DG JRC - ISPRA
IPSC-MARS
Technical support to DG AGRI

MARS - PAC

Discussion document

Implementation of IACS-GIS, Reg. 1782/03 and 796/2004
Derived and modified from
JRC Discussion Document
JRC IPSC/G03/P/SKA/ska D(2002)(1187)

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Reviewed:	MARS, DG AGRI	*Distribution:*	Commission, Member States
Date:	17/06/2002, last major update 19/09/2002, further deletions 15/12/2003, 29/2/2004 changes (SK) 4/5/2004 further changes to Annex (SK) 6/5/2004 changes on tech tol. (SK) 24/5/2004 final edits	*Int. ref:*	file://S:\FMPArchive\P\2575.doc

Contents

1. <u>Introduction</u>

1.1. Purpose of this document

1.1.1. The purpose of this document is to outline the main points to be assessed by the Commission services for compliance by Member States with the regulations referring to the implementation and management of the Integrated Administration and Control System (IACS). This document is limited to the management and control of area based subsidies and focuses in particular those aspects related to the use of geographical information systems (GIS), expected to be implemented by the 31/12/2004..

1.1.2. While this report will discuss many aspects of the implementation strategies that could be adopted, it is not the intention here to discuss the merits of different approaches (cadastre referencing versus block systems, for example).

1.1.3. Furthermore, the expected functional performance evaluation of the IACS-GIS will not be limited to the implementation of one or other software environments; the administration and control system must instead be developed as a function of the particular choices (parcel referencing system used in the Land Parcel Identification System (LPIS), application process management, use or not of orthophotos, etc.) made within each Member State for the basic structure of the system.

1.1.4. This version is a discussion document intended to establish target standards for Member States implementing the IACS-GIS already in 2004.

1.2. Document structure

1.2.1. The document is split into three technical sections:
- LPIS creation and use in the application process
- Administration and cross checks
- On the spot checks, including remote sensing controls

1.2.2. Each section will introduce the GIS-related concepts involved, followed by a table of critical points to be used for compliance assessment.

1.3. Preceding documentation

1.3.1. A number of document sources have been referenced in the preparation of this report:
- Internal memorandum "*Monitoring and Evaluation of IACS implementation for the identification of agricultural parcels in MS of the EU: synthesis of technical alternatives*" (S. Kay 1994)
- Final report "*Feasibility of using GIS technologies for managing the graphical component of the Integrated Administration and Control System (IACS)*", prepared under contract for DG-AGRI by SWK/GISL, 1997.
- Discussion paper "*Land Parcel Identification Systems in the frame of Regulation (EC) 1593/2000 (Version 1.4)*" (Mars ref: OL/I03/M2580/01), O. Léo & G. Lemoine (2001), circulated by DG-AGRI in the context of IACS expert group meetings.

1.3.2. The regulatory basis used is that of the current framework:

- Council Reg. 3508/92, in particular the amendment 1593/00.

- Council Reg. 1782/03

- Commission Reg. 2419/01

- Commission Reg. 796/04

2.   LPIS creation and use in the application process

2.1.   Direct support to farmers' applications

2.1.1.   Locating and measuring agricultural areas create wide-ranging difficulties for farmers who are not technically prepared for the task.

- The GIS should facilitate the geographical identification of the agricultural parcel as it is known to the farmer. Ideally, the GIS should manage the agricultural parcel that is in any case reflected in the standard, alphanumeric part of the IACS database.

- The IACS reference parcel information that is recorded in the GIS (either agricultural parcel or reference parcel) should be easily accessible to the applicant. This should be provided in the form of printed application forms, including some kind of mapping support. It is expected that this support be given to farmers not later than 2004 for the first time.

- The mapping support provided to the farmer should include enough detail (ideally, a recent orthophoto background, topographic features, place names etc.) to permit fast and reliable location of the parcels.

Application process		Date to be implemented
Direct support to farmers' applications		
2.1.1	Identifying, locating and measuring reference parcels	First documentation to farmers
2.1.1	Printed application forms	First documentation to farmers
2.1.1	Enough detail (e.g., topographic mapping, recent orthophoto, place names etc.) to permit fast and reliable location of the reference/agricultural parcels	First documentation to farmers
2.1.1	Area of the reference parcel (block, ilot), net of ineligible areas, should be provided to the farmer	First documentation to farmers
2.1.1	Application form data includes the GIS information (boundary, map, area) from previous year	First use of system, no later than 2005 application year

2.1.2.   Both the applicant and the Member State authority benefit from the use of orthophotography. In practice, orthophotography can be used as a secondary data source, either to complement an existing identification system (for example, a land register), or as the primary basis for an identification system internal to IACS.

2.1.3.   While their use is not obliged in the regulations, orthophotographs are undeniably more revealing than simple maps. Firstly, there are far fewer errors of localisation, thanks to landmarks recognised by the applicant (trees, hedges, buildings, ditches, etc.). Secondly, a recent photograph taken on a

known date allows existing reference maps to be subdivided more efficiently by better locating the current boundaries of reference parcels related to a particular applicant.

- Where orthophotos are used, these should be of the correct specification:
  - Geometry equivalent or better than to 1:10,000 scale Class 1 mapping (2.5m 1-D RMS)
  - Radiometry 8-bit (panchromatic), 24-bit (colour), pixel size 1m or smaller
- They should in general also be less than 5 years old (but see 2.1.4 below) and with respect to standard comply with the general regulations and working documents (i.e. resolution, geometric quality).

2.1.4. Measuring distance and surface area in the GIS permits a first check of the areas being declared, even during the application process if this is the approach adopted by the Member State. Such an approach allows the authority to take a firmer line on problems and, in certain cases, to identify and solve any problems with the declaration at source. This is an important factor in the simplification of the application process.

- A reference area, above which a farmer would not be expected to claim without proof of change of the parcel, must be recorded for all parcel objects in the GIS. This area will be calculated by the GIS using the applicable national projection and ellipsoid. It shall have a status at least equal to other official documents accepted by the national administration in respect of area aid claims.
- The IACS GIS parcel (reference or agricultural, depending upon the system) will have a legitimate status with respect to other data sources (cadastre, topographic mapping).
- A technical tolerance for parcel area measurement at least compatible with the equivalent mapping scale of the system may be applied in compliance with Comm. Reg. 796/04;
- The IACS GIS should permit the identification – automatically – of applications with problems associated with over declaration of reference parcel areas. This is a function that must be implemented at the earliest stage of the system and thus should exist from the first use (and has been required by IACS since 1996 anyway); it will be the primary means of identifying anomalies in the creation of the LPIS.
- Furthermore, functionality to ensure the identification of double-declared areas – and quick resolution of any consequent propagation of errors to applications linked to the same reference parcel – must be implemented. Again, this function is required to solve anomalies during the creation of the system and needs addressing at an early stage in the development.
- In order to ensure that the IACS GIS is capable of identifying double declared areas efficiently in the case of the use of a block system, they should be created and maintained to ensure that the area enclosed by the boundary is mostly eligible. To meet that goal, at least 75% of declared parcels should be eligible for declaration for at least 90% of their area (Art 6 of Reg. 796/04, see also Annex of this document), a figure that should be confirmed through on-the-spot controls or statistical evaluation. However, it may only be at the final stage of the refinement of the LPIS, i.e. in preparation for the 2005 application campaign, that this is achieved.

LPIS Creation and Use: Application process		Date to be implemented
Use of orthophotography		
2.1.3	Where orthophotos **are** used, these should be of the correct specification (image quality and geometric quality), according to current guidelines and working documents.	From first use
2.1.3	Orthophotos must also be of a suitable date (in general not more than 5 years old)	From first use
Measuring distance and surface area in the GIS		
2.1.4	Legal status shall be confirmed for the GIS derived areas of parcels in such a way that reductions can be derived from their use.	First use of GIS
2.1.4	Areas will be determined in the GIS in compliance with Art 30 of Reg 796/04.	
2.1.4	GIS should be able to perform topological coherent operations (area, perimeter, distance, intersection, etc.) in national geodetic system; areas shall be projected.	First documentation to farmers
2.1.4	GIS should permit the identification – automatically – of applications with problems associated with over-declaration of reference parcel areas	First use of system, no later than 2005 application year
2.1.4	Functionality to ensure the identification of double-declared areas	First use of system, no later than 2005 application year
2.1.4	In case of a reference parcel system, efficient structure (75%/90% rule) of reference parcels	1.1.2005

2.2.   Distributed Information Technology management of the LPIS creation and application process

2.2.1. Agricultural associations may play an important role in the process. Making GIS data available electronically as a management aid could motivate them to provide a service that is often otherwise the responsibility of the authority, thereby providing support for the application process. Alternatively, the interface with farmers may be handled by a national administration body. It is probable, however, that the system will include some delivery of data to a distributed source (possibly even client IT systems) and that also some return data flow must be managed and processed.

- Where MS administrations collaborate with such associations, the provision of GIS (and alphanumeric) data should be of a high standard; this is a requirement particularly during the initial creation of the LPIS.

- The data should also be current, to ensure that contact is not made with farmers using a dataset that is not synchronised, either because it has been modified by other applicants/associations, or because new anomalies have been identified in the application process but not yet notified down the user hierarchy (i.e. from a centralised control level to the distributed use of the system).

- Furthermore, for the data to be handled effectively throughout this exchange, a degree of GIS functionality must be provided at the applicant/association level, not just browse capability of the database. When anomalies are detected (or applicant information recorded) this must be returned to the central management facility in an efficient manner.

2.2.2. Making GIS data available in digital form – using for example internet technology – means they can be used by the most technically-advanced 5 to 10% of farmers who have computer systems capable of managing their cropping plans.

- However, it is clearly identified in the regulations that the reliance by other farmers on more analogue approaches should not prejudiced, in terms of receipt of payments, etc.
- In addition, there should be no difference in the level of control undertaken on applications made with digital or analogue approaches: both must be equally likely to be controlled or selected via risk analysis, and the administrative checks applied should be of equal efficiency.

LPIS Creation and Use: Management and data distribution		Date to be implemented
Interface with farmers: delivery of data to a distributed source		
2.2.1	The provision of GIS (and alphanumeric) data should be of a high standard; this is a requirement particularly during the initial creation of the LPIS	First contact with farmers for GIS implementation
2.2.1	The data should also be up to date to allow reliable identification	First contact with farmers for GIS implementation
2.2.1	Resolution of anomalies must be efficiently handled	2005 application year
Degree of GIS functionality must be provided at the administration or association level		
2.2.2	Reference parcel management (at least proposal/edit)	First contact with farmers for GIS implementation
2.2.2	Document production facilities	First contact with farmers for GIS implementation
Electronic submissions; internet technology		
2.2.2	reliance by other farmers on more analogue approaches should not prejudiced, in terms of receipt of payments	2005 application year
2.2.2	no difference in the level of control undertaken on applications made with digital or analogue approaches	2005 application year

2.3.   LPIS updating

2.3.1. Difficulties related to location of reference parcels become more pronounced when the available maps are old, or when the agricultural parcels to be declared no longer match the reference parcels used to locate them.   This is often the case with parcels as defined in a fiscal land register (cadastre).

- A clear strategy must be developed (by 2005) for the procedure to be used for updating the LPIS. These procedures must be in accordance with the general principles for the management of modifications to aid applications (with respect to relevant dates, deadlines for application or notification, etc) and should be in place and implemented for use during the 2005 application campaign.
- Reg. 1782/03 requires that computerized data relating to at least the previous three consecutive calendar or marketing years are available for direct and immediate consultation; the GIS data are considered part of this.

- The reference parcel should have been reliably validated against external information (topographic mapping, photo interpretation on orthophotos, information exchange and field check with farmer, on the spot visits) and – following this validation – the information on the area of the reference parcel should be provided to the farmer, to further reduce dependency on tolerances and anomalies related to areas. This validation should take place by the time of distribution of this information in preparation for 2005 applications.
- An assessment of the **currency** of the reference parcels should be made, after the 2004 application year, to determine if the LPIS creation successfully **reflects the farming system** in terms of the accuracy of the parcel boundaries stored in the GIS. This can be determined either from a field check (by the MS) of a statistically representative set of parcels, or by an analysis of the returns from the 2004 aid application information concerning anomalies related to reference parcels.

LPIS Creation and Use: Updating		Date to be implemented
Handling changes from farmers		
2.3.1	Annual assessment made to determine if the LPIS creation successfully reflects the farming system	after the 2004 application year
2.3.1	A strategy must be defined for the procedure to be used for updating the LPIS	In place by 2005 application year
2.3.1	Changes to GIS should be tracked for no less than 3 previous consecutive years	First use of system, no later than 2005 application year

3. Internal checks, including cross checks and eligibility

3.1. Speeding up administrative checks / lowering costs:

3.1.1. Eliminating a large number of errors at the declaration stage provides various advantages for the processing of dossiers, primarily by lowering the rate of irregularities detected by centralised administrative checks, and thus the resulting number of further contacts between applicants and the administrators concerned for dossiers not specifically targeted for on-the-spot checks.

- The approach adopted, resting on the use of GIS for reference parcel checks, should rapidly and unambiguously identify the possible cause of anomalies, using programmed logical analysis and automated reporting.
- Early detection of anomalies related to reference parcels – ideally in real-time at data entry (and not "off-line" or at milestone dates, for example monthly) should be implemented.
  - o In the case of electronic systems used for aid application either directly by the farmer or in association with farmers' organisations, this checking should immediately be indicated, to permit certain cases of anomalies (for example, non-existence of a reference parcel) to be resolved while the applicant is immediately available to clarify the issue.
- The level of workload shifted to a local level (or professional association) will be assessed and the degree of GIS functionality should be commensurate with the responsibility placed at that

level. For example, when anomalies with the area of the agricultural parcel declared are identified (with respect to the area of the reference parcel), the maximum area should be accessible to ensure that the issue can be resolved directly with the applicant.

3.1.2. Decisions on the remaining irregularities identified in administrative checks can be made more quickly where the LPIS is used effectively, without necessarily requiring an on-the-spot check.

- The declared area should be compared with the reference area of the GIS.
- The processing of dossiers at the administration management level that are not subject to on-the-spot checks should be highly automated, and make use of an automated reporting system. Anomalies should be automatically categorised by the system and permit the prioritisation of dossiers for examination and/or the leading to different control procedures.
- Anomalies relating to the LPIS should be visualised on screen and/or the graphical part of the system should be used in the preparation of anomaly reporting (preferably on-line via a computer terminal or networked PC).

Internal checks		Date to be implemented
Speeding up administrative checks / lowering costs		
3.1.1	Anomalies should be automatically classed by the system and permit the prioritisation of dossiers for examination	First year of use, no later than 2005 application year
3.1.1	Anomalies relating to the LPIS should be able to visualised on screen and/or the graphical part of the system should be used in the preparation of anomaly reporting (tracking)	First return of LPIS creation data
3.1.1	Identification of cause of anomalies	First return of LPIS creation data
3.1.2	The declared area should be compared with the reference area of the GIS	First year of use, no later than 2005 application year
3.1.2	Processing of dossiers at the administration management level should make use of an automated reporting system (tracking)	First year of use, no later than 2005 application year
3.1.1	Workload shifted to a local level commensurate with strategy	First contact with farmers for GIS implementation

3.1.3. Since a major difficulty in the use of a purely alphanumeric system is the execution of the agricultural parcel cross check with respect to efficiency, resolution and cost, the use of GIS is expected to significantly enhance this aspect of the area aid control.

- The geographical control, with respect to the definitions of eligible areas for various subsidies (eligibility as arable land Less Favoured Areas, or yield regions, for example) should be undertaken. The definition of the eligible zones may be kept in a different "layer" in the GIS, for comparison with the parcels declared.
- Considering that other geographic constraints are placed upon aid applications, queries could be formulated and conducted on the GIS database; for example, percentage of holding inside regional/member state boundaries.

Internal checks		Date to be implemented
Improving eligibility		
3.1.3	Geographical control, with respect to the definitions of eligible areas for various measures defined in 1782/03	First year of use, no later than 2005 application year
3.1.3	Cross compliance, in particular concerning agricultural parcel reference with other schemes required to be compatible with IACS	For GIS, first year of use, no later than 2005 application year

3.1.4. The reference system used for the agricultural parcel application process must be regularly and systematically updated with respect to the **eligibility** of all data. In particular, the identification of land cover change involving non-agricultural, wooded, built-up or non-arable areas must be carried out effectively and the GIS updated. Where use of orthophotos is made, the process relies on a) the use of up to date imagery, and b) their correct interpretation and use. If the GIS data are derived from an external source (digital topographic mapping, cadastre) then this too must assure currency and accuracy of eligibility with respect to IACS. This assessment should ensure that the system does not incorporate any ineligible areas greater than 0.1ha in the reference parcels.

- This assessment should be completed for all parcels **before** the preparation for the 2005 application campaign, and should be systematic for all subsequent changes to the LPIS layer.
- The vector parcel (agricultural or reference) information must accurately reflect the limits that can be interpreted from the reference layer, whether this is an orthophoto/image or an external non-image source (e.g., topographic mapping).

Internal checks		Date to be implemented
Systematic evaluation of eligibility of reference system used for the agricultural parcel application process		
3.1.4	Exclusion of non eligible areas >= 0.1 ha in referenced areas	Year of consolidation, no later than 2004
3.1.4	The vector parcel (agricultural or reference) information must accurately reflect the limits (within the specifications of the mapping, not smaller than 1:10,000 scale) that can be interpreted from the reference layer.	First year of use, no later than 2005 application year

3.1.5. The system should provide a means of ensuring that "undue multiple granting of aid" is prevented (Art. 24 of Reg. No. 796/2004). This function will typically concern the management of the creation and updating of the reference parcels.

- The procedure implemented in the GIS should ensure 100% control to ensure that no area of land is referenced twice in the system. Again, this should be completed before the 2005 application campaign, but is probably a function that must be implemented at an early stage.
- Detected anomalies in the reference parcels should be visualised and the cause of the problem analysed with operator interaction with the LPIS GIS layer (and orthophoto coverage if existing).
- Reference parcel updating procedures should be efficient and not cause the undue blocking of the applications related to them; however, they must be handled out of phase with the aid application process (see 2.3).

Internal checks		Date to be implemented
The system should provide a means of ensuring that "undue multiple granting of aid" is prevented (2419/01 Art 16 (a))		
3.1.5, 2.1.4	The procedure implemented in the GIS should ensure 100% control to ensure that no area of land is referenced twice in the system.	First contact with farmers for GIS implementation
3.1.5, 3.1.1	Detected anomalies in the reference parcels should be visualised and the cause of the problem analysed with operator interaction with the LPIS	First contact with farmers for GIS implementation
3.1.5, 2.3.1	Reference parcel updating procedures should be efficient and not cause the undue blocking of the applications related to them; handled out of phase with aid applications	First year of use, no later than 2005 application year

4.   On-the-spot checks, including controls with remote sensing

4.1.1.   In the office, on-the-spot checks need to be prepared by selecting the areas to be measured, grouping and/or subdividing the parcels declared with reference to the identification system, and arranging visit itineraries as efficiently as possible so as to cover one or more holdings.

- The data must be available for use during the on the spot control campaign from their first official GIS use.
- The direct – preferably in digital form – consultation of the GIS data (including where applicable orthophotos) shall be possible for the preparation of field controls for the 2005 application year.

4.1.2.   When performing either conventional on-the-spot or remote-sensing checks, survey officers should have all the documentation needed to do the job properly from the outset.

- The output from the control exercise should be efficiently implemented in the management of any consequent on-the-spot checks that need to be made.

4.1.3.   A clearly documented and/or non-proprietary interface to the IACS GIS should be implemented for the control exercise.

- The reference parcel vector layer and the associated alphanumeric application data must be directly exploited by the body (administration, contractor) responsible for executing these controls.
- While the data used in such an exercise may not be available for 100% of the LPIS before 2005, a specification should be devised at an early stage of the LPIS development (not later than 2004).
- The GIS should include consistent transaction monitoring during the application and control process also for graphical objects. Conceptually, this requires time stamping and operator identification for all operations applied to graphical objects.

On-the-spot checks	Date to be implemented
Preparation, standard OTS control	

4.1.1	GIS data used same season for controls	First year of use, no later than 2005 application year
4.1.2	The output from the control exercise should be implemented in the management of any consequent on-the-spot checks that need to be made	First year of use, no later than 2005 application year
4.1.3	The reference parcel vector layer and the associated alphanumeric application data must be directly used by the body (administration, contractor) responsible for executing these (including RS) controls.	First year of use, no later than 2005 application year
4.1.3	Clearly documented interface to the IACS GIS data should be implemented	First year of use, no later than 2005 application year
4.1.3	Transaction monitoring required for GIS database	First year of use, no later than 2005 application year

5.   Annexes

5.1.   75%/90% rule for reference parcel use

5.1.1.   There is a trend in the current implementation of agricultural reform administration to depend more on the indirect referencing of the agricultural parcel, rather than store the precise geographic description of the agricultural parcel. This represents an improved cost/efficiency performance only if the resulting reference parcel system actually provides a frame for parcel identification that realistically reflects the geographical configuration of the agricultural parcels.

5.1.2.   The objective of the 75%/90% rule is to ensure that the reference parcel system in use reflects sufficiently the land actually used and for which aid is applied. In the case where the reference system is not well correlated with the field cultivation pattern, the system provides worse support for the declaration made by the farmer, and weaker control possibilities for the administration. Therefore, a good reference system benefits both the farmer and the administration. Furthermore, the approach provides a measurable benchmark which can be calculated by both the Member State and the Commission, thus providing an objective assessment of the Land Parcel Identification System.

5.1.3.   In the case where the agricultural parcel is directly identified in the GIS database, using the exact boundaries of the parcel, we can state that 100% of the parcels have aid applied for 100% their area (100%/100%). At the other extreme, a block system which consists of regular squares (e.g. grid squares of 100m by 100m in a map system) the ratio would be lower – maybe only a few percent of the squares would actually be entirely applied. A parcel reference system that correlates well with the currently cropped fields would obviously approach a better ratio. The assessment is therefore valid for all reference parcel systems, whether farmer's block, physical block, or cadastre reference parcels.

5.1.4.   After evaluation of data from Control with Remote Sensing sites provided by Member States to the Commission, the level determined as being a suitable compromise between reliable agricultural parcel identification and realistically attainable reference parcel efficiency was that at least 75% of

the reference parcels should be eligible for at least 90% of their area. The statistics can be calculated in a straightforward manner by determining the 75th percentile for which the area declared (and validated as eligible) for each reference parcel is at least 90%.

5.1.5. The statistics are primarily intended for use at a national level, in order to demonstrate the effectiveness of the reference parcel system. However, the trend assessment **statistics within a region** could well provide useful information to trigger update projects. For example, the a decrease in the percentile for which at least 90% of the reference parcel areas are declared could either indicate abandonment of cultivated areas, or encroachment on areas previously not declared. Both circumstances are easily investigated using updated orthoimages, either acquired during a regular update cycle or during controls with remote sensing. Indeed, the justification for new orthoimage acquisition or placement of CwRS control zones could be made in part on a "risk analysis" based upon such a statistic.

5.1.6. In order to generate statistics that are meaningful, two considerations should be made. First, in the calculation of the 75th percentile, reference parcels with no area aid applications should be excluded from the assessment. Second, in order to calculate the percentage of the area declared for a reference parcel, the annual total area for which aid is applied for should be used, compared to the documented net eligible area of the reference parcel for the aid scheme concerned. This second condition will also enforce that reference parcel boundaries between permanent crops (e.g. vineyards, olive trees), non-eligible areas and other schemes are correctly incorporated into the GIS and preserved over time.

5.2.   Use of technical tolerance on farmers' block (*îlot*) reference parcel areas during the transition to the IACS-GIS

5.2.1. In the creation of farmers' blocks (ilots) during the LPIS creation, it is rational and cost-effective that small errors in areas declared for the gross areas of the reference parcels are not adjusted. In such circumstances, an evaluation should take place following the work flow as presented in Figure 1.

5.2.2. The technical tolerance applied should be compliant with Art. 30 of Reg 796/04, as well as compatible with the technique chosen for the block creation. For example, where orthophotos with an 80cm pixel size are used, the technical tolerance should not be more than (1.5 x 0.80) = 1.20m.

5.2.3. This approach usually requires a period of **validation** and is therefore more complex to operate once aid applications are fully dependent upon the farmers' block as the reference parcel:

- In the first stage, where block areas determined are significantly different from those declared by the farmer, it is usually considered that a cycle of verification by the farmer is required before they can be used correctly in the aid application process;

- For the above reason, after the initial creation of the system and from its first year of use (i.e., no later than 2005), the update process (and subsequent validation) should be clearly managed with respect to the aid application process.
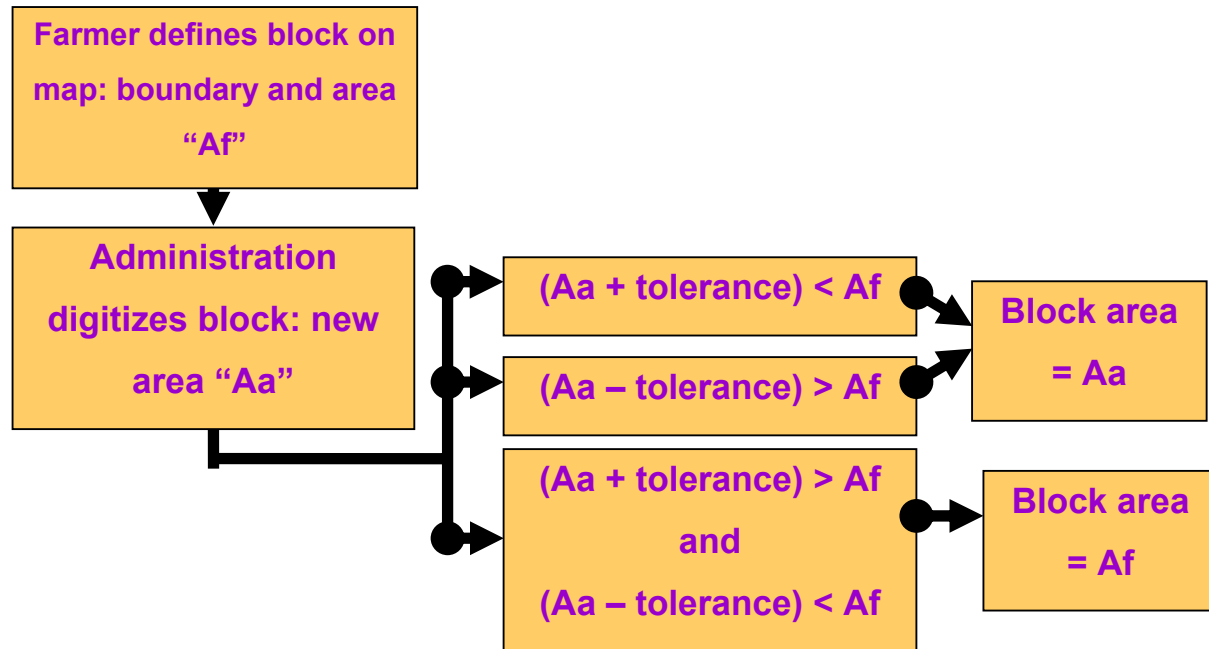
Farmer defines block on map: boundary and area "Af"

Administration digitizes block: new area "Aa"

(Aa + tolerance) < Af

(Aa – tolerance) > Af

(Aa + tolerance) > Af and (Aa – tolerance) < Af

Block area = Aa

Block area = Af

Figure 1: Farmers' block tolerance during creation

(end of document)