance package for the Hexagon Geospatial software that is integral to their system: GeoMedia Smart Client, GeoMedia Web Map, Apollo Essentials GeoMedia Desktop Professional. The maintenance package allows for one major release per year plus service packs. One update to GeoMedia Smart Client was delivered during the development phase. Towards the end of 2015 AMA will either switch to the 2015 versions of the software or may skip to the 2016 versions. This ensures the users remain on a currently supported version, as well as benefitting from any enhancements and fixes in the newer versions.

The first installation of a major version release is typically done by a Hexagon Geospatial application engineer who will then demonstrate any new functionality to AMA’s development team in an update workshop. Subsequent installations are then rolled out by the customer’s team. Updates go into the development or test system first, through integration and then into production.

AgrarMarkt purchase consultancy, for assisting with the development of additional workflows for example, from Hexagon Geospatial on T&M basis. They order about 30 days each six months, but they do not always use as much as this. As experience with the new system grows so they are becoming more independent which was one of their aims. About five days of consultancy has been used in the first six months of 2015.
Business continuity planning

Business continuity planning is in the hands of AgrarMarkt Austria’s own skilled team. The software license held by AMA supports multiple environments which could be hosted in separate data centres if required.

The project is now fully productive

The aim of the IACS-GIS project was to allow farmers to be able to digitise and provide attribution for polygon data defining their land parcels via the AgrarMarkt web portal to further their applications for EU subsidy.

Farmers are trained how to use the system by visiting their local Chambers of Agriculture for a one-to-one session with local staff. They are trained to use the tools provided by the GeoMedia Smart Client workflows via the web portal. After the training session they are ready to use the tools to maintain their data. All the updates have are done online to the main system since one of AgrarMarkt’s security requirements is that no data, including the aerial imagery, is stored on the local computers. (GeoMedia Smart Client does support offline working using local caches but for AgrarMarkt this mode is not used for security reasons.)

Documentation available for AgrarMarkt’s IACS-GIS

AgrarMarkt Austria provides farmers with a comprehensive handbook which covers all the functionality of the online application. The handbook (in German) can be downloaded from their website at:


Instructional videos are also publically available which provide short examples of how to undertake all the key operations. Although these are in German the operations are fairly self-explanatory. See Invekos-GIS on YouTube at:

www.youtube.com/playlist?list=PLCa2YX6LFRR34SEOg8hZP8eLDP6hB0iof

Overview of IACS-GIS application

Once logged into the web portal the user can start up the IACS-GIS application.

IACS-GIS automatically opens two windows (see Fig. 1). The first window has the map window (1), the menu bar (2) and the legend panel (3). In the second window the list of fields (4) is displayed.

The map window is the main element of the user interface and includes a dynamic map. This display fields as vector data overlaying the orthophotos. Fields are highlighted as the user moves their mouse over the map. Navigation tools (Fig. 2) allow movement around the map and permit the user to zoom in and out.
The legend includes several map layers that can be displayed in the map window. The map layers contain the graphical representations of field pieces, reference surfaces, aerial imagery, etc. The user can expand the various categories of features (Fig. 3) and use the legend to control what is displayed in the map window.

The user can create a "bookmark", to allow settings that have been made in the legend along with the current map section to be stored. After exiting or rebooting the IACS-GIS the bookmark can be reactivated. Bookmarks can be "exported" as a local computer bookmark (Fig. 4).
The field pick-list (Fig. 5) opens automatically when the program starts. It can be re-opened at any time from a menu option. The field pick-list is the starting point for workflows to edit field attribution, create new field pieces, or delete a field piece.

Fig. 5: Field attribution.

Selection of a field (or part of a field) from the initial pick-list opens a second form which shows details of the selected field piece (1) and the attribution such as land use and area measurements (2).

As well as updating attributes for the fields, the user can also use workflows to modify field boundary polygons, adding new polygons, splitting or merging. The geometry edit mode can be invoked in a number of ways: from the field attributes window, the land use list or by right-clicking in the map window.

Tools are available to perform the following tasks:

- Draw a new area – this can also be used to create an “island” or “hole” within and existing polygon to define an ineligible area such as a rock outcrop, wooded area, building etc.
- Edit an existing polygon – to re-draw the boundary
- Perform a difference operation to remove a part of one polygon overlapped by another.
- Delete an area.
- Merge two adjacent areas – this can also be used to remove “holes” from polygons.
- Split an area.
- Move an existing area.
- Drawing a new point to a feature such as a single tree for example.
- Editing an existing point
- Delete a point

Example workflow – the difference operation:
Fig. 6: Example workflow.

- In geometry mode the existing polygon area is shown in yellow.
- To capture the hedge, the user press the “New Polygon” button.
- The hedge is drawn overlapping the existing polygon and is finished with a double-click.
- The surface of the field is displayed with a yellow border, the hedge with a green border.
- The user then presses the “Difference” button.
- The pointer changes to a hand icon and the hedge is selected with one click.
- The hedge will be subtracted from the rest of the field.
- There will be two separate areas each with a green border.
- Finally, the area must be saved. Then the user is returned return to the "Field attributes" window.

After saving two areas are presented separately, and the attribute change of the hedge can be done in the attribution window.

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