Project case study:

SITEWELL LPIS 2

system implementation

Customer:	Contractor:
MINISTRY OF AGRICULTURE OF THE CZECH REPUBLIC Těšnov 17, 117 05 Prague 1 Tel.: +420-221.811.111 Fax: +420-224.810.478 E-mail: info@mze.cz Internet: http://www.mze.cz	Sitewell information systems Táborská 31, 14000 Prague 4 Tel.: +420 261 102 206 Fax: +420 261 102 314 E-mail: info@sitewell.cz Internet: www.sitewell.cz

Intended for: the public

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List of abbreviations

AP	agricultural parcel
BP	land block portion
EC	European Commission
EU	European Union
FB	farmer's block
GIS	geographic information system
GPS	Global Positioning Systems
HRDP	Horizontal Rural Development Plan
HW	hardware
IACS	Integrated Administration and Control System
IS	information system
KEZ	Kontrola ekologického zemědělství, o.p.s. (Inspection of Organic Farming – the control and certification body for organic farming in the Czech Republic)
LB	land block
LFA	less favoured area
LPIS	Land Parcel Identification System (LB register)
MoA	Ministry of Agriculture
MoE	Ministry of the Environment
SAIF	State Agricultural Intervention Fund (the paying agency for the EAGGF Guarantee Section in the Czech Republic)
SAPS	single area payment scheme
SOP	Sectoral Operational Programme
SQL	Standard Query Language
SW	software
RS	remote sensing

Chapter 1. History of the origination of Czech LPIS

To understand the LPIS system in the Czech Republic, it is necessary to briefly describe the history of system origination and, in particular, the reasons that led to the preparation of individual LPIS versions, especially the version that in now implemented as part of the integrated administrative and control system.

1.1 Reasons for LPIS origination in the Czech Republic

In the late 1990s, there occurred a need in the Czech Republic for the creation of a new parcel identification system to **manage the control of the continually growing spectrum of state area payments.** The data on agricultural land from cadastre resources that were available at that time were not available in a graphical digital form and they provided limited information about the actual user of a given agricultural parcel for which the aid was intended. Note that with respect to agricultural aid, the crucial information is not who is the owner of a parcel registered in the cadastre, but who is actually farming on the parcel, regardless of whether they are tenants or landowners.

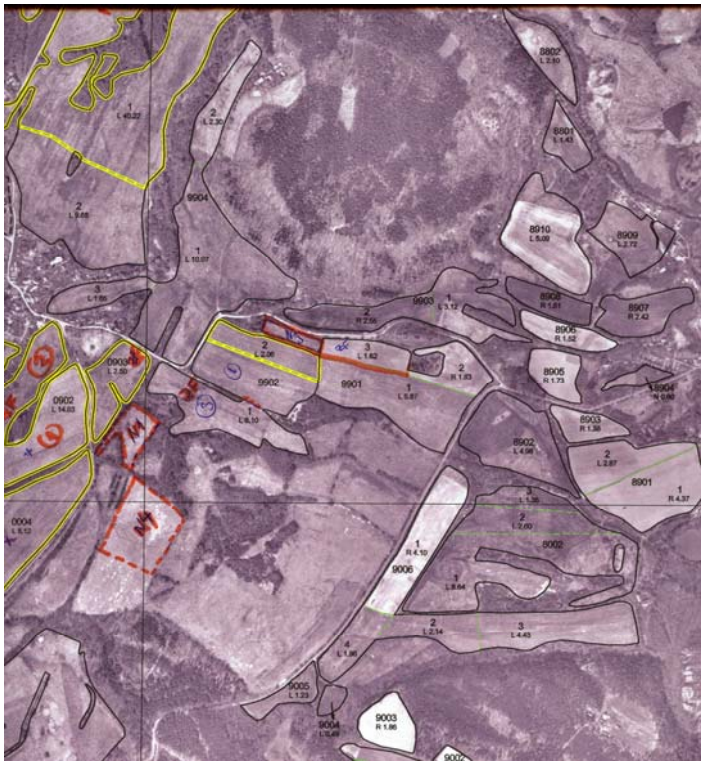
The need for the creation of a new identification system for agricultural parcels to be able to administer aid then significantly increased with the expected accession to the EU. In the EU, area payments involved much higher amounts at that time than those in the Czech Republic. In addition, the EU's condition for access to them was that the **member state should establish an agricultural parcel identification system based on the actual use of land in a geographic information system** (hereinafter "LPIS" – Land Parcel Identification System). The Czech Republic undertook to build such a system within a legislation screening in 1999. By this commitment towards the European Commission, the use of cadastre data to administer land payments provided after the Czech Republic's accession to the EU was rejected definitely.

Based on this decision, the Ministry of Agriculture placed an order for a pilot project solving a new LPIS based on aerial photos transformed in orthophotos with the actually used agricultural land units plotted in them.

History of LPIS generation 1	
1999	Pilot parcel identification project based on aerial photos
2000	Conclusion of a contract for the delivery of an IACS including LPIS for the Ministry of Agriculture of the CR
2001-2002	Initial plotting of blocks on the territory of the Czech Republic
2003	Official registration of farmers in the parcel identification system in compliance with the new Agriculture Act using notifications on paper printed maps

1.2 First generation of an off-line land block register solution

The creation of the first version of the land block register was started based on a contract aimed at the implementation of the entire IACS. The appointed contractor was company Ekotoxa Opava s.r.o. In 2000 – 2002, the user units of agricultural land were initially plotted in orthophotos made in 1999 – 2001 and the plots were then verified with the users. Land block boundaries were digitally plotted off-line on the contractor's site. The subsequent verification was performed at the regional offices of the Ministry of Agriculture by verifying the boundaries of land blocks plotted on paper maps at a scale of 1:10000. The result was the delivery of the first version of an off-line created land block register at the end 2002. The register in its then form may be considered the first version of LPIS in the Czech Republic. It was kept in digital form based on an Oracle 9i Spatial database, using the Autodesk MapGuide map server technology only for map viewing in an intranet environment.



The first off-line version of Czech LPIS was created on the basis of voluntary communication between land users and the regional offices of MoA and the employees of the contracting company. At that time, having a legal framework for this new agricultural land identification that would specify its **essential identification parameters and update rules** proved mandatory. The need was even more urgent in the Czech Republic as the planned sale of approx. 500,000 ha of state land was approaching, expected to stir up the land market.

1.3 LPIS enactment

Czech LPIS received its legal framework by means of an amendment to the most important act in the field – i.e. **Act No 252/1997 Coll., on agriculture.** This amendment included the specification of (i) the mode of origin of parcel identification based on user relations by **reporting land usage,** and (ii) the **process of updating parcel identification modifications.** The amendment was passed by the Czech Parliament under No 128/2003 Coll. in the first half of 2003 and came into effect in June of that year. The Act set down several key conditions for the operation of the new parcel identification:

- ⇒ It was set down that **area payments might only be provided on the basis of data in the new agricultural parcel identification system**.
- ⇒ The body that would **operate the new identification system would be the Ministry of Agriculture.**
- ⇒ It set down a **six-month transitional period** during which users could report agricultural land that had not been registered in the parcel identification system yet.
- ⇒ It set down the **basic rules for the standard updating of the identification system after the six-month transitional period.** Users are required to report any modifications within 15 days.

The legal regulations for parcel identification, as specified in articles 3a to 3i of Act No 252/1997 Coll., on agriculture, were a sufficient tool to manage the registration of changes in user relations on agricultural land. However, to manage the full administration and control of aid, the legal identification had to be completed with some classification parameters. Only then the parcel identification, full-valued in terms of the needs of aid schemes, can be **as a whole identified by the term common in the EU, LPIS.** Hereinafter we use the term **LPIS** where we talk about the **parcel identification system as a whole** and the term **parcel identification** where we only discuss the "core" of LPIS – i.e. the records of **user relations to agricultural land.**

1.4 Experience with the practical use of the first generation of the solution (2003)

The official registration of users in the parcel identification system pursuant to the amended Agriculture Act was an ideal opportunity for testing the first generation of Czech LPIS. Since it was an off-line solution, land usage had to be reported using a "paper report" method. That means all documents relating to used land including a used land plot were provided to land users at the regional offices of the Ministry of Agriculture in paper form; likewise, the reports of used blocks were plotted in the paper maps at a scale of 1:10,000. After the deadline for report admission, the documents were processed on the site of the contracting firm – Ekotoxa Opava s.r.o. During the evaluation of the data, several limiting factors of the off-line identification solution showed up:

- ⇒ **Without the users present at the evaluation, it was often impossible to evaluate a conflicting plot of two land blocks**
- ⇒ **The readability of plots in paper maps turned out to be often problematic and inaccurate**
- ⇒ **The response time of the processing was too long to allow for response to further changes in agricultural land usage, which occur constantly**
- ⇒ **Resolving many ambiguities at the off-line workplace required inadequate cost of time and human resources, as it was impossible to communicate with the concerned users directly and often impossible to fully interpret how exactly a report was meant**

Based on this experience, at the end of 2003 Ekotoxa developed an application, SpLPIS, whose aim was to eliminate the problems of the paper-based, off-line solution, i.e.:

- ⇒ **To allow for updates on graphic data directly at MoA regional offices in the presence of concerned users**
- ⇒ **To eliminate the fact that the boundaries of blocks, which determine the amount of aid for farmers, are plotted by a private company instead of the Ministry of Agriculture that is liable for this under the Act**
- ⇒ **To reduce the response time between the reporting of a change and its induction in the identification system.**

While SpLPIS eliminated some of the problems of the paper-based solution, it could not ensure the full-scale operation of LPIS as required by the Agriculture Act, as it was still based on the off-line solution principle: the regional offices of MoA produced proposals for boundary modification, but on a certain historical version of LPIS that was amended at approximately one-month intervals. At these intervals the appointed contractor's office evaluated modification plots created at the regional offices of MoA. **It turned out that the crucial problem is the off-line principle of the solution, which often resulted in ambiguities in the evaluation of changes, turned out to be insufficiently flexible and could not ensure full data integrity.** At the same time, it seemed very problematic that decisions on valid modifications were taken in a private company without the full engagement of officials from the regional ministry offices.

1.5 Launch of the first on-line solution of Czech LPIS – LPIS Generation 2

In view of the experience with the first generation of the off-line solution of Czech LPIS, at the beginning of 2004 the Ministry of Agriculture decided to change the philosophy of the system. The task of creating an on-line solution for Czech LPIS was assigned to Sitewell s.r.o. The objective was to provide the technology and applications that would allow updating data in LPIS on-line, directly at the regional offices of the Ministry of Agriculture and without an intermediary in the form of an external contractor, and, in particular, to provide an opportunity to handle modifications "in time".

In a short, record-breaking time – as soon as 24 March 2004 – the **Sitewell LPIS** application was launched and standard register

New LPIS Generation 2	
4/2/2004	Contract for a new generation of on-line LPIS solution signed
24/3/2004	Launch of on-line LPIS data updating in the new system
30/4/2004	Launch of full version with support for automatic data classification and interconnection with the paying agency

data updating was started through the 63 regional offices of the Ministry of Agriculture. By the first deadline for the acceptance of SAPS and LFA applications (15 May 2004), graphic or descriptive data changed for more than 25% of blocks in the identification system.

Since 1/5/2004, Czech LPIS has been fully deployed as a reference register for the verification of data in aid applications submitted to the State Agricultural Intervention Fund (the Czech paying agency). Czech LPIS run by the Ministry is completely on-line interconnected with the information system of the paying agency though an XML interface.

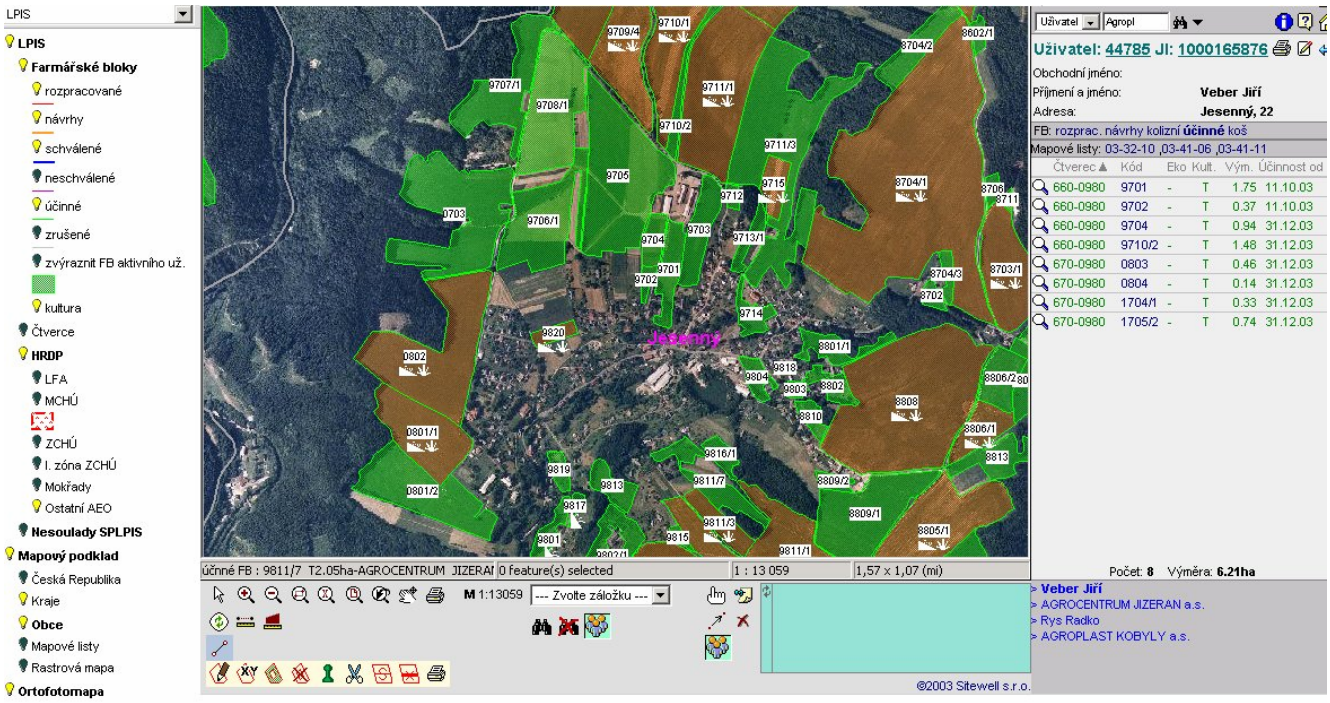


Figure 1 An example of the look of Sitewell LPIS

Chapter 2. The principles of Czech LPIS

In some details, the principles of Czech LPIS differ from the systems deployed in the old Member States as well as from those used in the newly acceding Member States. Therefore, we place emphasis on understanding the individual elements of Czech LPIS and the essential rules that govern it. The rules are absolutely crucial and non-compliance with them would make the implementation of Czech LPIS infeasible or at least considerably restricted.

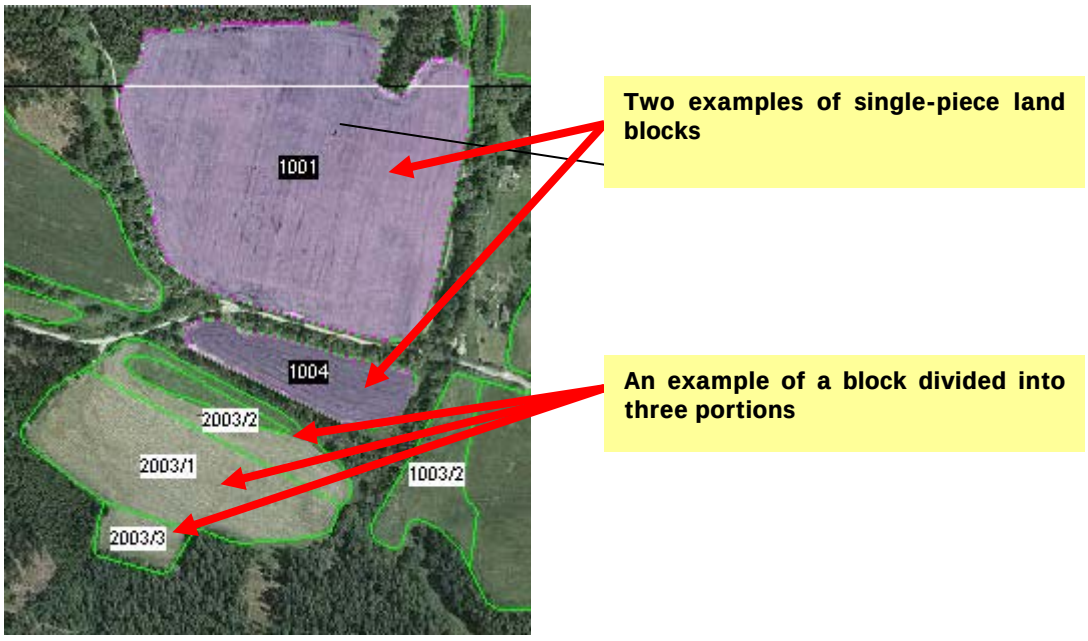
2.1 Basic elements of LPIS

Czech LPIS has been primarily designed as a **reference land register** that is in the first place used to **verify information in aid applications** provided in relation to agricultural land, regardless of whether the aid is financed from EU sources or national aid schemes. The system contains detailed data of less favoured areas (LFAs) and factors needed to implement agri-environment measures in compliance with Council Regulation (EC) 1257/1999. In addition to the control of aid, LPIS serves as a basis for the registration of organically farmed land, as a tool for the monitoring of the impacts of HRDP measures and, last but not least, as a tool facilitating the application of farming limitations resulting from the nitrate directive.

2.1.1 Elementary identification unit in LPIS

Elementary identification unit in LPIS = Farmer's block

The elementary reference item of Czech LPIS is a farmer's block representing **a continuous area of agricultural land with one type of crop, cultivated by one user in one farming mode** (conventional vs. transitional vs. organic farming). A farmer's block is either a **land block portion** or a **single-piece land block.** The abbreviation for a farmer's block is FB.



Land block and land block portion (Article 3a (3) and (4) of Agriculture Act):

According to the Agriculture Act, a land block *represents a continuous area of land under cultivation clearly separated in the terrain in particular with a forest stand, paved road, water stream or fallow land.*

A land block is subdivided into land block portions if there are more than one types of crop grown on it and/or if the land block is farmed by more than one natural or legal persons that pursue this activity in their own name and at their own risk (hereinafter the "user"); **land block portions represent a continuous area under cultivation with one type of crop farmed by one user.**

For the elementary unit of a farmer's block, data linked to land are registered. In Sitewell LPIS, these data are entered in the **register of farmer's blocks** – i.e. to the key table **LPIS_RFB**. An overview of data

registered for a farmer's block is shown in the following diagram 1. With respect to their origination, the individual data can be categorized as follows:

⇒ **Data reported by the farmer**
⇒ **Data calculated by the system by means of intersection with other geographical layers**
⇒ **Data calculated by the system in relation to the digital terrain model**
⇒ **Data computed by the system as a combination of several criteria**

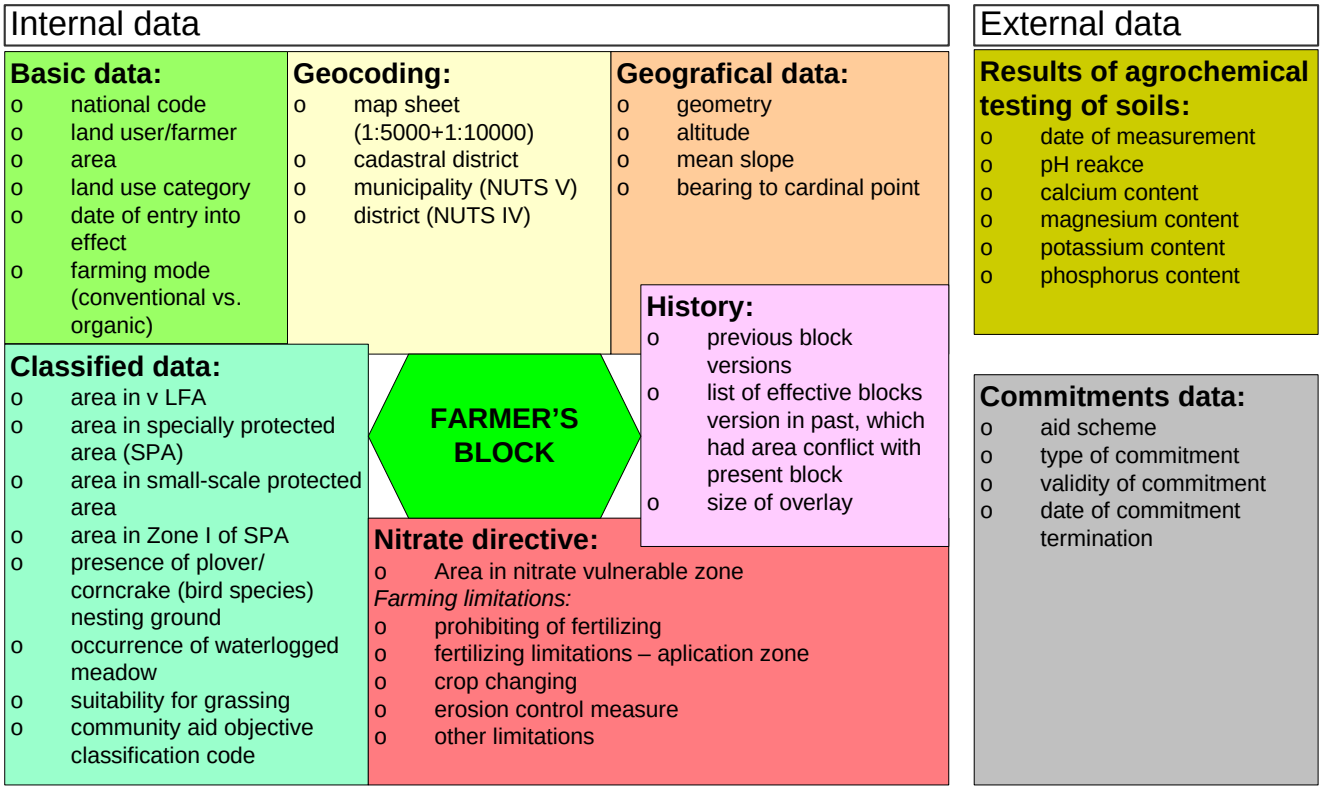


Diagram 1: Farmer's block data registered in Czech LPIS

Rule No 1 of Czech LPIS says: "There may always be only 1 effective version of data at a moment for one parcel = one farmer's block." Sitewell LPIS strictly rules out approving 2 effective versions of a farmer's block for one parcel.

2.1.2 Basic information about a farmer's block

The basic information about a farmer's block constitutes the core of LPIS and is sometimes called "parcel identification based on user relations. These data are changed in LPIS based on a farmer's report or on the findings of an inspection by government bodies (Ministry of Agriculture, State Agricultural Intervention Fund). In a case of changing data in LPIS on the initiative of somebody else than the concerned user, the changes are discussed with the user or reported to the users in writing if they ignore the request for discussion about the changes.

2.1.2.1 National code

- The national codes of farmer's blocks are guaranteed to be unique – the Sitewell LPIS application assigns a new national code whenever a proposal for a new block version is created.
- The national code has up to thirteen characters
- To facilitate orientation, the national code is abbreviated as a 4-digit number and denotation of the square in which it is located, e.g. block No 1003 (square 730-0940)

Rule No 2 of Czech LPIS says: "There cannot be 2 effective farmer's blocks with the same national code."

2.1.2.2 Geometry of farmer's block plot

- The boundaries of farmer's blocks are plotted on orthophoto.
- The plot of a farmer's block according to the methodology of the Ministry of Agriculture involves land under cultivation only; this methodology also sets down the rules for plotting minor non-agricultural land objects performing non-production functions (such as field boundaries or isolated trees)
- A detailed methodology has been prepared for plotting

2.1.2.3 User

- The user of a farmer's block may only be a single natural or legal person
- The users and their identification data are registered in a "land user register" (table LPIS_RUZ)
- Integration with other IACS registers is ensured using a "uniform identifier"

Rule No 3 of Czech LPIS says: "A double claim for land is excluded by the fact that only one user may be effectively registered for one area = farmer's block."

2.1.2.4 Area

- Area is calculated for each farmer's block as soon as a proposal for the plot is set up, by the Sitewell LPIS application. A FB has an area calculated by the system on the basis of its plotted boundary
- The system only registers one farmer's block area, which is the **reference area for aid. An applicant may never make a legitimate claim for a larger area for aid than the area of the farmer's block in LPIS.**
- The farmer's block area in Czech LPIS **is the net area, i.e. it only covers the area of agricultural land for which a claim for aid may be submitted**
- Any change in the farmer's block area requires changing the block boundary, or removing non-agricultural objects from within the block.

Rule No 4 of Czech LPIS says: "A farmer's block has a single registered area that may only be changed by block boundary modification or by removing a non-agricultural object from the plot within the block."

2.1.2.5 Land use category

Land use categories in Czech LPIS:

1. Arable land
2. Grassland
3. Orchard
4. Vineyard
5. Hop field
6. Other category
   - afforested agricultural land
   - stands of fast-growing species
   - other

- Czech LPIS differentiates 6 basic land use categories (see the text box); as the box shows, individual crops or crop groups are not distinguished at the level of LPIS. According to LPIS, a land use category has the widest possible meaning to be well controllable and constitute a solid basis for aid administration. If an aid scheme requires differentiating crops in a farmer's block or differentiating whether a given block is a pasture or a meadow, this is done at the level of aid an application, not at the level of LPIS. It is then verified against LPIS whether the farmer's block identified by the applicant as a pasture ground in his aid application is grassland or not.
- The land use category in a farmer's block is declared by the farmer when reporting the usage of the block at a regional office of the Ministry of Agriculture
- The land use category is verifiable – if state bodies find that the land use category is different from that declared by the farmer, they will propose its modification.

2.1.2.6 Farming mode

- The farmer's block farming mode is differentiated as:
  - ⇒ Conventional farming
  - ⇒ Farming in a transitional phase within an organic farming system
  - ⇒ Certified organic farming
- The farming mode is declared by the user when reporting the usage of a farmer's block, and it must be in compliance with the records of the certifying agency, KEZ o.p.s

- Data about the inclusion of a FB in the OF mode is verified on-line by the certifying body, KEZ o.p.s

2.1.2.7 Farmer's block effect

- Each version of a farmer's block has its **effective date** specified in LPIS and if its cancellation has been approved, it also has its **expiration date.**
- The effective date of a farmer's block is crucial for all bodies working with the register. On the effective date of a farmer's block, **new data about the farmer's block come into effect with respect to third parties,** e.g. the paying agency – SAIF. The effective date of a new farmer's block version is entered when creating a proposal for farmer's block modification.
- If the employee that creates a proposal for modification in LPIS does not enter another effective date, the new block version takes effect as of the day on which the employee created the proposal for modification in LPIS. The cancellation of the old block version than becomes effective as of the immediately preceding day.
- The employee can specify the effective date of the proposed modification within the next 5 months. This allows changes in user relations to be entered into the register in advance, e.g. when it is certain that a change will surely occur as of a future date. A typical example involves changes in user relations resulting from lease contracts: in an overwhelming majority of cases, notice periods end as of the 30th of September or the 31st of December. Instead of registering those changes under time pressure in early October or January, Ministry officials can register reported modifications during September or December. This improves the quality of the registration of modifications considerably.

2.2 Rules for updating the core of LPIS – block life cycle

The core of Czech LPIS is updated in compliance with the procedure specified in article 3g of Act No 252/1997 Coll., on agriculture. From it results rule No 5 of Czech LPIS

Rule No 5 of Czech LPIS says: "The farmer is obliged to report any change in block boundaries, any change in the person of the user, any change in the land use category and any change in the block farming mode within 15 days."

The farmer may initiate the following types of farmer's block modifications in the register:

1) **Change in the person** using the farmer's block
2) **Change in the boundary** of the farmer's block (block splitting, block merger, bare shift of a boundary)
3) **Change in the land use category** in the block
4) **Change in the block farming mode** (organic vs. conventional farming mode)
5) **Beginning or complete cancellation of block usage**

Changes may be initiated not only by the farmer but also by the Ministry of Agriculture based on its own inspection findings or the findings of other inspection authorities (e.g. the paying agency – SAIF or the body inspecting organic farming – KEZ o.p.s)

To allow for the implementation of the above changes in the core of LPIS on an on-line basis, it was necessary to adopt several essential principles for the process design of Czech LPIS:

⇒ Data about farmer's blocks have to be **versioned**

⇒ It is necessary to introduce **farmer's block statuses** corresponding to each individual phase of the processing of a proposed change in the register

⇒ It is only possible to approve a proposal for a farmer's block that is **not in "area conflict"** with another effective farmer's block or a proposal for a farmer's block

⇒ It was necessary to create user roles with certain rights for the individual steps of the change management process (reviser entitled to propose a modification, auditor entitled to approve the modification).

The process of change processing in Czech LPIS can be described by means of the "farmer's block life cycle".

2.2.1 Farmer's block life cycle in LPIS

During its life cycle, a farmer's block may have the following statuses:

Status	Name of FB status	Comments
(0)	**Unfinished**	A proposal for modification is in process; it may be further particularized or rejected without archiving. By approving an unfinished proposal, the farmer's block assumes the "valid proposal" status through "Audit 0".
(1)	**Proposal**	Valid proposal – the user is assured that the change reported by him/her is entered in LPIS correctly (this may also be an initiative motion by an employee of the Ministry). A valid proposal is already subject to a "conflict analysis" within which the proposal is checked for area conflict with another effective block or another valid proposal for modification. Until the conflict is resolved, the proposal cannot be approved – the **system will not allow approving it.** Within the bounds of the law, conflicts are resolved by an official from the competent regional office of the Ministry of Agriculture.
(2)	**Approved**	The proposal for block modification passed a "4-eyes audit" successfully. It has been approved and is "waiting" until it becomes effective.
(3)	**Disapproved**	The proposal for modification was rejected by some of the auditors (at least one) for different reasons. The user him/herself may have taken back the proposal for modification, he/she may have modified it, necessitating the creation of a new unfinished proposal, or an official from the Ministry may have decided that the proposal was illegitimate.
(4)	**Effective**	The approved proposal for block modification has come into effect with respect to third parties (in particular the paying agency – SAIF).
(5)	**Deleted**	The effective block was deleted from the register. Deletion is based on the same principle as a proposal for modification. An official from MoA makes a proposal for the deletion of a farmer's block from the register on the user's initiative or on the basis of his/her own findings. According to the "4-eyes check" rule, such a proposal must be approved by another official. The farmer's block may be either deleted from the register completely, or replaced with a new version of the farmer's block.

The farmer's block life cycle in Czech LPIS can be visualized using the following diagram:

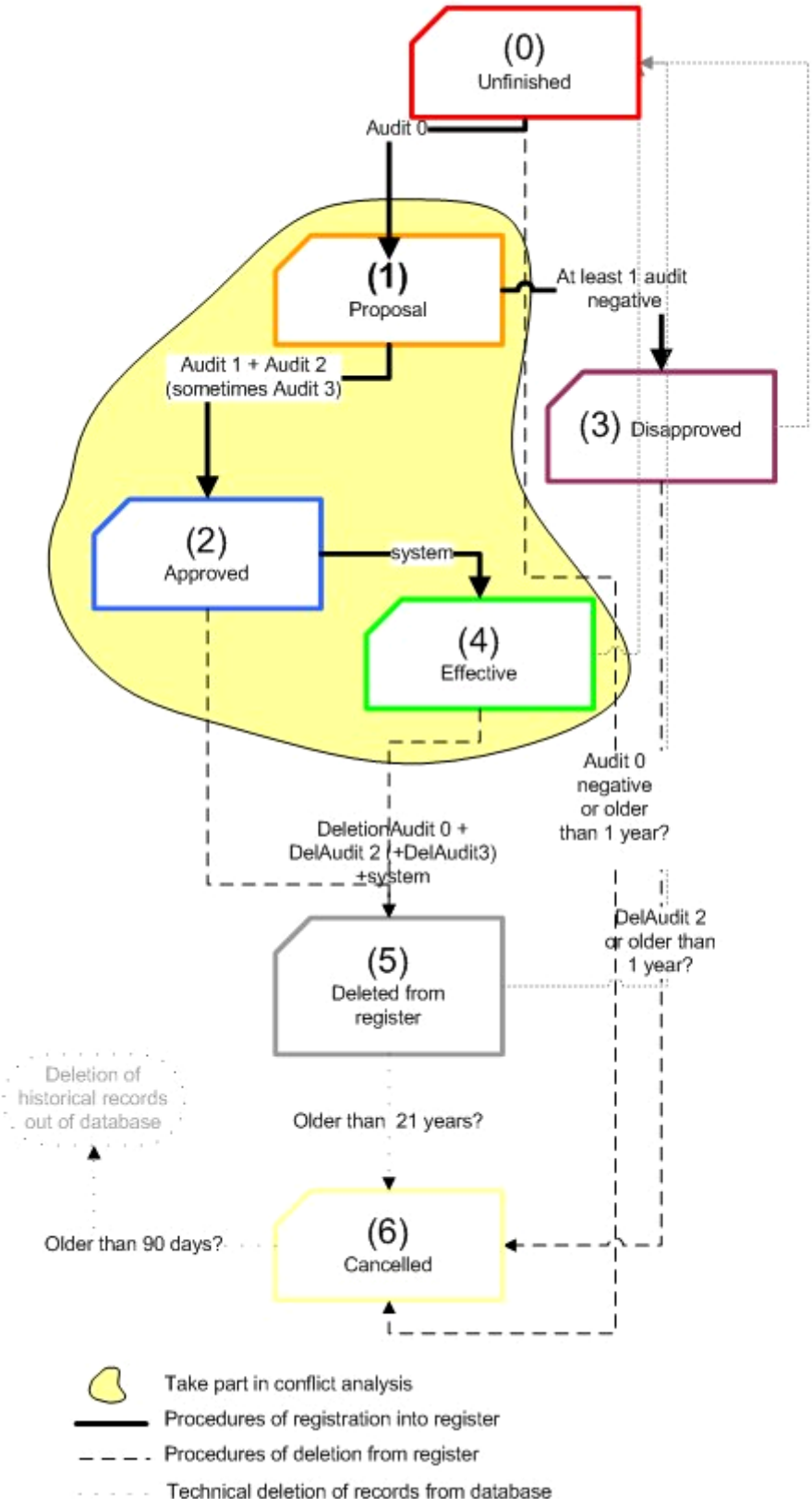


Diagram 2: Change management process in Sitewell LPIS

Rule No 6 of Czech LPIS says: "All changes in Czech LPIS must be approved by at least 2 officials from the Ministry of Agriculture – the rule of "4-eyes" audit is strictly followed. Sitewell LPIS records the date and name of the official confirming/rejecting a given change in LPIS."

2.2.2 Example of a typical change process in Czech LPIS

The life cycle of a farmer's block may be demonstrated in more detail on a typical change in user relations that commonly occurs in the Czech Republic:

1. The owner of an agricultural parcel decides to terminate the lease contract with farmer A and lease his land to farmer B. Let's say that one of the parcels constitutes a part of block 1001. The lease contract will be terminated on 30/9/2004.
2. Farmer B – the new user comes to a regional office of the Ministry of Agriculture to report the change and an official will create an **unfinished proposal** for a new version of block 1001/1. He will use the block split function. A new unfinished proposal for block 1001/2 will be created automatically from the rest of the original block that remains to the original user – farmer A. In this phase, the MoA official provides the user with expert assistance and particularizes the plotting of the block use split-up.
3. As soon as farmer B agrees with the new plot, the MoA official will approve the block split-up with Audit 0 **and set the effective date of the change to 1/10/2004.** If farmer A is present or if farmer B has at least his written consent, the status of the rest of the original block 1001 that remains in use by farmer A – new block 1001/2 – may be switched to "valid proposal" as well. When performing Audit 0, the official will set the effective date for the change to 1/10/2004, too.
4. Logically, both valid proposals will be in conflict with the original block 1001. The MoA official will therefore propose deleting the original block 1001 as of 30/9 and will have the proposal approved by his colleague within a "4-eyes audit". If the conflict analysis confirms that there is no conflict for the proposed blocks 1001/1 and 1001/2, the system will allows performing Audit 1.
5. Subsequently, another official at the competent regional office of MoA will carry out Audit 2 (the rule of "4-eyes" check is followed) and will switch the status of the proposals for blocks 1001/1 and 1001/2 to "approved". **The system will make out an acknowledgement of the introduction of the change in the parcel identification system for both users and they will sign it formally.**
6. At midnight between 30/9 and 1/10, the system will make the changes effective and LPIS will newly contain blocks 1001/1 and 1001/2 instead of the original block 1001. Block 1001 is deleted from the system.

2.2.3 User conflicts

Conflicts among users naturally occur when there are rather extensive changes in the agricultural land ownership structure. In addition, the Land Fund sells state land very quickly in the Czech Republic today. Therefore, LPIS must be ready to resolve conflicts among users.

A conflict is any situation where **at least 2 users claim their land use entitlement for a single agricultural land area.** In Sitewell LPIS, a conflict is identified using a "conflict analysis". The system will perform it as soon as an unfinished proposal is approved for the "valid proposal" status.

Whenever there is a conflict that is not resolved by immediate agreement of conflicting users, a **MoA official is obliged to call on the concerned users to present an agreement or to present legal arguments** that would prove their entitlement for the use of the disputed area.

If the users have not come to an agreement, an official of the Ministry of Agriculture has to assess the presented legal arguments and decide who is entitled to be entered into the identification system as the user of the area in dispute.

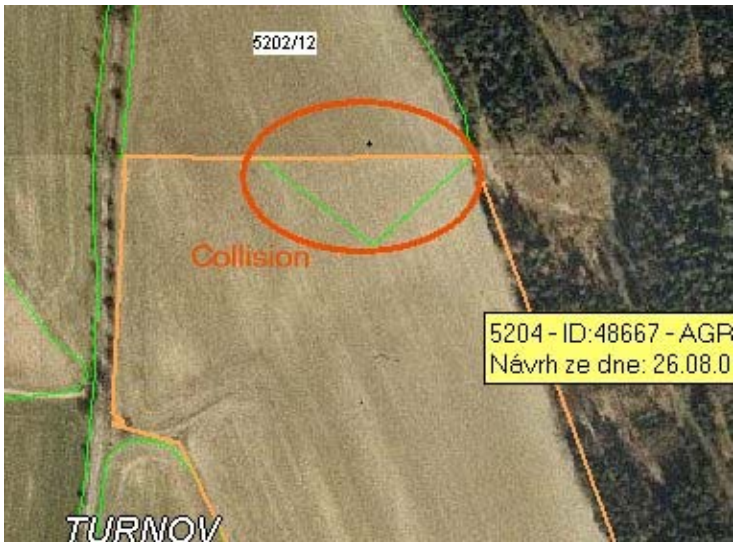


Figure 2 Example of area conflict between a block proposal and an effective block

Rule No 7 of Czech LPIS says: "No user may have the information about the blocks they use changed without their knowledge."

2.2.4 Exceptional update on a new orthophoto

The Sitewell LPIS application allows updating the plots of farmer's blocks in Czech LPIS permanently. This year, we have taken advantage of summer, when farmers report almost no changes in use and officials at the regional offices of the Ministry of Agriculture have time to verify the plots of farmer's blocks. An "exceptional update" uses the following procedure:

1. An official of MoA verifies the plot of each block at a scale of **1:1000**
2. If she founds the plot inaccurate, she will create an unfinished proposal and specify the reason for the creation of the proposal as **"exceptional update".**
3. After verifying the plots for all the farmer's blocks of a given user, she will call on the user to discuss the changes in plots.
4. The result of discussion about the changes is their final approval with a "4-eyes" audit and the user is issued an acknowledgement of the introduction of the changes in the register. The effective date of changes resulting from an exceptional update is specified as 1 January 2004 to avoid disorder in this year's aid period.

In the Czech Republic, orthophotos are expected to be updated approx. once in 3 years. Whenever the orthophoto changes, LPIS will be updated using the above procedure.

Figure 3 Deletion of unfarmed land from a block based on update on a new orthophoto

2.2.5 Update using the results of SAIF's check

The State Agricultural Intervention Fund as the paying agency for agricultural aid performs physical on-the-spot checks. They are focused, among other things, on verifying whether the user applies the relevant measure on the entire area of his/her farmer's block as declared in his/her application. If a smaller area is found (e.g. using GPS or by checking the plot in LPIS), the inspector may create an unfinished proposal for farmer's block boundary modification in Sitewell LPIS and edit the necessary information on the check performed in Card "K" (see figure 3).
If SAIF's findings pass the amendment procedure, the inspector's unfinished proposal will be approved for the "valid change proposal" status in LPIS. MoA officials will then audit the proposals arising from SAIF's findings and enter them into LPIS.
LPIS plot updating using the results of SAIF's inspections has been performed in a test mode in 2004.

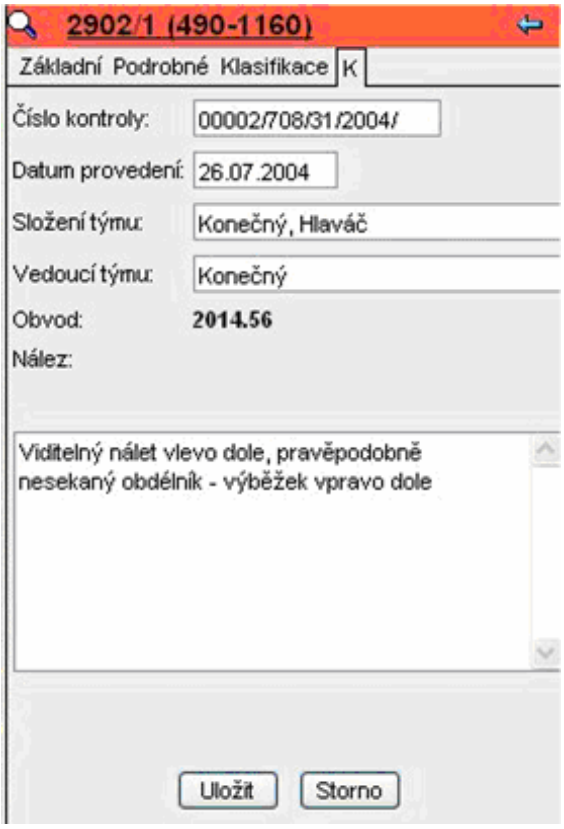


Figure 4: Record of a SAIF inspection carried out on a farmer's block

2.3 Farmer's block history

Farmer's block history is one of the essential functionalities of Sitewell LPIS. A farmer's block history consists of a list of previously effective blocks that had a non-zero intersection with the territory of the current farmer's block, always stating the amount of intersection between each previously effective block and the current block.
The basic reason for keeping a block history is the ability to control compliance with aid conditions, in particular for five-year agri-environment measures. The block history allows eliminating problems that could occur during retrospective checks if there were changes in block boundaries or in the user. As each farmer's block remembers its "territorial" history (in other words, it is possible today to find out which land use category and which user existed in the given area before x months), the paying agency – SAIF – may formulate its

check queries for LPIS during a SW check efficiently and does not have to call up alternative, more complex procedures.
With the farmer's block history in place, after the five-year period of the organic farming measure expires, it will be possible to make a simple query to LPIS within a SW check to find out whether an entire given block has really been used by one farmer in the organic farming mode and whether the land use category on the block has not changed from grassland to arable land. Verify eligibility for transferring five-year commitments within agri-environment measures among farmers will also be simple.

Chapter 3. Classified data in LPIS

For the purposes of the administration of Horizontal Rural Development Plan aid measures, the data about a farmer's block had to be classified with respect to a number of criteria:

1) Inclusion in a less favoured area (LFA) zone
2) Occurrence of farming-limiting factors for the purposes of checking the eligibility for agri-environment measures
3) Inclusion in a Community aid objective

Rule No 8 of Czech LPIS says: "If a new version of a farmer's block is approved, all classified data will be recalculated before the new block version enters into effect."

3.1 Less favoured areas (LFAs) and areas with environmental restrictions

The classification of a farmer's block with respect to its inclusion in an appropriate LFA zone is carried out by means of an overlay analysis using a layer of the **boundaries of less favoured areas.** The layer of the boundaries of less favoured areas is a digitized layer of the boundaries of cadastral districts and municipalities specifying the type of the area according to the table shown on the right.

The layer of the boundaries of areas with environmental restrictions has not been implemented in LPIS yet, because its basis, consisting of areas declared NATURA 2000, has not been digitized. This layer is expected to be implemented during 2005.
For each farmer's block, its area (even if zero) in each type of LFA is registered (see the following text box).

Types of less favoured areas in Czech LPIS:

1. Mountain area type A
2. Mountain area type B
3. Other less favoured area type A
4. Other less favoured area type B
5. Specific handicap area
6. Area with environmental restrictions

3.2 Agri-environment data

The classification of a farmer's block with respect to the needs of aid administration within agri-environment measures is carried out against several data layers:

⇒ Boundaries of large specially protected areas (natural preserves + national parks)
⇒ Boundaries of small-scale specially protected areas
⇒ Boundaries of large specially protected areas Zone I
⇒ Polygons of plover and corncrake nesting grounds
⇒ Polygons of waterlogged and peaty meadows Category I, II and III.
⇒ Polygons of agricultural land suitable for grassing

Each farmer's block has been classified based on an overlay analysis using the above-mentioned layers. The result is a complete block assessment in terms of its suitability for inclusion in the individual agri-environment measures. The following data are registered on-line in LPIS (see the box):

Users may get information on block classification from an informative agri-environment data report, which is made out on-line upon the user's request, or from a map they may obtain from officials at a regional office of the Ministry upon request. The map shows the farmer's block suitability for inclusion in the individual agri-environment measures with symbols right in the map.

Classification of agri-environment data:

1. FB area in a specially protected area
2. FB area in a small-scale protected area
3. FB area in specially protected area Zone I
4. FB area in Moravian Karst
5. FB area in White Carpathian Mountains
6. Area of a Category I waterlogged meadow
7. Area of a Category II waterlogged meadow
8. Area of a Category III waterlogged meadow
9. Presence of a plover nesting ground
10. Presence of a corncrake nesting ground
11. Suitability for grassing

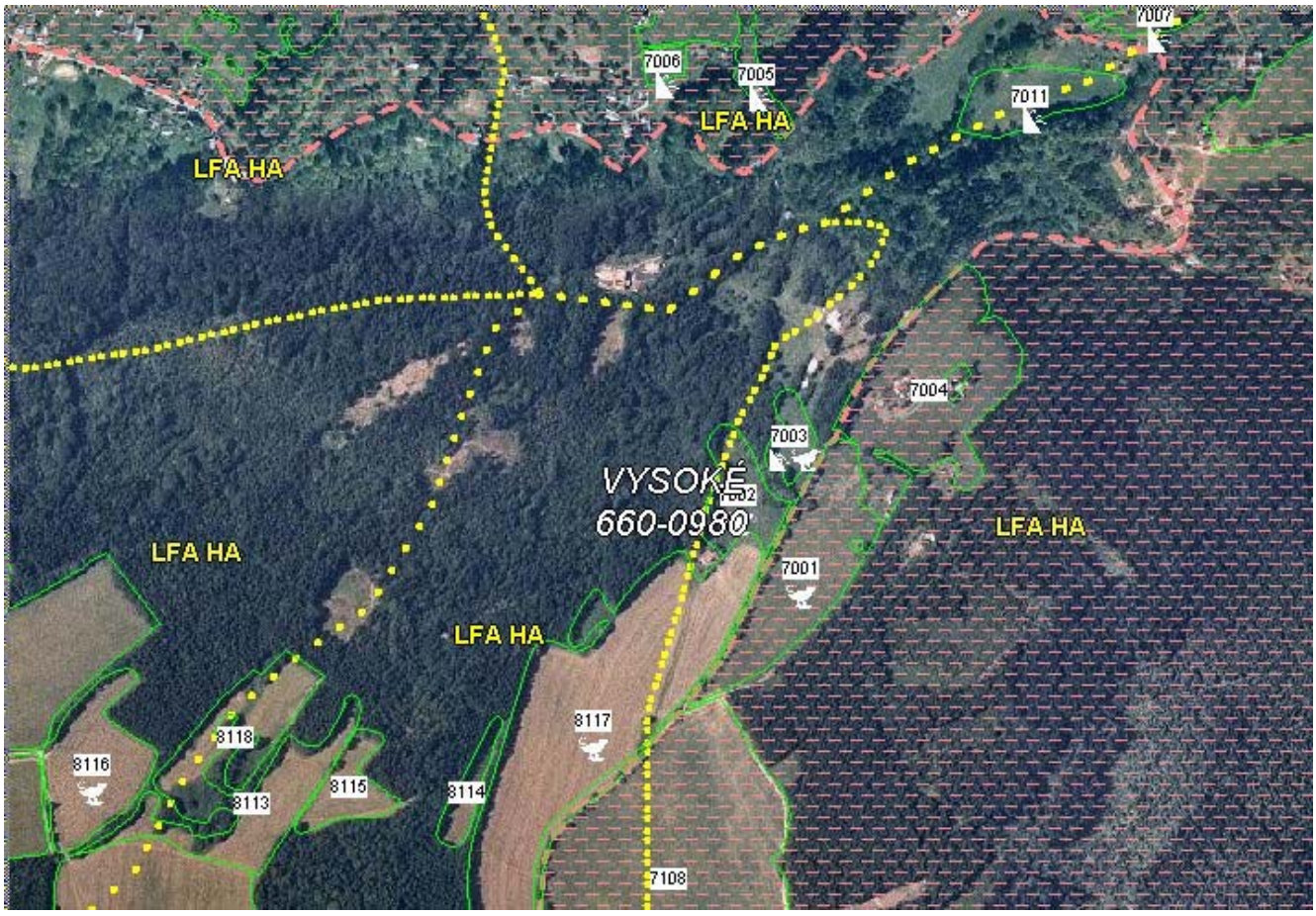


Figure 5 Example of the results of agri-environment data classification (the symbols indicate block suitability for the individual agri-environment measures) and LFA zone boundaries

In September 2004, detailed classification data will also be made available to farmers by means of the LPIS Internet Portal.

3.3 Community aid objective classification code

The classification of a farmer's block in terms of the Community Aid Objective code has been carried out against the layer of administrative division of the Czech Republic, which is classified under objective code 1 except of the capital of Prague.
The classification of a block under a Community aid objective code is important in terms of the method of co-financing for the EU rural development aid. HRDP aid for blocks located on territory classified under objective code 1 is financed from EU resources in 80%, while aid for other blocks is only financed from EU resources in 50%.

3.4 Farming limitations resulting from the nitrate directive

The classification of farmer's blocks with respect to possible farming limitations in compliance with the nitrate directive ***(Council Directive (EEC) No 676/1991),*** has been carried out on the basis of conditions stipulated by the national regulation (Government Order No 103/2003), against the layer of cadastral districts located in nitrate vulnerable zones and against the layer of valuated land environment units with given properties for the purposes of the classification.

The classification of farmer's blocks in terms of the implementation of the nitrate directive is not primarily intended for the needs of aid administration, but for making farmers familiar with farming limitations on the blocks they use. The farming limitations are structured in 5 sections (see the text box).

Farming limitations resulting from the nitrate directive:

1. Period during which fertilizing is prohibited
2. Limited fertilizing – application zone
3. Crop rotation
4. Erosion control measures
5. Other limitations

3.5 Updates of classification data layers

The process of updating underlying geographic layers is also handled within the Sitewell LPIS application, as neither the boundaries of LFAs nor the boundaries of specially protected areas are stable for good; for instance, the layers of polygons with bird nesting grounds or waterlogged meadows may change rather quickly in time. These graphic layers are updated in the ENVIRO module using a similar data "versioning" principle as in the farmer's block register. The updating of this information is handled in cooperation with the Ministry of Agriculture and the Ministry of the Environment in the central on-line LPIS application.

The process of updating underlying geographic layers in LPIS may be demonstrated on updating the boundaries of a natural preserve:

1. An employee at the Natural Preserve Administration with the right of an agri-environment geo-data reviser creates an unfinished proposal for a change in the boundary of the natural preserve (updates the border of the natural preserve polygon).
2. As soon as he finishes the change in boundaries and believes that the new boundary is correct, he will approve it with Audit 0. By doing so, he creates a valid proposal for a change in the natural preserve boundary.
3. Under the "4-eyes" rule, the valid proposal must be reviewed by his superior (the Natural Preserve Administration manager or an official from the Ministry of the Environment head office). If everything is O.K., he will carry out Audit 1. By performing Audit 1, MoE guarantees to LPIS and consequently to the paying agency SAIF that the proposed change is correct.
4. The above process may be used on any polygon of the 22 natural preserves in the Czech Republic.
5. At a certain moment (e.g. on the 1st of October), the central office of the Ministry of Agriculture takes away the right to perform Audit 1 for changes in natural preserve polygons. There will be an "impact analysis" for the impact of the changes in the natural preserve boundaries approved by Audit 1 upon provided aid.
6. After evaluating the impact analysis, the MoA central office will propose the effective date of the change in the layer of natural preserves in LPIS. After consulting with the paying agency, it will perform the final Audit 2 of the new layer of natural preserve boundaries.

Chapter 4. Position of Czech LPIS in the aid administration system

Pursuant to the Agriculture Act, Czech LPIS has the position of an **independent reference register.** According to article 3 of the Agriculture Act, its main purpose is to **serve as a resource for the verification of information specified in applications for aid whose conditions relate to agricultural land. Two more key rules for the relationship between the aid system and LPIS result from the Agriculture Act:**

Rule No 9 of Czech LPIS says: "A farmer that is not registered in LPIS may never submit an eligible aid application for agricultural land."

Rule No 10 of Czech LPIS says: "No eligible aid application for agricultural land may be submitted for agricultural land that is not registered as a farmer's block in LPIS."

The relationship between LPIS and the paying agency SAIF and other bodies is shown by the following diagram. It clearly shows the main link to the paying agency SAIF over an XML interface, as well as other links that reflect the fact that the use of LPIS is wider than just aid administration.

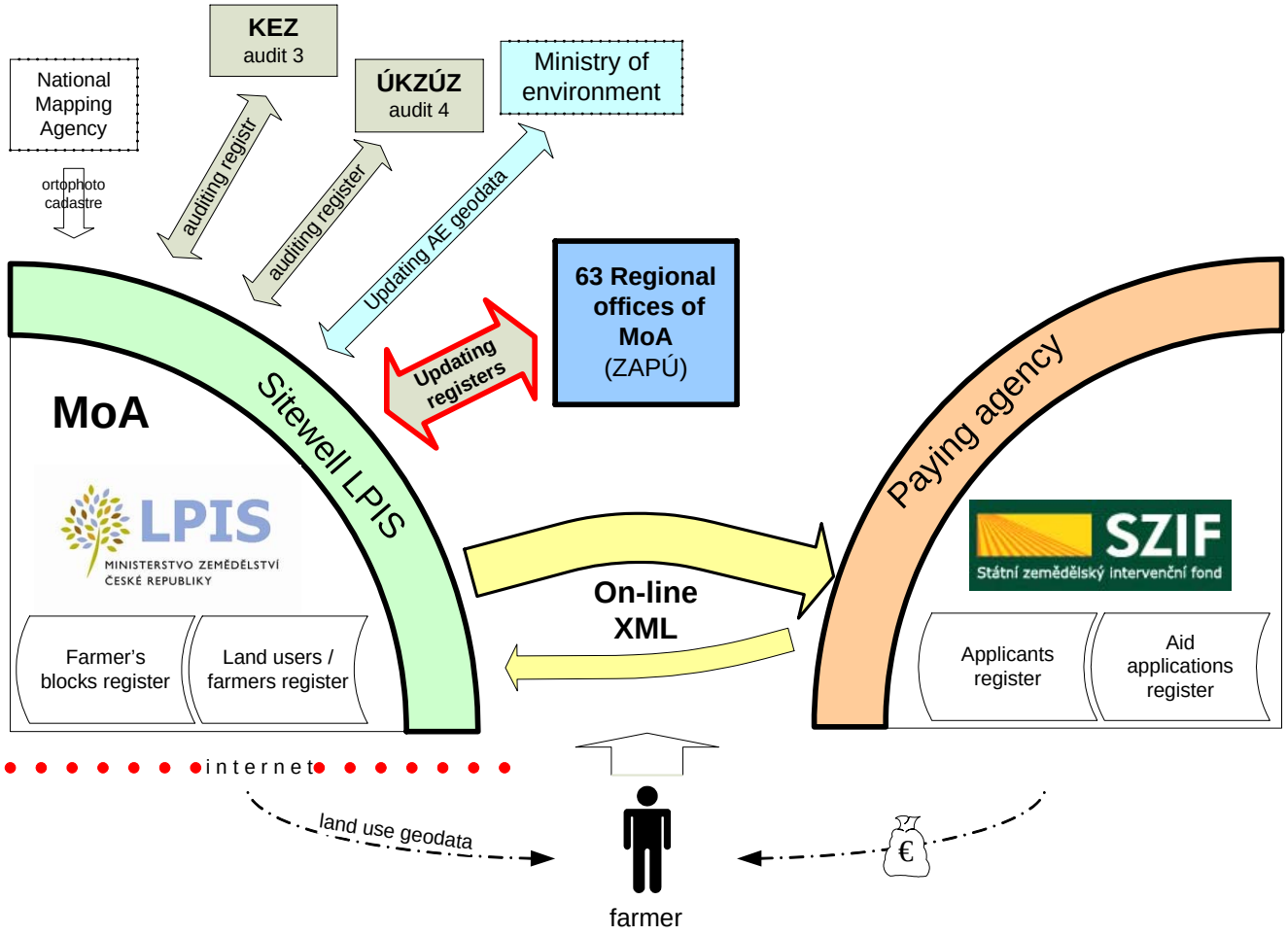


Figure 6 Diagram showing the relation between LPIS and SAIF IS

4.1 For which aid measures LPIS is used

LPIS is used to verify information in applications and to fulfil the conditions **for all** aid schemes whose **conditions relate to agricultural land**.

Aid schemes administered using LPIS:

1. Single area payment scheme (SAPS)
2. Compensatory allowance for LFAs
3. Agri-environment measures
   - Organic farming
   - Grassland treatment
   - Grassing of arable land
   - Grass belts on sloping land
   - Growing of intercrops
   - Permanently waterlogged and peaty meadows
   - Bird locations in grassland
   - Bio-belts
   - Cropping pattern in the protection zones of caverns
4. Afforestation of agricultural land
5. Establishment of stands of fast-growing species
6. Early retirement of farmers

For an overwhelming majority of the above measures, the farmer is obliged to apply for aid for the entire area of a farmer's block, or they can choose not to apply for aid at all for some blocks. An exception from this rule involves 5 measures for which aid can be requested for a **part of a farmer's block. These are:**

- ⇒ Aid for **organic farming on arable land,** if field vegetables or special herbs are grown on a single block together with another crop;
- ⇒ Aid for the **growing of intercrops,** if the intercrop is not to be grown on the entire farmer's block;
- ⇒ Aid for **bio-belts**;
- ⇒ Aid for **grassland treatment**, if a part of the block is concurrently defined as a waterlogged meadow;
- ⇒ Aid for the **afforestation of agricultural land** or for the **establishment of a stand of fast-growing species.**

Since these 5 measures represent less-important aid schemes, it can be legitimately expected that there will be only a minimum number of cases in which farmers will not cite the entire reference area of their farmer's block from LPIS in their aid application. If they do so, they will have to accompany the application with a map containing the plotting of the relevant part of the farmer's block that they want to include in the measure.

Rule No 11 of Czech LPIS says: "Two different applicants may never make a legitimate claim for different parts of the same farmer's block."

4.2 Utilization of LPIS in aid administration and control

Agricultural aid in the Czech Republic is provided by an accredited paying agency – the State Agricultural Intervention Fund (SAIF). SAIF has 7 regional offices at the level of NUTS II, in which inspectors for on-the-spot checks are gathered and decisions on aid provision are issued. Aid applications are taken in and typed into the SW system by officials at the 63 regional offices of the Ministry of Agriculture, based on an activity delegation agreement. This is also the level at which farmers receive the necessary advisory services concerning aid and may ask for a pre-printed application form for SAPS or LFA. For agri-environment measures, farmers may be provided with the necessary informative report from LPIS and a map. After an application is typed in by officials at a MoA regional office, it is subjected to SW checks against reference registers – i.e. including LPIS.

Therefore, LPIS is used in three phases during the actual aid administration and control:

- ⇒ **Preparation of pre-printed application forms for SAPS/LFA or informative reports for the purposes of completing applications for aid under agri-environment measures**
- ⇒ **SW checks of the correctness of information in applications concerning agricultural land**
- ⇒ **Preparation of physical on-the-spot checks at selected bodies and subsequent entry of the results of the checks**

4.2.1 Preparation of aid applications and map printouts

In the first phase of the preparation of aid applications, LPIS serves farmers by making them able to take **the right decision on participation in aid schemes.** In this year, it was possible to print out a pre-printed application for SAPS and LFA compensatory allowance right from LPIS (this was 1 common application for both aid measures). **No maps were submitted** for these claimed aid measures.
No application forms were pre-printed for agri-environment measures, where an applicant has a much larger space for decision-making. However, the applicants were able to ask for a report with of agri-environment data for farmer's blocks and for a thematic map set with symbols showing the applicants the opportunities for the enrolment of a given farmer's block in the relevant measures. Enclosing maps with aid applications under agri-environment measures was obligatory. Sitewell LPIS allows printing A3-size maps at the 63 MoA regional offices upon request. The maps contained highlighted boundaries of the users' blocks.
This extent of assistance to farmers is also expected in next years.

4.2.2 Changing information in an application

If an applicant wants to change information **concerning the area of a block** in an aid application after he/she has submitted it, he/she is obliged to **effect a modification of the plot in LPIS first** and only then submit an **amendment aid application** to the State Agricultural Intervention Fund. Likewise, the applicant must register all changes in land use that occurred to him/her in LPIS before submitting an aid application for the first time to eliminate possible discrepancies during the SW check.

Rule No 12 of Czech LPIS says: "Data integrity in the on-line mode of Czech LPIS may only be preserved if there is an explicit procedure for updating the basic data of a farmer's block. Therefore, the basic data of a farmer's block may not be updated in any other way than by means of reporting a change to a regional office of MoA."

4.2.3 Software check

LPIS primarily serves for verifying information in aid applications. SW checks are carried out by means of real-time queries through the XML interface between the information system of the paying agency and LPIS (see diagram 4). It is verified whether the applicant's farmer's blocks cited in his/her aid application were registered under the applicant's name in LPIS as of the application date and then on other dates, depending on the type of measure. In principle, the user, area, and land use category of a farmer's block are verified. Depending on the type of measure, other check queries are formed to check compliance with the measure conditions.
With Czech LPIS registering a single user for each farmer's block and applications being submitted almost solely for whole farmer's blocks, **the risk of origination of a double claim for aid for the same farmer's block is considerably reduced.** Duplicity at the moment of application submittal occurs very rarely, either due to a slip of the pen if the application is completed by hand, or due to a deliberately fraud on the part of the applicant, who knowingly specifies in his/her application a block that is registered under someone else's name in LPIS. This highly reduced the need for crosscheck of double claims for the same aid. However, thanks to continuous on-line reference checking against LPIS, such an illegitimate aid application will be discovered very quickly and then rejected.

Rule No 13 of Czech LPIS says: "Disputes over entitlement to the use of agricultural land are resolved by the Ministry of Agriculture as part of the LPIS entry modification proceedings, not by the paying agency within its aid application administration."

4.2.4 Preparation for physical on-the-spot checks

LPIS also serves inspectors in their preparation for physical on-the-spot checks. Based on new orthophotos, they may also identify inaccuracies in the plots, as well as possible incompliance with the conditions of a given measure on the entire area of a farmer's block. This helps them focus their checks better and get prepared in advance.

Chapter 5. Integration with other registers

Based on the Agriculture Act, Czech LPIS has been built as a complete source of agricultural land use identification, regardless of land use categories. Aid for permanent crops such as vineyards and hop fields is also **based on LPIS data.** Aid for organic farming is fully based on LPIS data as well. However, there are separate registers of permanent crops – vineyards, hop fields and intensive orchards – that register in particular production indicators. To prevent creation of duplicate data, **LPIS is currently being integrated with those special registers.**

5.1 Integration with the register of organic farming

Until LPIS was launched, data on the use of agricultural land in the transitional period mode and in the certified organic farming mode had been kept in paper form, the only digital data being the summary areas of an organic farmer categorized by land use categories.
When reporting agricultural land to LPIS in 2003, users also reported their block farming modes (organic vs. conventional farming). Since this May, KEZ o.p.s., the certification body, has been connected to LPIS on-line and audited farmer's blocks for correct classification under the transitional period or certified OF. If it founds discrepancy in classification, it proposes reclassifying the farmer's block under another mode.
Since 1 January 2005, any change to a block in a mode other than conventional will be subject to standard audit by the certification organization, KEZ o.p.s.

5.2 Integration with special registers of permanent crops

Integration with special registers of permanent crops – vineyards, hop fields and intensive orchards – is in its implementation stage today. The goal is to integrate data from LPIS and from the special register for the same parcel with a permanent crop. There is a Sitewell LPIS module being prepared that would allow integrating the identification number of a farmer's block with a permanent crop from LPIS with the registration number of the same parcel from the special register by means of a link table. The application will be based on the on-line principle to allow it to respond to changes that may occur on both sides.

5.3 Auxiliary cadastre layer

Today, Czech LPIS does not have any link to the cadastre and cadastre data are only reviewed if there are disputes among users over the use of a farmer's block. In such a case, the users have to present legal arguments based on cadastre data. The data, including cadastral maps, must be then confronted with the plot of farmer's blocks. To facilitate resolving such disputes, the implementation of a layer of cadastre plots into LPIS is being prepared; officials at the regional offices of the Ministry of Agriculture will be able to turn on the layer as needed. This functionality will indisputably improve the accuracy of farmer's block plotting, especially in the event of splitting blocks between two users.

Chapter 6. Technical solution of LPIS

6.1 System structure and deployed technology

The whole solution is very progressive not only thanks to the principles applied, but also with respect to the deployed system structure and progressively utilized modern technology. There is a very innovative use of a standard web client for the topological editing of geographic data with support for data versioning. The system has been fully designed with three-layer architecture:

1. The first system level is a database server, Oracle Enterprise Edition 9i including the Oracle Spatial component.
2. The second system level is the layer of application servers, Macromedia ColdFusion MX J2EE and Autodesk Mapguide 6.5 for map services.
3. System clients use Microsoft Internet Explorer 6 with an ActiveX element installed, Autodesk Mapguide, and using JavaScript

All update operations with data are handled and checked for integrity on the part of the database, including a check of the topological cleanness of data. This ensures full data integrity and allows several users to work with one set of data simultaneously, without the risk of data integrity corruption. No operations that actively manipulate with data are ever performed at the level of application servers or even system clients.

Today, two types of clients are actively implemented in Sitewell LPIS at the Ministry of Agriculture:

a) More than 700 system users use a web application providing the environment for access to LPIS; about 300 of them update data
b) For special complex operations, four DESKTOP client workstations are connected to the system, using a hybrid client/server environment and web access to applications.

6.1.1 System Database

The database is a pivotal element of the system. The database has been designed as a central database in the Oracle Spatial 9i environment. Czech LPIS works with two elementary database entities:

1. Farmer's blocks;
2. Registered users of agricultural land (farmers).

Other entities in the LPIS design are:

1. Data for the specification of farming limitations resulting from the nitrate directive;
2. Data on effective agri-environment commitments;
3. Data on measurements in agrochemical testing of soils.

Computational procedures run over the Oracle database, triggered either by the system (e.g. making a new block version effective, calculations of classified data) or by users' requests. Database fields also store all vectorized geographic layers intended for farmer's block classification (e.g. the boundaries of LFAs, specially protected areas, etc.).

The database also stores all meta-information about data processed in the system and the rules for its operation.

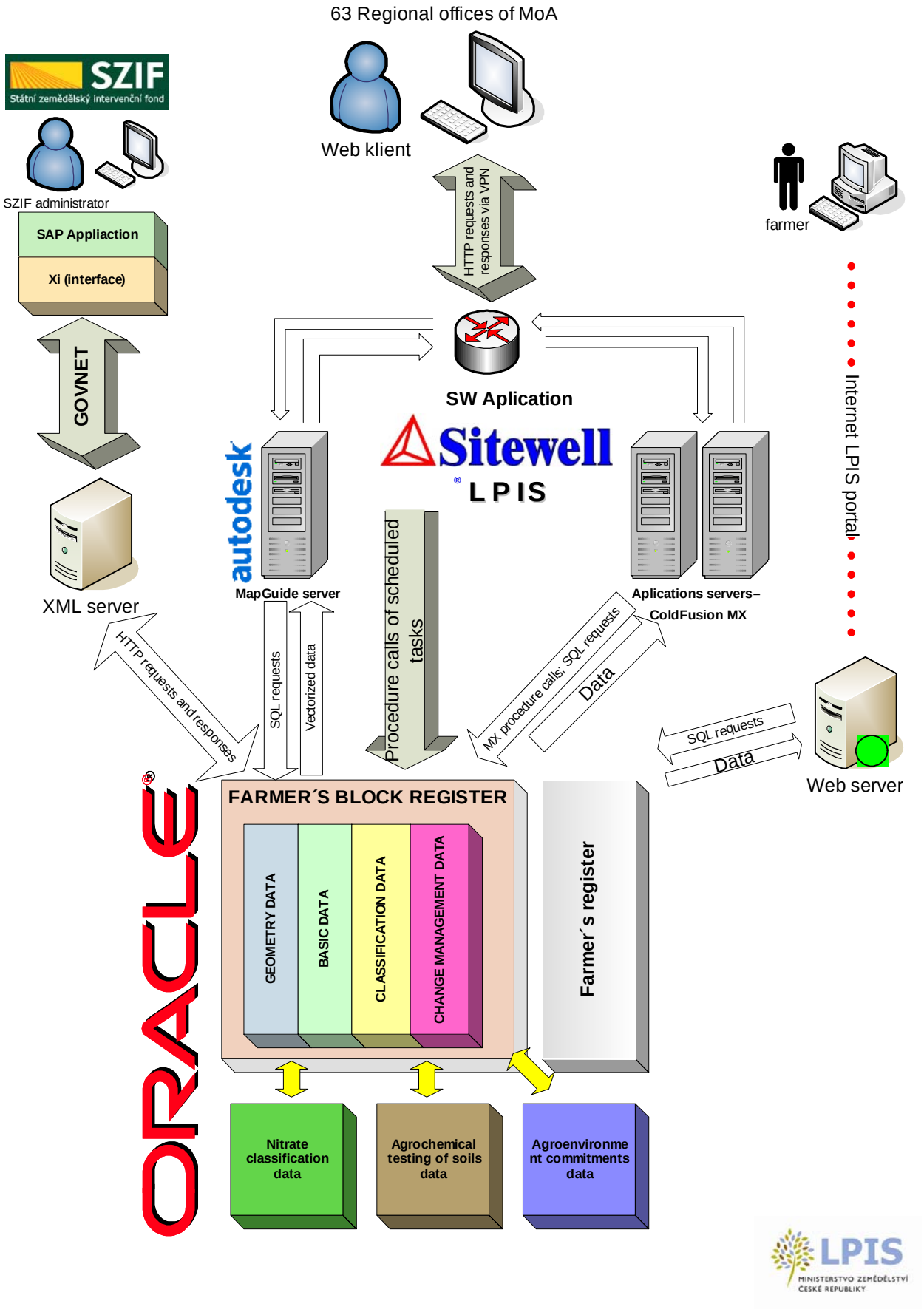


Figure 7 Diagram of the technical solution of Czech LPIS

6.1.2 Map server: Autodesk Mapguide

Graphical data from the database are visualized using map servers with Autodesk MapGuide. This powerful technology by Autodesk allows the entire system to handle peak load thanks to support for load balancing among several map servers simultaneously. There are three such map servers in total running at the Ministry of Agriculture. Autodesk Mapguide offers very progressive tools for a quick development of map applications. Thanks to this technology and using the extensive experience of the contractor's team, the entire system could be implemented in a very short, record-breaking time.

6.1.3 Application server: Macromedia ColdFusion MX

A number of standard application modules of Sitewell Project Application Server are implemented in the ColdFusion application server environment, in particular: iGIS, MG, LPIS Desk, Datawell, DM and others. There has been a set of customized application functions for operations with farmer's blocks developed in this environment. Macromedia ColdFusion MX application servers intermediate requests to the database for operations with farmer's blocks or for data presentation, and take care of creating the dynamic user environment for users.

6.1.4 Web client

Regardless of their role (basic user, data reviser, auditor, etc.), LPIS users work with LPIS by means of a web application. The 63 regional offices of MoA are connected to the central database and application servers over virtual private networks. This technology is also used to connect the organizations that carry out extraordinary audit of farmer's blocks (KEZ o.p.s. and the Central Institute for Supervising and Testing in Agriculture) and users from the paying agency within SAIF. The information system of the paying agency – SAIF – is linked to LPIS through an XML interface that intermediates queries to the LPIS database. This online interface is used to make reference checks of the correctness of block information in submitted aid applications and compliance with aid rules in time. The two systems also synchronize their data about land users.

You can find more information about the above technologies at: www.sitewell.cz, www.oracle.com, www.autodesk.com, www.macromedia.com and www.ermapper.com

6.2 Operating architecture of the Ministry's infrastructure

The entire system is installed on central application servers and a database server. On the part of the data centre, LPIS uses a total of:

a) Two Macromedia ColdFusion MX application servers installed on two-processor Intel Xeon / Hewlett Packard DL360 servers (one primary, one backup)
b) Three Autodesk Mapguide map application servers installed on two-processor Intel Xeon / Hewlett Packard DL360 servers
c) An Oracle Enterprise Edition database server including Oracle Spatial in the environment of the Unix True 64 operating system, which is standard at MoA
d) Another application server is used for batch operations such as high-volume generation of pre-printed application forms in the PDF format for electronic distribution to users. This server also runs a server application for work with terrain model data for the recalculation of 3D parameters of farmer's blocks.

In addition to the central servers, a non-stop backup centre has been built. All is shown in diagram 8.

LPIS operating architecture at the Ministry of Agriculture

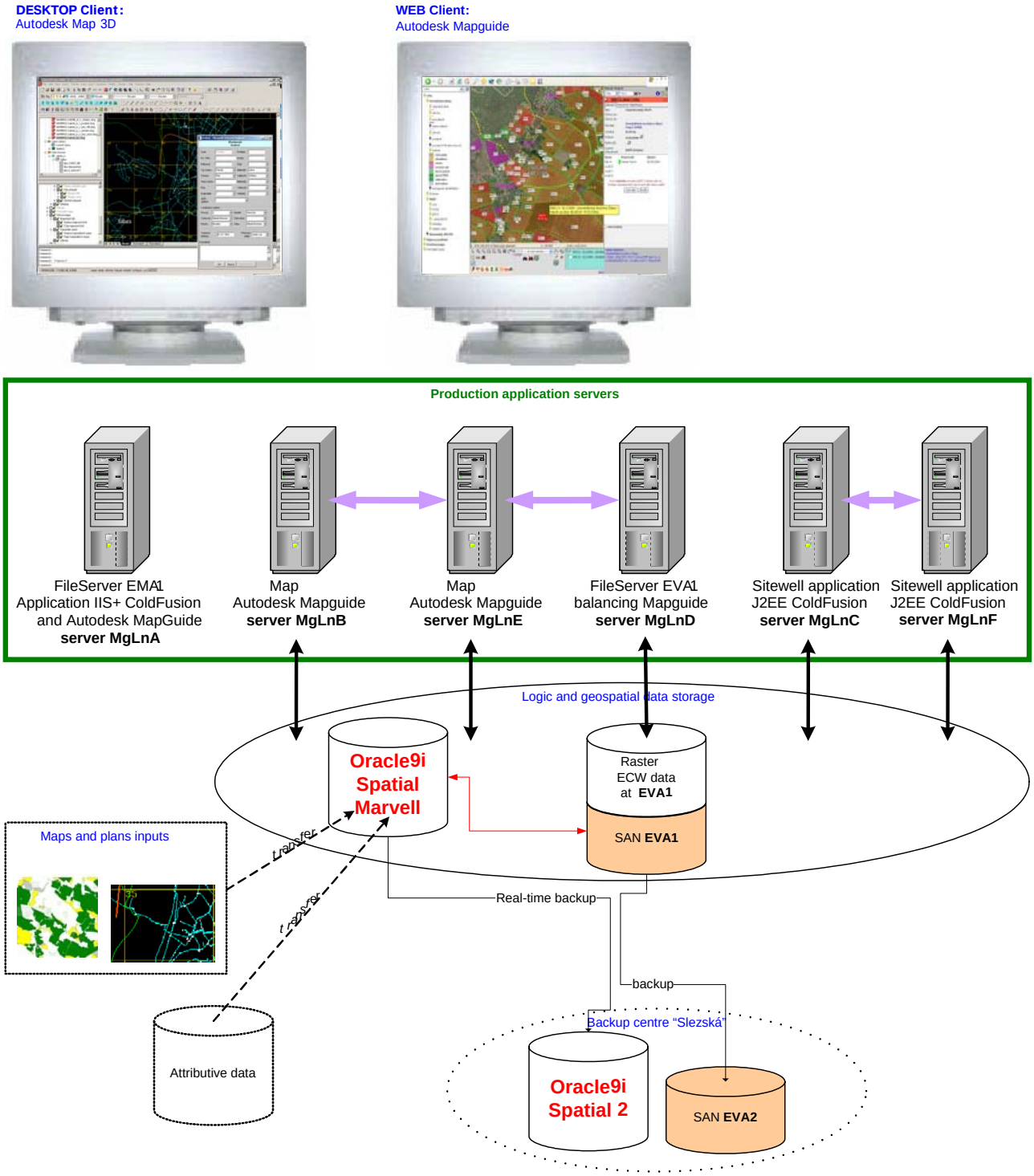


Figure 8 LPIS operating architecture diagram

Chapter 7. Real-world outputs of Czech LPIS

Czech LPIS serves not only as a tool for the verification of information in agricultural aid applications, but also as a source of statistic information about agricultural land for the state administration and as an auxiliary tool for farmers facilitating their own registration of used land. In addition to standard statistic outputs in the form of tables and charts, it also allows producing special thematic maps.

7.1 Statistics

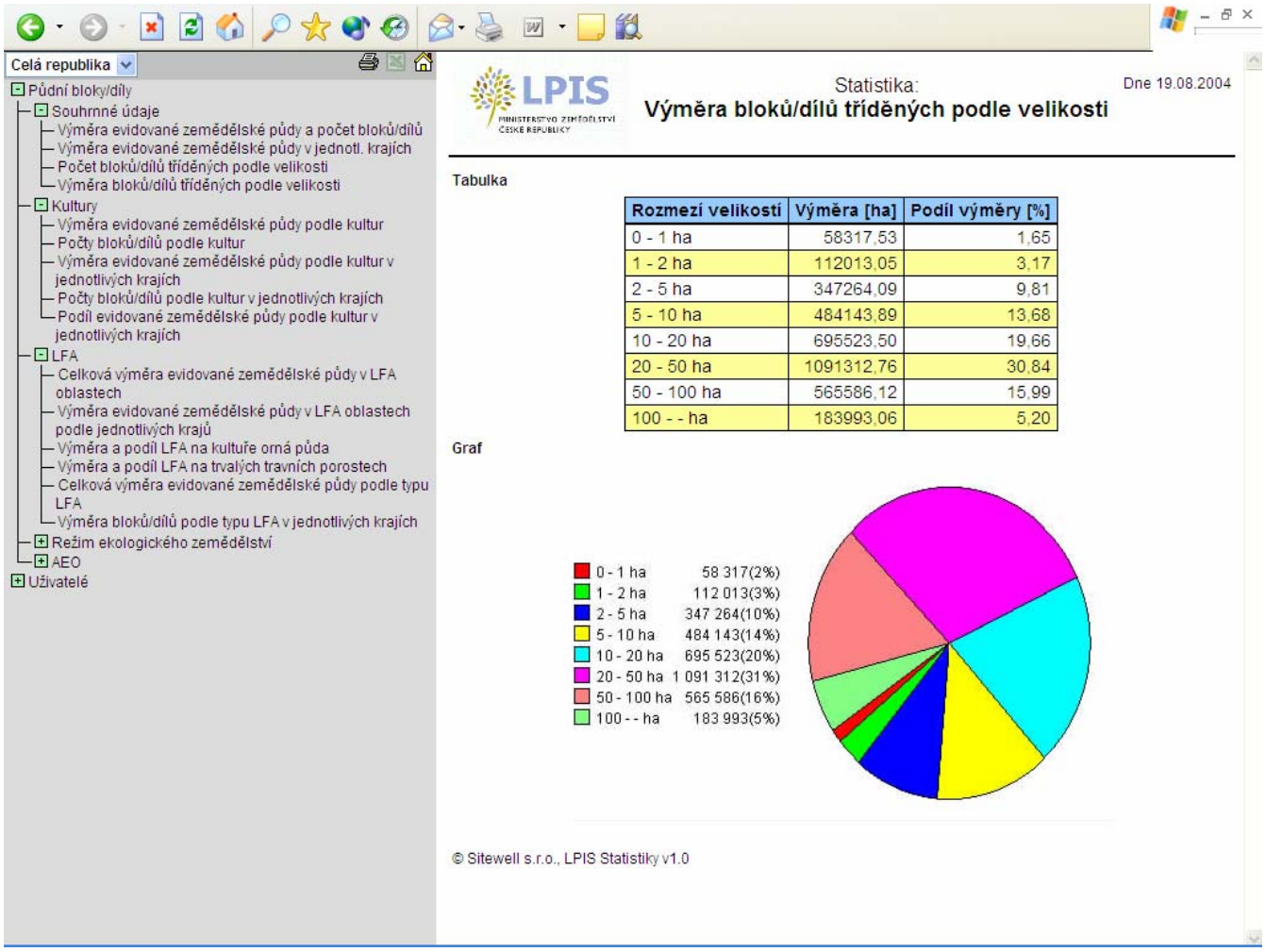
Statistics from Czech LPIS are produced in a separate module of Sitewell LPIS. **Statistics are created on-line, based on the current data in LPIS on the given day. All types of statistic outputs** can be calculated at one of 3 levels:

- ⇒ for the Czech Republic as a whole
- ⇒ for an individual region (NUTS III)
- ⇒ for an individual district (NUTS IV)

Statistics are further differentiated by whether they relate to users or agricultural land. In the current version of Sitewell LPIS, it is possible to obtain approx. 50 types of statistic outputs classified under the following categories:

- ⇒ Summary data
- ⇒ Farmer's block statistics by land use categories
- ⇒ Statistics relating to less favoured areas (LFAs)
- ⇒ Statistics of organization data
- ⇒ Statistics related to agri-environment measures

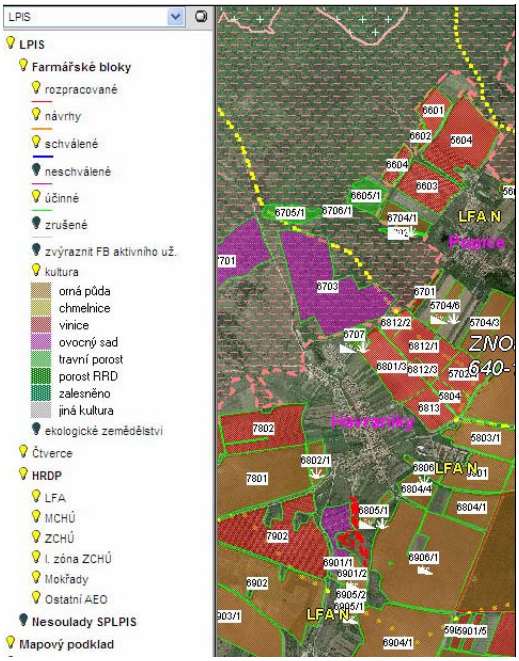
Sitewell LPIS allows exporting any statistics directly to MS Excel for further work.



7.2 Thematic maps

Thematic maps can be created in the system both in the web client environment and in the environment of a specialized geographic desktop system client.

In the web environment, detailed thematic maps are created on-line especially for high map scales. An example is the frequently used thematic map visualizing block land use categories, the status of organic farming or block suitability for the individual agri-environment aids under HRDP. These on-line, web-generated thematic maps may be printed right from the web application either on paper or in digital form for distribution in the DWF format. The DWF format has been successfully used for electronic distribution of maps to farmers at a large scale.

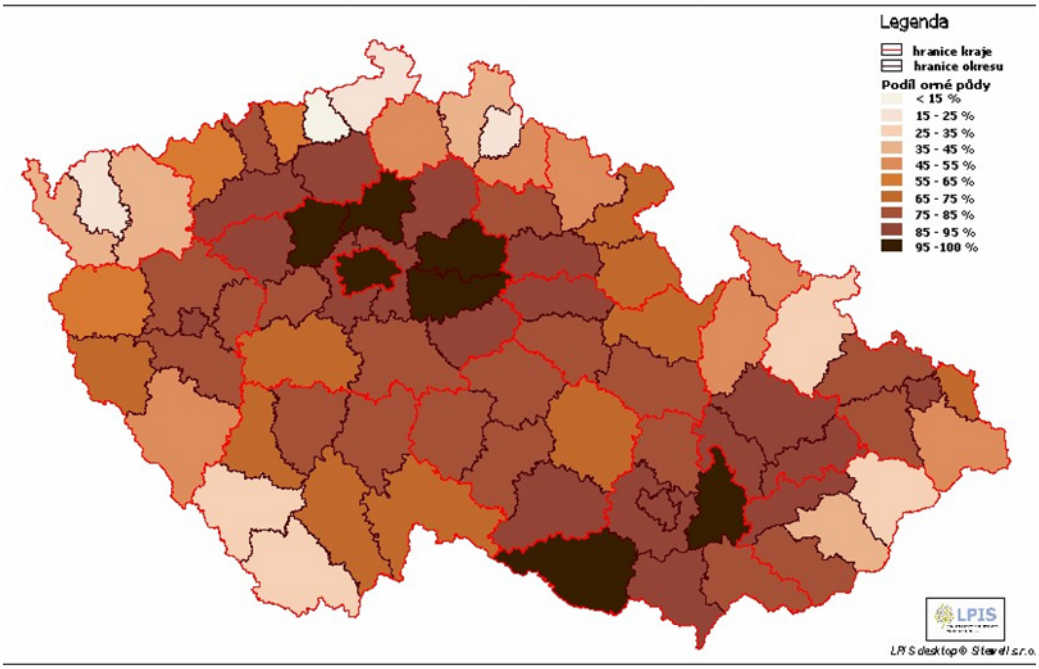


In the desktop "heavy" client environment, Autodesk Map 3D and SiteNet Enterprise can be used to produce detailed thematic maps across the entire area of the Czech Republic, which help visualize some of the characteristics of the Czech agriculture. Using the system desktop client, it is possible to create custom-tailored, specialized maps.

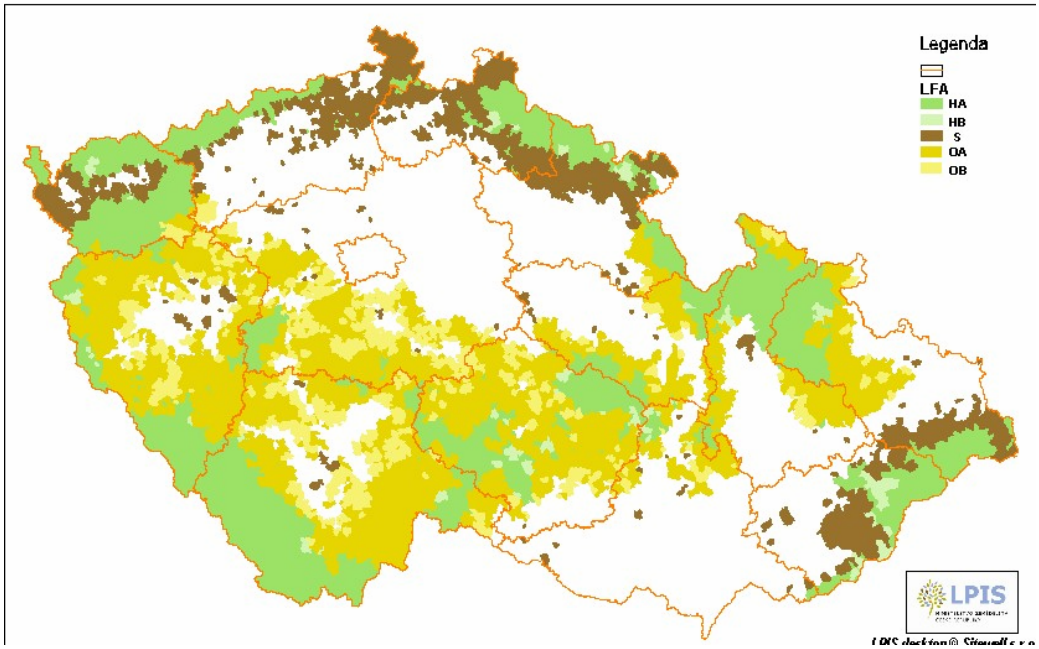
The following two key maps show the basic characteristics of conditions in the Czech agriculture:

Synoptic map of the ratio of tilled land in individual districts in the CR

Share of tilled land in the total area of agricultural land in 2004



Synoptic map of the distribution of LFAs on the territory of the CR
Status in 2004



7.3 Outputs for users

In principle, Czech LPIS has been designed to provide timely and high-quality information to the actual users. Therefore, users may ask the regional offices of the Ministry of Agriculture for:

- ⇒ Informative reports from LPIS
- ⇒ Maps in the A2, A3 or A4 size (on paper or in digital form in the DWF format)
- ⇒ Digital geographic data of the blocks they use

All these services are provided to farmers free of charge.

7.3.1 Informative reports from LPIS

An informative report contains different types of data and informs about the status of currently registered farmer's block data for farmers. An informative report always relates to a single specific farmer. An informative report is used to quickly identify registered data, as well as to e.g. help the farmer decide about completing an aid application under agri-environment measures. The opportunity to obtain an up-to-date report from LPIS at any time significantly reduces the risk that a farmer might complete an aid application on the basis of outdated data. Informative reports can be obtained at any of the regional offices of the Ministry of Agriculture.

LPIS currently provides 5 types of informative reports:

- ⇒ **Basic report** (contains only effective blocks with basic information – land use category, area, in effect since, farming mode)
- ⇒ **Basic report with changes** (in addition to effective blocks, the report contains proposals for changes in registered data)
- ⇒ **LFA data report** (the basic report is completed with information about the inclusion of a block in a relevant LFA zone)
- ⇒ **Agri-environment data report** (the basic report is completed with information necessary for the farmer's decision-making when submitting an aid application under agri-environment measures)
- ⇒ **Compete report** (the report combines the data of LFA and agri-environment measures)

The reports are produced on-line, with status valid as of the date on which the report is made out.

LPIS: Informative report of parcel identification based on user relations

Type of report: **Agri-environment data** Made out by: Macek Mojmír (Sitewell Prague – technical dept.), 19.8.2004 07:32

MINISTRY OF AGRICULTURE OF THE CR

Registered information about the user:

Registration number:	**47447**	Uniform identifier for aid:	**1000023734**
Business name:	**Zelená farma s.r.o.**	ID No:	**25490421**
Last and first name:	**Jan Nový**		
Address:	**Lovečkovice, Levínské Petrovice, 35**		

Registered information about land blocks/portions:

S/N	Square	Portion code	Map sheet	LUC	OF mode[1)]	Area [ha]	Status[2)]	SPA type[5)]	Area in SPA	SCPA[6)]	Nesting ground[7)]	Type[8)] of wetland	Wetland area	Slope [°]	Suitable for grassing[9)]
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	740-0980	2001/2	02-41-15	T	OF	14.62	effective	SPA	14.62	0.00	-	-	0.00	5.4	no
2	740-0980	3001/2	02-41-15	T	TP	32.79	effective	SPA	32.79	0.00	-	-	0.00	6.1	no
3	740-0980	3001/3	02-41-15	T	OF	81.53	effective	SPA	81.53	0.00	-	-	0.00	4.5	no
4	740-0980	3102/2	02-41-15	T	OF	26.16	effective	SPA	26.16	0.00	-	-	0.00	7.0	no
5	740-0980	3201/10	02-41-20	T	OF	42.22	effective	SPA	42.22	0.00	-	-	0.00	4.5	no
6	740-0980	4002/3	02-41-15	T	OF	61.29	effective	SPA	61.29	0.00	-	-	0.00	4.2	no
7	740-0980	4101	02-41-15	T	OF	4.54	effective	SPA	4.54	0.00	-	-	0.00	2.8	no
8	740-0980	4102/1	02-41-15	T	OF	26.27	effective	SPA	26.27	0.00	-	-	0.00	6.4	no
9	740-0980	4102/2	02-41-15	T	TP	10.13	effective	SPA	10.13	0.00	-	-	0.00	3.1	no
10	740-0980	4204	02-41-15	T	OF	1.04	effective	SPA	1.04	0.00	-	-	0.00	7.7	no

Sum of effective and approved areas by land use categories and OF modes:

Land use category	Total area	Area in OF	Area in TP	Area in SPA	Area in Zone I	Area in SCPA	Wetland area
grassland (T)	**300.59**	257.67	42.92	300.59	0.00	0.00	0.00
Total	**300.59**	**257.67**	**42.92**	**300.59**	**0.00**	**0.00**	**0.00**

.....
Ministry of Agriculture
Sitewell Prague – technical dept.

This report has an informative nature and contains data valid as of 19/8/2004!!

7.3.2 Map printouts for users

A similar principal as that of informative reports is followed by the map provision service. Users are able to print either a current map section, or a map set containing all the blocks they use.
In addition, the users may ask for maps printed with preset parameters. In its current version, Sitewell LPIS contains 5 types of preset maps

- ⇒ **Basic map** (contains the user's highlighted blocks with orthophoto background)
- ⇒ **Map of farmer's blocks statuses** (contains effective farmer's blocks and proposals for changes)
- ⇒ **LFA map** (the map contains LFA boundaries)
- ⇒ **Agri-environment map** (the map contains the boundaries of protected areas and each block is assigned symbols indicating its suitability for individual agri-environment measures)
- ⇒ **HRDP map** (combines the characteristics of the LFA and agri-environment maps)

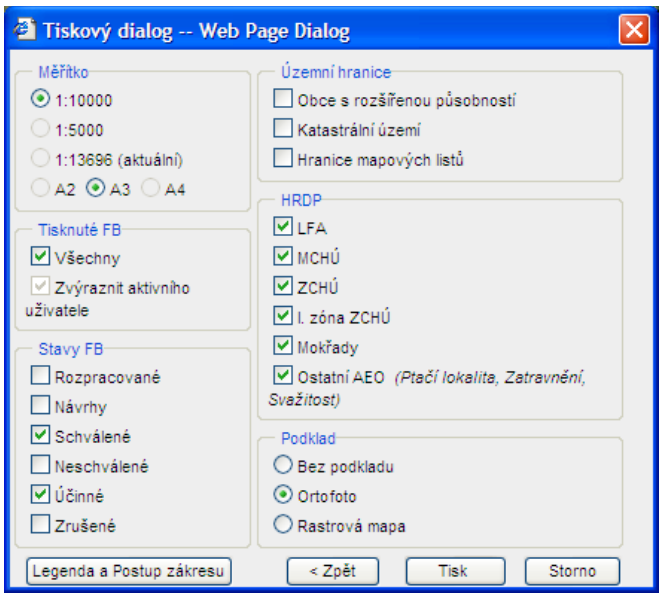


Figure 9 Print dialog used to specify requirements for the parameters of a printed map

For some aid titles, maps are enclosed to aid applications as an obligatory enclosure.

7.3.3 Export of digital data

Using a separate module, Datawell, within Sitewell LPIS, it is possible to export geographic data about the farmer's blocks used by a user right through the web interface. Export is currently provided in the SHP+DBF format. Export in the LandXML and DWF formats has been prepared for future use. Users may ask for the data at the regional offices of the Ministry of Agriculture, which will deliver the data to them on a CD or via e-mail. The exported data may be used chiefly by larger agricultural companies having their own GIS system, in which they combine the registration of used land, lease contracts, production, fertilizing, etc. In addition to standard data exports for land users, customized special export digital outputs can be prepared at the Central Register Office of MoA using the desktop client of Sitewell LPIS.

7.4 LPIS Internet Portal

Publication of selected LPIS data for land users on the Internet is currently being prepared. The LPIS Internet Portal will be launched in early October. With secured access, it will allow users to view data relating to the blocks they use and obtain on-line informative reports and print out maps.

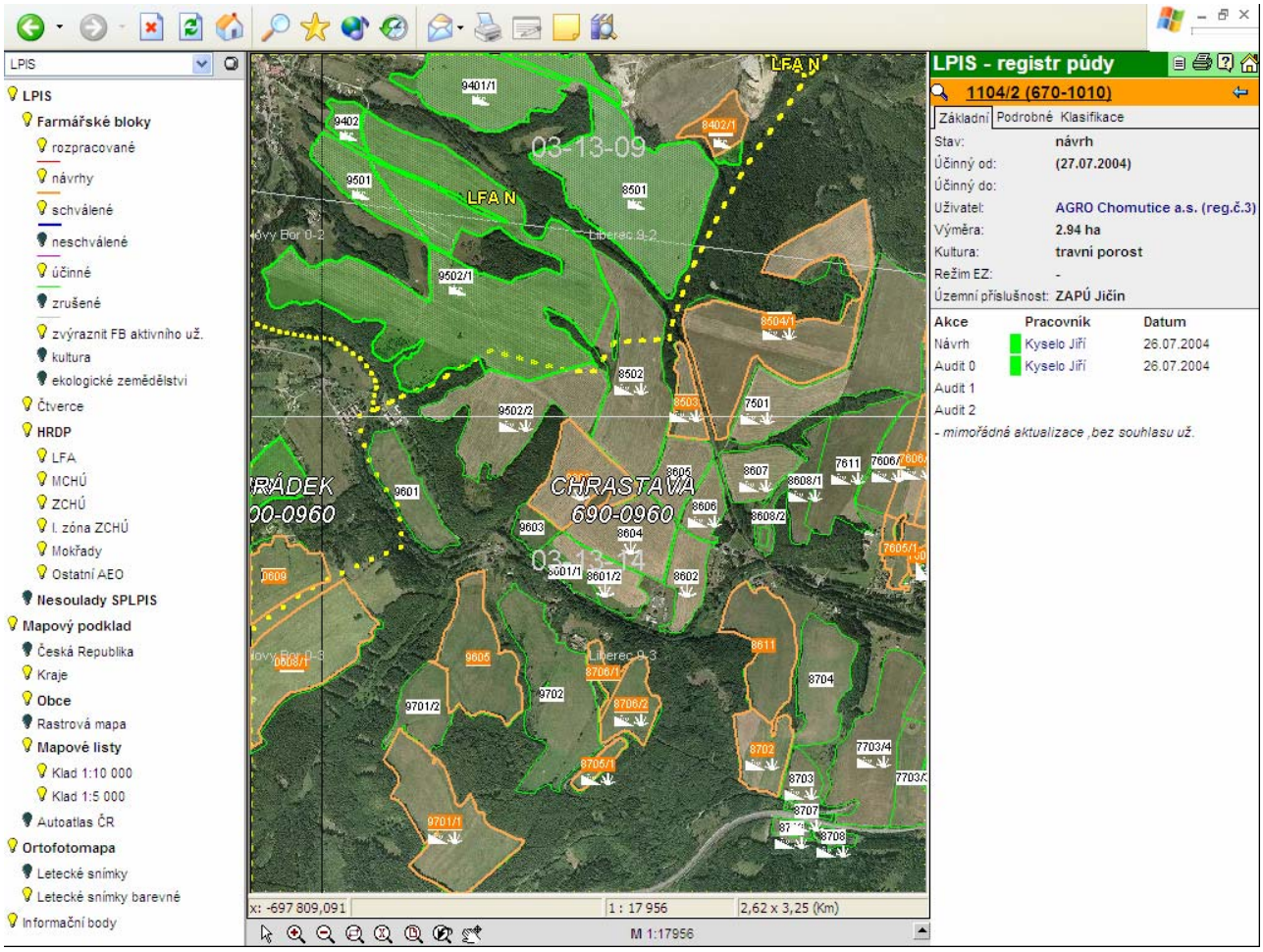


Figure 10 Example of the look of LPIS Internet Portal

Chapter 8. Final Summary

8.1 Need for the creation of a LPIS in the Czech Republic

In 1999, the Czech Republic undertook the European Commission that it will **build a new parcel identification system** based on user relations (LPIS) **before its accession to the EU,** as there had been no such system in the Czech Republic before. In 2000–2002, Ekotoxa Opava s.r.o. created the **first off-line solution of Czech LPIS.** The blocks of used land were plotted using aerial photos and verified with farmers. **In June 2003, an amendment to the Agriculture Act came into effect,** setting down the process rules for the updating of Czech LPIS. However, the off-line LPIS solution turned out to be inadequate and having operational problems with the management of parcel identification as required by the Agriculture Act. Consequently, the Ministry of Agriculture decided in early 2004 **to hire a new contractor and change the philosophy of the LPIS solution.**

8.2 Requirements for the new technological solution of LPIS

The new technological solution of Czech LPIS was developed by Sitewell s.r.o. in January–March 2004. This solution honours the following requirements and principles:

- **LPIS is based** on a unique central database
- **The elementary identification unit in LPIS is** a farmer's block, **which represents** a continuous area of agricultural land with one type of crop used by one farmer
- **The database is updated** on-line in real time over a VPN from the 63 regional offices of MoA **– liability for the correctness of data is held by the Ministry of Agriculture**
- There may always be only 1 effective version of data at a moment for 1 area
- Classification of blocks against geographic data layers must be performed automatically as soon as a new version is approved, without manual intervention
- A history of changes must be kept for each block – **at any time in future, it must be possible to quickly recall the status of the database on any day in the past**
- The data of **blocks used by a farmer** may never be changed without the farmer's knowledge

The new technological solution allowed introducing a **classification of farmer's block data necessary for the administration of rural development measures.** The classification consists in the fact that for each new version of a block, the **system** recalculates selected characteristics based on intersection with other geographic layers as soon as the version is approved. The classified data include, in particular, characteristics determined from a 3D terrain model, as well as inclusion in less favoured areas and properties needed to determine block suitability for individual agri-environment measures. With these data calculated by the system, the risk of errors and the high costs incurred in connection with the manual calculation of the data in the off-line solution were eliminated.

8.3 Benefits of the new LPIS solution for the state administration

The technological solution that consists in storing LPIS data **on a single central server and updating them through a web application over the Ministry's private network (VPN)** has brought several major benefits:

- ***The total operating costs of the system dropped considerably*** *– a single database is maintained and there is no need to provide costly solutions to errors originating during off-line data transmissions or due to the existence of data copies*
- ***Data security and protection of personal information on a single server became much easier to implement than in the off-line solution*** *– another factor that considerably cuts down the cost of system operation and boosts system users' confidence*
- ***The need for data copies and the consequent risk of data duplicities have been eliminated***
- ***The Ministry of Agriculture does not have to rely on external data producers and may assume full liability for data in the system*** *– which makes it fully compliant with the requirements of the Agriculture Act and the EU*
- **The solution providing automatic geographic classification** (categorization) **of data** directly on the server has allowed eliminating the need for placing orders for repeated recalculations and analyses to external contractors, cutting down the costs considerably. The cost of the creation of automatic classification functions in the system has proved one-year payoff of the investment!

- *All LPIS users from the state administration as well as among farmers have **real-time access to the same, immediately classified data***
- *The response time for a request for data change or for statistic data from LPIS has been cut down to the necessary minimum – **everything can be found out on-line in real time,** as opposed to the past when there were several-month delays in register updates*
- *An optimum tool for the monitoring of the impacts of rural development measures has been created*
- The control of compliance with aid rules has been facilitated for the paying agency, making the control much more efficient
- *Sitewell LPIS helps Czech farmers thanks to the **improved comprehensibility of the entire aid system.** With data classification and the visualization of farmer's block suitability for individual aid titles in maps, it allows providing farmers with matter-of-fact information about which aid titles for which blocks they may apply to.*

Thanks to the new generation of the Czech LPIS solution, it was possible to meet the EU's conditions for aid administration under the common agricultural policy in a timely manner and provide access to EU funds already in 2004.

LPIS is an **independent reference register** and data in it are updated **independently from the aid application administration process at the paying agency.** The paying agency uses an XML interface to verify the data of individual farmer's blocks in aid applications against LPIS. **It is not possible to approve an aid application concerning a block whose data as specified by the farmer are found inconsistent with the data in LPIS.** In addition, the Czech system **prevents claiming aid for an agricultural parcel that is not registered as a farmer's block in LPIS.** The paying agency also uses LPIS to prepare and evaluate physical on-the-spot checks.

8.4 LPIS also serves farmers

Not only is LPIS used by the state to verify information in aid applications, but it also functions as a **service for the farmers themselves.** A basic goal of LPIS is to allow farmers to obtain **high-quality and comprehensible information about the blocks they use** from LPIS in a short time.
Therefore they may ask for **informative reports and map sets at a scale of 1:10,000** in any of the 63 regional offices of MoA in the Czech Republic. LPIS can offer them elementary data reports and maps allowing them to find out about the status of registered data, as well as more complex reports and maps containing information and symbols that help the farmer make decision on joining agri-environment schemes. Farmers may also obtain **pre-printed application forms for single area payments and compensatory allowance for farming in LFA** at a regional office in almost no time.
In addition to assistance in the preparation of aid applications concerning agricultural land, LPIS provides farmers with information about **farming limitations on blocks resulting from the nitrate directive** or about **performed agrochemical testing of soils.**
A project that will make LPIS accessible by farmers via the Internet is currently being implemented.
With its open information policy, Czech LPIS allows farmers to avoid hiring costly consulting firms and **make competent decisions** based on high-quality background information.