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1. Introduction

The present Document is elaborated under the Action 4.1 "Use Cases Identification" of the project "AGROQuality: Towards a Common Quality Control and food chain traceability system for the Greek – Italian primary sector of activity".

The present documents the first part of the corresponding action 4.1: "User Requirements gathering and functionality definition".

2. Methodological approach

A common methodological approach has been prepared for the collection and analysis of data in order to ensure conformity in the user requirement approach, to facilitate the proper collection, analysis and cross-referencing of results. The methodology has mainly relied on the following techniques:

- Questionnaires
- Personal Contacts and Interviews

During the early stages of the project, Questionnaires were created and distributed to local cultivators and actors involved in the olive growing processing and distribution.

The Questionnaires consisted of two major parts, namely the "Agro" part and the "IT background" part¹.

The present focuses on the User Requirements Identification, ending up on the Use Cases definition, based on the post-process of the second portion of the Questionnaires, along with data derived from personal interviews to local stakeholders.

The present is designed to act as the primary guide both of the detailed architectural definition and the development of the platform.

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¹ See Appendix

1. User Groups Identification

From the very early stages of the project, the following User Groups where Identified:

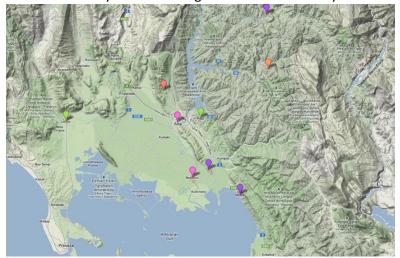
- <u>The farmers:</u> Everyone invoked in the olive cultivation process is a potential user of the system. The cultivators are the major stake-holding user group, since they are the actual link of the whole production: Olive tree growing, cultivating, harvesting. In most of the cases they are the land-owners as-well, thus linking the fruit to the property, which is about the most solid link in the overall circle (cultivation, process, distribution, consumption).
- <u>Unions and Associations:</u> The farmer may be a member of wider Groups of Farmers of Cultivation and Trading Associations. The Unions and Associations will have special access privileges, allowing them to outlook on their members data, view the land parcels of their members and even pose queries of the form: In which farms is the "specific" variety cultivated?
- <u>The agronomists:</u> Agro-experts are a key-actor, since they provide the farmers with guidance and information. They also monitor the overall process and play the role of the "farmers' agent".
- <u>Adminstrative agronomist:</u> Authorised agronomists also act as administrators in the ECR_GenericFeatures database. Data integrity and consistency safeguarding. Evaluating and accepting or rejecting requests on new certifiers/barcode issuers.
- Third party certifying authorities: The system will be based on the model of "Limited responsibility". Everyone inserting information of any kind will be responsible for the data he inserts. In addition and for the cases local or EU legislation dictates (i.e. biological product), certified agronomists will play the role of "Certifying Authority" and thus should be able to certify farming, processing and potentially storage and distribution conditions.
- **Geospatial information administrators:** The system will be based on a special case multilayered GIS. The initial mapping information (Digital Terrain Models, images, vector objects and metadata) will be inserted and maintained by the "Geoinfo" administrator(s). Geoinfo administrator(s) are also entitled to update land-ownership and usage information, in case of dispute settlements. At least one group per pilot will be occupied, to safeguard the maintenance of the information.
- **System Administrator:** The system will be able to issue QR bar-code per cultivator, farm, product, production and harvest period. For the system to be running consistently and for safeguarding the internal data integrity, it has to be supervised by the "super administrator". In addition the system administrator will be responsible for the security, the backup and recovery policy, as well as for reporting bugs and applying any future updates.
- QR-barcode issuer: According to the EU CAP, and the corresponding national legislation, every
 product should be labeled with the ID of the cultivator, as well as the ID of the processing and
 packaging carrier. The bar-code issuer may be the farmer himself, the responsible agronomist
 and the trader (packaging and processing unit). In all cases, the farmer will have to approve the
 issue of labels on his behalf.

- <u>Trader:</u> All interested in trading the products should be able to "outlook" all related tracing information. The corresponding farmer(s) has to approve.
- <u>Consumer:</u> All tracing information has to be available to the consumer unconditionally. The consumer has to be able to access the information based on the labeling of the product (QR/barcodes). Linking to the map should be a sine-qua-non.

2. Questionnaires post-process results

2.1 Survey objectives

All the Mediterranean area and, as a consequence, all the Adriatic area, is characterised by olive growing. In effect, this specie is so common that its presence is one of the most evident characteristic of this geographic area and that it can be considered as an actual biodiversity reservoir both because so many varieties exist and because – being they strictly linked to the territory in which the plants are cultivated – they favour an high level of biodiversity of the territories themselves. Moreover, olive



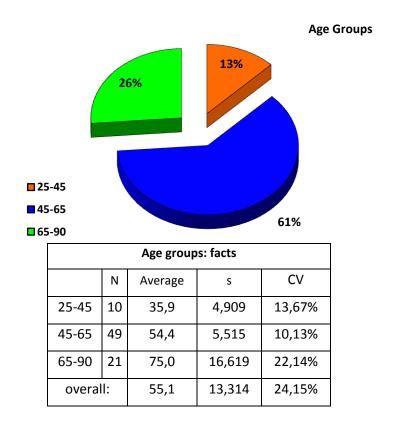
From Google Maps

traditionally growing is environment-friendly cultivation since it usually does not affect the natural resources. Finally, olives and olive oil are valuable foods, having very positive effects on human health. Special attention was taken to include as many information as possible to the questionnaires. Except from specific information mostly which, included applicable questions, most of the questionnaires were answered in great extend. The specimen of farmers is representative of the Arta plain and surrounding areas. There

were also included farms in areas with higher altitudes, such as Palaiokatouno (300-400 m) and Ano Kalentini (400-600m). It should be noted that the Arta plain has the Amvrakikos gulf as on of its borders. In the map, there are noted the municipalities or the villages where the farms pertain. The greater area of the plain of Arta (which includes a large part of the homonymous prefecture and a part of the prefecture of Preveza), is used mostly for the farming of citrus trees (oranges, lemons, etc) with the olive farms to follow. Olive farming is very old in the area, with some of the trees in farms to reach, or even exceed, a century of life. The questionnaires were filled in a period of 10 months, from 03/01/2012 to 15/10/2012. Analytical data from their farms were inferred as well as the cultivation techniques that are in use. A as great as possible variety of farmers (sex, age, education, etc) as well as olive farms (area, altitude, ground composition, etc), cultivation methods and practices (irrigation, manuring, pruning, using of pesticides ,etc) and items and practises of selling, were examined. In the questionnaires, the preposition of Association between the farmers and that with AgroQuality was also questioned. The overall idea that the final customer will have the capability of tracing the product that was bought (whether it was olive oil, edible olives, etc) back to the farm itself, as well as other information that will be discussed later, was received positively. Some potential problems with the interaction farmer-IT platform can and must be dealt, although farmers are nowadays more accustomed with new (mostly computerized) methods of transaction (either with the State or other constitutions). 91% of the farmers assent with the idea of further Association with AgroQuality. Another objective (besides with the very concurrence with AgroQuality) was the will of farmers to expand or even improve their work (exportations, certification and selling practises, EU subvention programmes, partnerships, e-commerce, etc). Finally the disposition of farmers towards concepts and practises (HACCP, ISO, PDO, PGI, etc) was questioned.

2.2 Audience

The specimen consists of 80 farmers of the greater area of the plain of Arta. The age of the farmers varies from 29 to 88 years, with a mean of 58 years old. Farmers were divided into 3 classes: [25-45), [45,65) and [65,90). As can be seen in the next graph, the larger group is by far farmers between the ages of 45 and 65, with the younger group comprising 13% of the total number and the older group 26% of our population. These, in accordance to the educational background of our farmers would lead to negative results in accordance to their interest in (general) improvements and IT applications and methods.



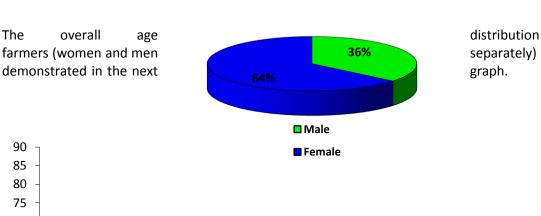
Continuing to the sex distribution of the farmers, it can be seen in the pie-graph that follows that, 29 are women and 51 men. In a male dominant profession, like farming is in Greece, the rather large number of women that participated was a positive surprise. The general effect that this rather large number of women has in our variables will be discussed.

11

The

90

overall



Farmers sex

Female/Male age groups: facts						
N Average s CV						
female	29	61,0	13,438	22,03%		
male 51 55,6 12,963 23,33%						
overall		55,1	13,314	24,15%		

The coefficient variable (CV) of the ages of the two sexes is 22,03% for the women and 23,33% for the men. This means that the two groups, although the number of men is approximately double than that of the women, have similar homogeneity.

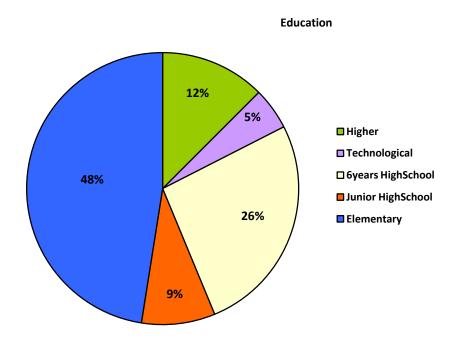
2.3 Questionaires Post Process Results

Moving on, we will depict educational background of the farmers and their receptivity in modern technologies. These days, with e-government rapidly progressing in Greece, no active citizen can be said to be unaware of development involving computational systems. 47% of the farmers graduated from Elementary school and 26% from High school, with Higher, Technological and Junior High school (Gymnasium as it is called in Greece). The younger the farmer the more years he has devoted into education.

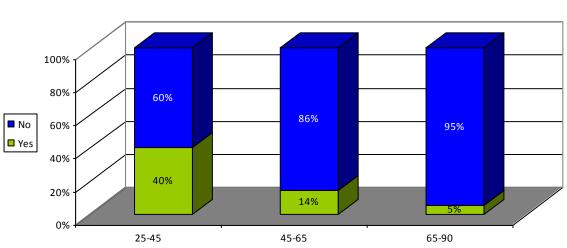
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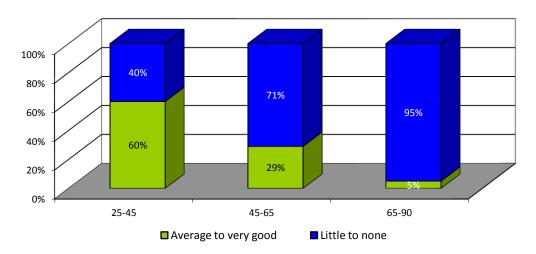
The same goes for the knowledge of another (other than the mother Greek tongue) language. The younger the farmer, the more likely he is to be familiar with a second language.



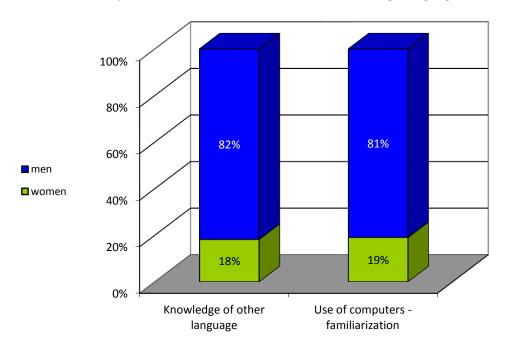
Knowledge of other language

Another interesting answer would be the one about the familiarity of the farmer in the use of computers. Again the younger group exhibited much larger positive numbers.

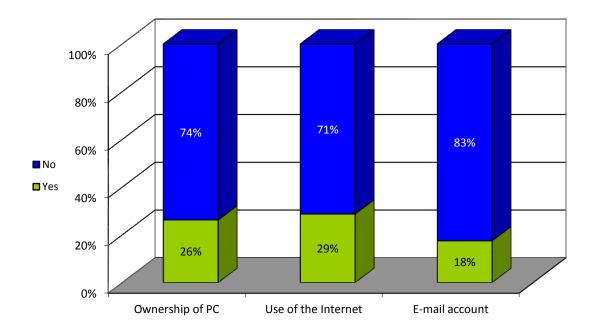




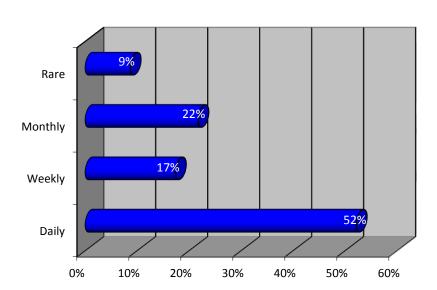
If we now compared the equivalent numbers for women and men we would notice that men seem more interested in the use of computers are more familiar with the use of foreign languages.



The percentages of computer ownership, use of internet and possession of an e-mail account amongst the farmers are of equivalent number with that of familiarity in computer use. An average of around 25% of the farmers is into IT, number that must not considered low given the average of the age of both the women and the men subgroups.



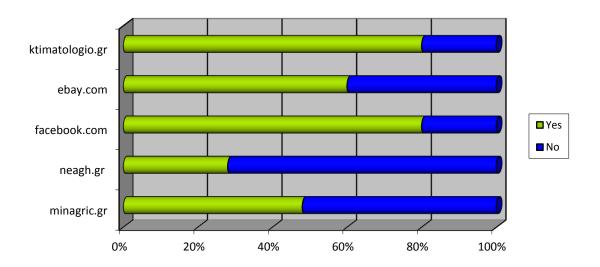
Particularizating further into those of the farmers who where affirmative to the previous questions, regarding the use of computers and the Internet, we explored the following. The farmers which are familiar with the use o computers and the Internet, are frequent users of the Internet, as the following graph depicts.



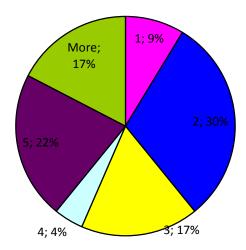
Frequency of Internet use

The use of the Internet concerns mainly professional and personal use with fluctuant usage of official sites like the ones of the Ministry of Rural Development and Food, the site of the Hellenic Cadastral and other popular sites. The general conclusion is that the farmers that stated that are familiar with the use of computers and the Internet, they do not "stay in the surface" of it and, aw we will see further on, are receptive to new ways and procedures.

Familiarity with various sites

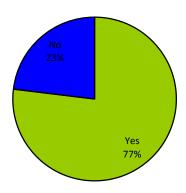


How many sites are you familiar with?



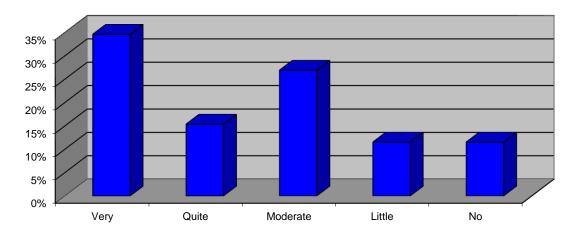
On the subject of e-commerce, the farmers exhibited great interest into getting involved. All the same, at the time being the farmers seem not to trust electronic purchases. 53% of the farmers said they have never purchased anything electronically. On the other hand 77% of them would be interested in selling their products on-line.

Interest in selling electronically



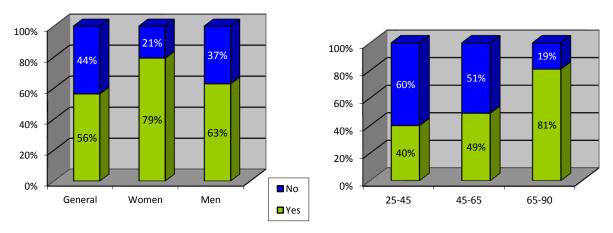
The next, and last question, answered had to do with the electronic journal that will be developed in AgroQuality. In general the farmers are interested into keeping an electronic task journal which will be available on-line for their customers.

Interest in keeping electronic task journal which would be available to customer



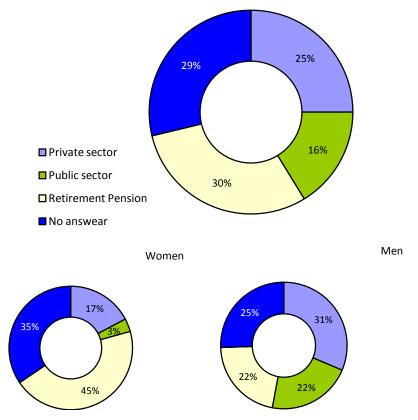
77% of the farmers would be from moderate to very interested in keeping electronic task journal. As we move on, let's see where does olive farming stands in our farmer's life as citizens, economically, as regarding their property, the machinery they use and others. 96% of the farmer denoted as chief of their agricultural utilization.

From the aspect of annual outcome, 56% of the farmers stated that farming is their principal profession, with the percentage of women being greater than that of men (79% to 63%). If we see the age groups we can deduce that the older the farmer the more likely to have farming as principal profession. The younger group is by 40% primarily farmers with the percentage rising to 81% to the older group. Furthermore 94% of the group did not denote "new farmer".

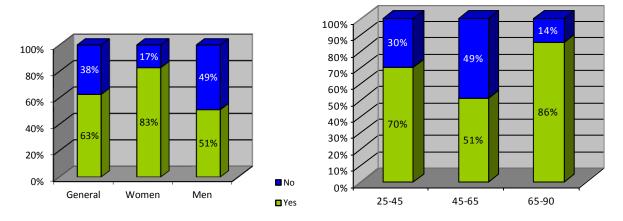


Principal profession farmer (>50% of outcome from farming)

Consecutively we can see from where the other part of the farmers comes from.



As we already noted olive cultivation is one of many forms of farming that thrive in the greater area of the city of Arta. When the farmers answered to the previous question, they included all the possible farming contents in which they engage. Now let's see which of them stated olive cultivation to be their primary profession.

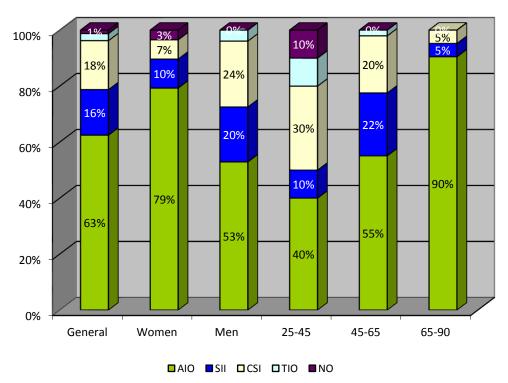


Principal profession olive grower (>50% of outcome of farming from olive cultivation)

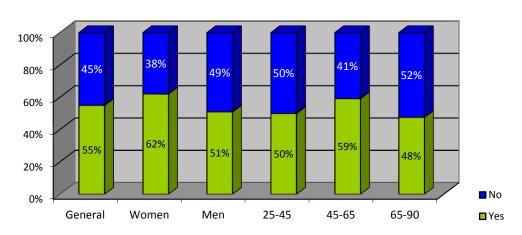
Again women declared olive growing to be their primary profession with a percentage of 83%, as opposed to the 51% of men and a total of 63%. The youngest and the oldest age groups exhibit the largest percentages.

In terms of Insurance, the farmers had to choose between Agricultural Insurance Organization (AIO), Social Insurance Institution (SII), Civil Servant Insurance (CSI), Tradesman Insurance Organization (TIO) and No Insurance (NO). In percentages, the older group as well as the women subgroup reported AIO as their insurance organization, with the younger group depicting the greatest diversity.

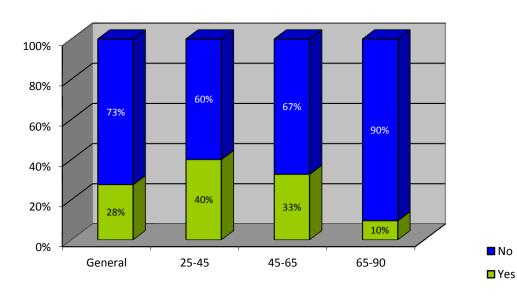
Insurance Organisation



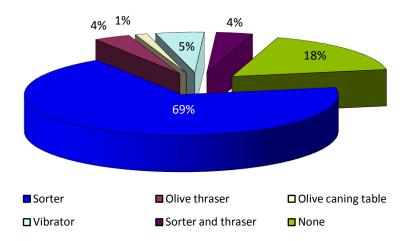
Owner of farming car



Owner of arboricultural tractor

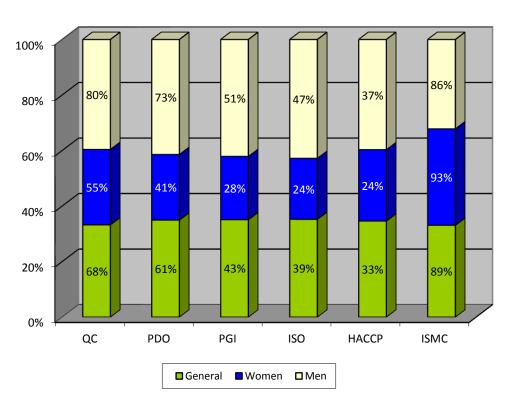




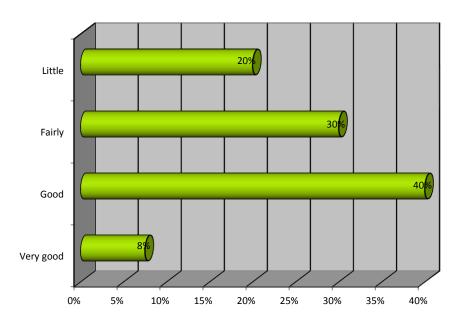


95% are familiar with the procedures that lead to State Funding / Support. In the following graph we depict the affirmative answers to the question of familiarity/knowledge with the following certifications/procedures: Quality Certification (QI), Protected Designation of Origin (PDO), Protected Geographical Indication (PGI), International Organization for Standardization (ISO), Hazard Analysis & Critical Control Points (HACCP), Integrated System of Management & Control.

Congizant of Standard and Procedures

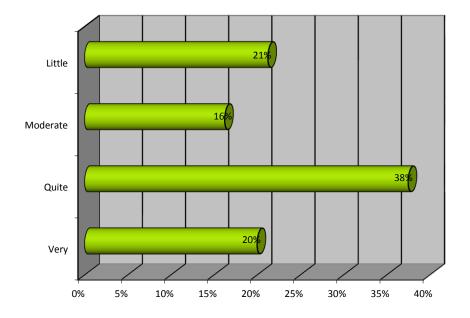


In general, we could say that farmers are aware of Hellenic, European Union and global procedures and techniques of certification. Beyond these, se asked our farmers if they are familiar with how they can improve the quality of their products and what affects that.



Knowing of factors that influence the quality of ones products

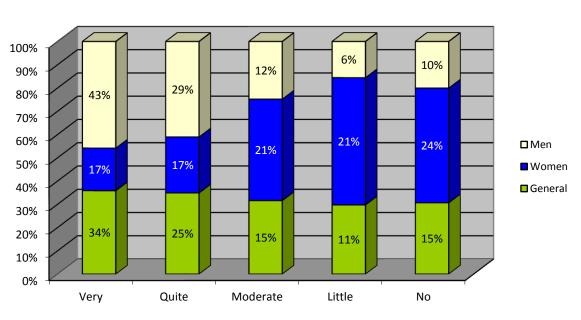
In general our farmers would be interested to prove the quality of the product through quantitative measures, strengthening the positioning.



Interest for: measurement and averment of the quality of ones products

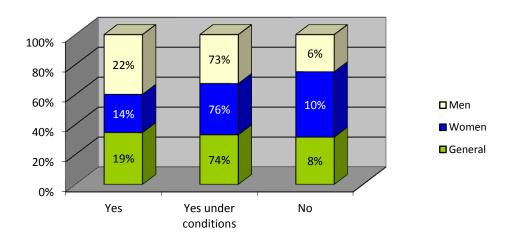
In an subsequent question, asking for the time that the farmer would devote measuring and averment of the quality of ones products, 44% said that they would devote as much time as needed, 26% one week per season, 9% one day per year and 21% said that they wouldn't have any time.

In a similar to the electronic task journal, all the farmers were asked if they were interested in keeping a task journal. Their answers are depicted in the following graph.



Interest for keeping of task journal

Given the equivalent answers concerning the electronic task journal and the low familiarity the farmers depicted with computers and the Internet in general, we should notice that the very idea of a task journal for olive cultivation is not negative. If it would be in electronic or hard copy form or both is to be decided. In general the farmers were affirmative.



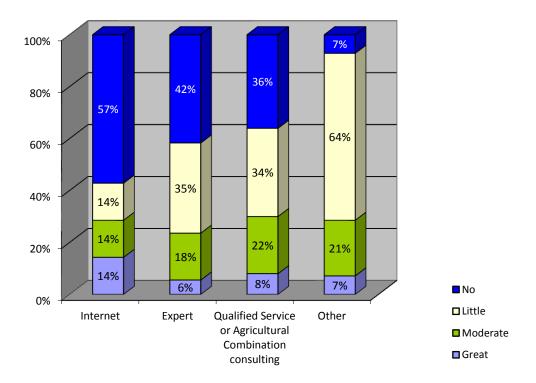
Interest for: common branding of products with other farmers

A core objective of the project consists in the Association among actors such as the farmers, the research institutions and the local and regional authorities/ agencies of the territories covered by the

project, in order to guarantee an actual transfer of the results of the research and consequently to promote the development and maintenance of this traditional agricultural sector.

Another interesting question was: how do you keep in track with recent developments in cultivation, packing, storing, alteration and transportation of ones products? 21% of the farmers rely on Expert consulting (Agronomist, etc), while 45% (55% in women and 39% in men) rely on some (State or not) Qualified Service or Agricultural Association as well as Expert consulting. The combination seems to be under a lot of respect from the farmers. Finally a 15% (7% in women and 20% in men) rely on both Internet search and (State or not) Qualified Service or Agricultural Association. The general conclusion is that farmers need a second (at least) opinion in everything that concerns their profession.

No, their degree of satisfaction from the answers they get and the results they have are showed in the graph below.



3. Usage Scenarios

The present captures the Use Cases identified from the very early stages of the project. It covers in terms of scenarios the special purpose GIS as well as the join to the ECR management subsystem.

3.1 Use case 1: Registration and personal information entry

Input: Registration information

Output: Populated personal data repositories

Actors involved: Geospatial information Administrator, Farmer, Agronomist, Third-Party Certifying Authority, QR Barcode Issuer and Trader

Use Case Diagram Registration and Personal information entry

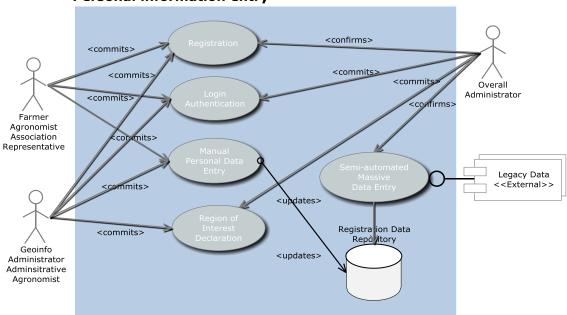


Fig. 3.1: Special Purpose GIS - Registration and Personal information entry - Use Case 1

Step	Users Involved	Action	Result	User Requirements
1	Geospatial information Administrator	system and poses a request for a role. Enters personal identification and	The system issues access credentials (active login and password). The validity of the contact information (i.e. e-mail) of the candidate active user is cross-checked by the overall system administrator.	Web-browsing capable device (PC, tablet, smart-

Step	Users Involved	Action	Result	User Requirements
2	Geospatial information Administrator	Logs to the system and poses a request for geographical region assignment.	System administrator forwards the request to the head of the dept. The system assigns access rights.	 Internet access Web-browsing capable device (PC, tablet, smartphone, etc.) Active access credentials
3	Farmer	Logs to the system and inputs personal information and demographis	The system assigns access rights.	 Internet access Web-browsing capable device (PC, tablet, smartphone, etc.)
4	Agronomist	Logs to the system and inputs personal information and demographics. Also assigns regions of interest or authorisation	The system assigns access rights. GIS Administrator assigns the parcels falling into the regions of interest to the agronomist.	 Internet access Web-browsing capable device (PC, tablet, smartphone, etc.)
5	Union/ Association representative	Logs into the system and populates the Union/Association data (i.e. activity, contact information, etc)	New Union/Association data, pending for validation by the system administrator. Credentials and access rights assigned.	 Internet access Web-browsing capable device (PC, tablet, smartphone, etc.)
6	Administrative agronomist	Logs to the system and inputs personal information and demographics.	Data to be verified by the overall system administrator. Credentials and access rights assigned upon acceptance.	 Internet access Web-browsing capable device (PC, tablet, smartphone, etc.)
7	Third-Party Certifying Authority QR Barcode Issuer	Logs into the system and populates the Certifier data (i.e. certifications provided, contact information, etc)	Data to be verified by the overall system administrator. Credentials and access rights assigned upon acceptance.	 Internet access Web-browsing capable device (PC, tablet, smart-phone, etc.) Active access credentials

3.2 Use case 2: Geospatial information entry

Input: Mapping data (Digital maps, Geocorrelated polygons)

Output: Populated GIS basic DTS and image Layers (Layer 0) and land parcels polygons

Actors involved: Geospatial information Administrator

Use Case Diagram Geospatial information entry and maintenance

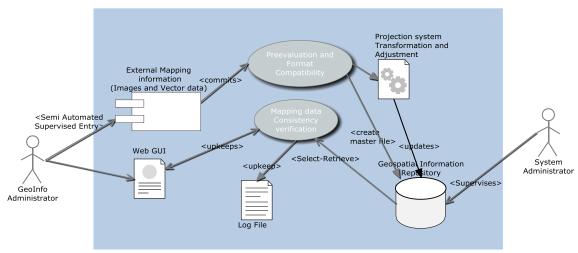


Fig. 3.2: Special Purpose GIS – Mapping initial data entry - Use Case 2

Step	Users Involved	Action	Result	User Requirements
1	Geospatial information Administrator	Logs into the system	New valid session and access rights applied	 Active access credentials Knowledge of the internal GIS repository structure (area, geo Reference System Coordinates, etc)
2	Geospatial information Administrator	Transforms the initial raw digital images and DTM to the reference coordinates system.	Initial mapping data ready to be ported to the system	 Active access credentials Knowledge of the internal GIS repository structure (Layers, geo Reference System Coordinates, etc)
3	Geospatial information Administrator	raw digital mapping	reference coordinates	

Step	Users Involved	Action	Result	User Requirements
				System Coordinates, etc)
4	Geospatial information Administrator	Validates the third party vector layers (land parcel polygons). Transforms to the reference model where appropriate. Imports the new vectror-layer (Mass semi-automated import)	Land parcel polygon layer populated.	 Active access credentials Knowledge of the internal GIS repository structure (Layers, geo Reference System Coordinates, etc)
5	Geospatial information Administrator	Validates and updates the polygons where necessary (e.g. resolves overlap issues, misplaced polygons, etc.)	updated. Vector information	

3.3 Use case 3: Farmers' administration session

Input: Validation on ownership information

Land and production data import and upkeep

Output: Populated personal data repositories

Actors involved: Geospatial information Administrator, Farmer, Agronomist

Use Case Diagram Farmer Administration session

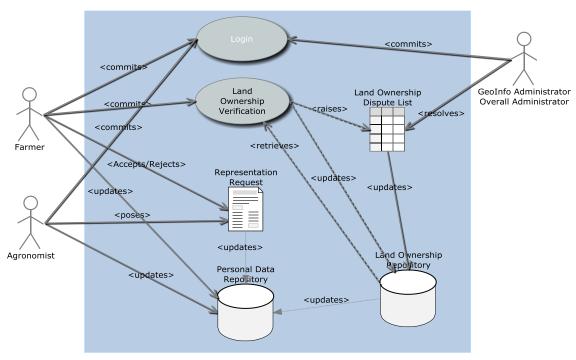


Fig. 3.3: Farmers' Administration Session - Use Case 3

Step	Users Involved	Action	Result	User Requirements
1	Farmer	and verifies ownership or legal	The system verifies polygon- farmer correlation or raises a "land declaration dispute" if the parcel is previously assigned to others.	Web-browsing capable
2	Geospatial information Administrator Overall system administrator	Receive a list of the possible disputes and attempts to resolve based on the current legislation and prior ownership data	Clear land ownership information.	Active access credentials

Step	Users Involved	Action	Result	User Requirements
		(Ktimatologio A.E.)		
3	Agronomist	Requests to act on behalf of specific farmers	Poses a "representation" request to the farmer(s)	 Internet access Web-browsing capable device (PC, tablet, smartphone, etc.) Active access credentials
4	Farmer	Accepts or rejects the representation by the specific Agronomist		 Internet access Web-browsing capable device (PC, tablet, smartphone, etc.) Active access credentials

3.4 Use case 4: Unions, Associations and Agronomists session

Input: ECR_GenericFeatures repository information

Output: Populated ECR_GenericFeatures repository

Validated data regarding fertilizers, drastic substances, pests, deseases, measurement units

Response to spatial queries in the form of new GIS Layers

Actors involved: Agronomists, Unions and Associations

Use Case Diagram ECR_GenericFeatures repository population,validation and Query Formulation

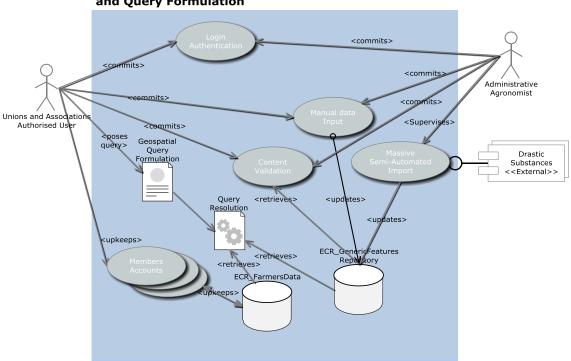


Fig. 3.4: Special Purpose GIS – Unions, Associations and Agronomists session - Use Case 4

Step	Users Involved	Action		Result		User Requirements
1	Agronomists, Unions a Associations	Logs into	the system	New valid session a access rights applied		 Active access credentials Knowledge of the ECR structure and constraints
2	Agronomists, Unions a Associations		Generic	ECR_GenericFeatures repository populated. D consistency verified	ata	Active access credentialsKnowledge of the ECR structure and constraints
3	Agronomists,	Updates	and	ECR_GenericFeatures	,	Active access credentials

Step	Users Involved		Action	Result	User Requirements
	Unions Associations	and	validates the content of the Generic Features repository in the ECR database.	repository populated. Content verified	Knowledge of the ECR structure and constraints
4	Unions Associations	and	Outlook their members data	Informed Associations and farmer unions	Active access credentialsUpdated member list
5	Unions Associations	and	Query the system	New information layers depictions created in response to the query	 Active access credentials Updated member list Knowledge of the ECR structure and constraints Knowledge of GIS handling

3.5 Use case 5: Certifying Authorities, QR-barcode issuers administration session

Input: Farmers application for certification issuing

Output: Bound farmers and traders to certifiers

Actors involved: Farmers or representing agronomists, Traders, QR Barcode Issuers, Certifying

authorities

Use Case Diagram Bounding Farmers & Traders to Certifiers

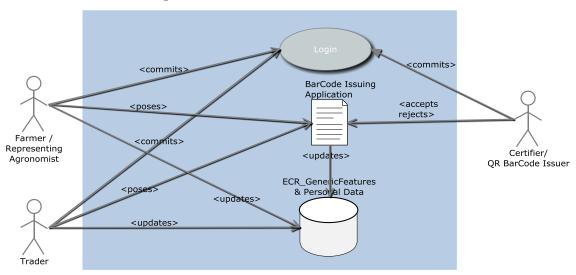


Fig. 3.5: Bounding farmers and traders to Certifiers. BarCode issuing process - Use Case 5

Step	Users Involved	Action	Result	User Requirements
1	Farmer or representing agronomist Trader	Logs into the system	New valid session and access rights applied	Active access credentialsWeb access
2	Farmer or representing agronomist Trader	Poses Request for Future certification and Barcode issuing	<u> </u>	 Internet access Web-browsing capable device Active access credentials
3	Third-Party Certifying Authority QR Barcode Issuer	Accepts or rejects request to act as the certifier of the farmer or trader	· ,	 Internet access Web-browsing capable device Active access credentials
4	Third-Party Certifying		Valid QR BarCode, Unique per farmer, farm, cultivation	

Step	Users Involved	Action	Result	User Requirements
	Authority	request	period and harvest batch	Web-browsing capable
	QR Barcode Issuer			device
				Active access credentials

3.6 Use case 6: Cultivation calendar upkeep and barcode issuing

Input: Farmers and representing agronomists

Output: Cultivation calendar

Actors involved: Farmers or representing agronomists, Traders, Certifying authorities, QR-barcode

issuers

Use Case Diagram Cultivation calendar upkeep Barcode issuing and certification

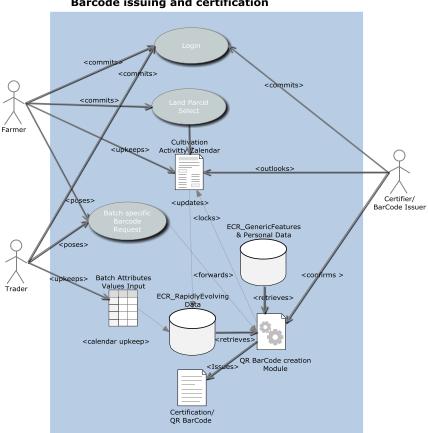


Fig. 3.6: Cultivation Activity Calendar upkeep, QR-Barcode issuing – Use Case 6

Step	Users Involved	Action	Result	User Requirements
1	Farmer or representing agronomist	Logs into the system	New valid session and access rights applied	Active access credentialsWeb access
2	Farmer	Select the farm (either automatically via GPS tracking) or via	Selected farm	Internet accessMobile GPS enabled, Webbrowsing capable device

Step	Users Involved	Action	Result	User Requirements
		web-map selection.		(tablet, smart-phone, etc.)Active access credentials
3	Farmer or representing agronomist	Activity Calendar upkeep (fertilizers, pests and diseases protection, irrigation, etc)	Updated calendar	 Internet access Web-browsing capable device (PC, tablet, smartphone, etc.) Active access credentials
4	Farmer or representing agronomist	Request BarCode. (The Barcode is unique per period, farmer, farm and harvest)	BarCode Request posed	 Internet access Web-browsing capable device (PC, tablet, smartphone, etc.) Active access credentials
5	Third-Party Certifying Authority QR Barcode Issuer	Aprove and issue BarCode with link to the certain calendar. Calendar locked for up to the BarCode issue date	BarCode with link to the finalized calendar issued	Internet accessActive access credentials

4. APPENDIX I: Questionnaires Part B

The IT-related part of the Questionnaires.

<Appendix 1 Content>