ICT Based Services for Agriculture Extension – Phase II

Final Report

Mahrukh Siraj, Atiq-ur-Rehman

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Acronyms

AO	Agriculture Officer
CI	Cotton Inspector
CLCV	Cotton Leaf Curl Virus
CSA	Call Service Agent
CSR	Corporate Social Responsibility
DCO	District Coordination Officer
DDO	Deputy District Officer
DDOA	Deputy District Officer Agriculture
DFID	Department for International Development
DO	District Officer
DOA	District Officer Agriculture
DG	Director General
DG AE & AR	Director General Agriculture Extension and Adaptive Research and also Directorate General of Agriculture Extension and Adaptive Research
EDO	Executive District Officer
FA	Field Assistant
FAQ	Frequently Asked Question
FGD	Focused Group Discussion
HQRs	Headquarters
ICT	Information Communication Technologies
KII	Key Informant Interview
MIS	Management Information System
MoU	Memorandum of Understanding
PITB	Punjab Information Technology Board
RD	Regional Director

Mahrukh Siraj
Coordinator Knowledge Management

Atiq-ur- Rehman
CABI Consultant

CABI
Opp. 1-A, Data Gunj Buksh Road
Satellite Town
Rawalpindi
Pakistan

Tel: +92 (0) 51 9290 132
Email: m.siraj@cabi.org

Executive Summary

Agriculture is of critical importance for the socio-economic development of the country. It accounts for over 21% of GDP, provides employment to about 45% of the labour force (Government of Pakistan, 2013) and helps bring in a substantial part of foreign exchange earnings through export. It also provides raw material to the industrial sector and provides livelihood to almost two-thirds of the entire population of the country.

There are about 8,264 million private farms in the country, of which 64% of the farms are in Punjab alone, while the total number of households in the country associated with farming is 24,095 million. (Government of Pakistan, 2010).

This project aims to improve livelihoods for farmers in target states in Pakistan using ICTs to improve the reach and monitoring of extension services to the farming community at a lower cost. However, working with the private sector, specifically the mobile telecommunications provider has been a challenge and this required some changes to the work plan thus affecting the achievement of key indicators.

A service has been developed, E-Zaraat (agriculture in Urdu), it includes a MIS application, consisting of a web interface and mobile application, plus a help line. The application is now live and can be viewed at www.E-zaraat.org.

To date: more than 750 Frequently Asked Questions have been developed, with input from workshops; around 450 text and voice messages in Urdu have been developed; more than 100 local champions have been trained to provide local on-site support to other users and more than 80% of the participants rated themselves as ‘confident’ or as ‘very confident’ in using the training material. The criteria used for selection of these local champions included: computer literacy; regular employee of the Agriculture Extension Department; previous experience of preparation of departmental reports; and ability to generate reports through the system.

The target of reaching 30% of farmers in the districts of Vehari, Sialkot and Sargodha was in the end too ambitious to be met within the timescale. There are over 87,000 farmers registered with the Directorate of AE & AR in the target districts, the cost of reaching such a large number of farmers is very high. The fact that Mobilink was unable to make its commitment also negatively affected our ability to achieve the target.

The Executive District Officer (EDO) of the District of Vehari believes that E-Zaraat will cut their costs by 40%. The Director General, Agriculture Extension & Adaptive Research (AE&AR)-Punjab is of the view that this kind of organized effort can substantially bring down cost of reaching the farmers and that “We want to create awareness of this project in the whole Punjab and target at creation of an appetite for such reforms in all other districts. And with the success of this model we want the e-governance model at the earliest [opportunity] in entire Punjab.”

A follow-on survey was conducted to assess the use and usefulness of E-Zaraat; identify issues constraining the use of E-Zaraat; and to suggest recommendations for improvement in the effectiveness of E-Zaraat. The study involved an evaluation of the call log (for the helpline); interviews with the Director General AE& AR-Punjab, Executive District Officer (EDO) Vehari, and DO (Extension) Vehari; and focused group discussions with a group of Agriculture Officers (AOs) and interviews with selected farmers.

Results suggest that more than 1200 calls from the farmers were received via the helpline from 15th March to 30th May, 2013: District Vehari accounted for most of the calls to the helpline, followed by District Sialkot and District Sargodha. Most of the queries of the farmers pertained to the cotton crop. However, there were other queries related to other major crops, fruits, vegetables. As the helpline workflow is designed to cater to and manage new queries which are not part of the FAQs already generated, these new queries about crops which were not about the target crops (cotton, wheat, rice &

citrus) generated new FAQs. Thus over 220 new FAQs have been added. Major barriers to usage of the service include the high cost of calling and long-waiting time.

Text messages are also being sent to farmers in accordance with crop calendars. About 130 advisory messages have been transmitted to 1503 farmers so far against the target of 1200 farmers by the end of June 2013. Over 50 messages have been delivered to 1503 farmers. The voice message strategy had to be changed to sending only one message per day as the farmers found text and a voice message too much information.

The benefits of E-Zaraat perceived by the extension officers include enhancement in the capacity of the extension workers and their exposure to the e-environment of working; easy and quick access to advisories; more efficient and quick reporting, preservation of records; and the quick retrieval of data.

However, there are some issues identified by the extension workers, which include the addition of more forms/data to the software, slow internet speed, non-functionality of the helpline on off-days and off-times on working days. Some of the issues have already been resolved.

Major suggestions for improvement in the effectiveness of E-Zaraat include waiving /reducing call charges on the helpline, integrating the work of Field Assistants with E-Zaraat through provision of tablets to them, improvement in the speed of internet, and monitoring the performance of users of the system (at the AO level).

The project has generated a lot of interest among the different stakeholders. The DG AE & AR is keen to expand the project to the whole of the Punjab province. E-Zaraat will eventually be owned and run by the Government. The helpline and other information products that can be generated from the project MIS have the potential to generate an extra income stream. It is estimated that it will take another five years for the information to be collected to such an extent that it becomes commercially viable.

The Directorate of Agriculture Extension and Adoptive Research (DG, AE & AR) has committed to provide a 0800 number and office space for the helpline to support the increase in reach of the helpline to all districts of Punjab. A MoU between CABI and Department of Agriculture will be signed whereby, rights to data, hosting of application and support to the application will be agreed upon. The DG, AE & AR has also requested the Punjab IT Board (PITB) to host the application and to provide a government URL www.e-zaraat.punjab.gov.pk for the application.

PITB, through another project, will be providing the staff of Agriculture Extension with smart phones thus complementing the project by drastically reducing the cost of essential hardware required to deploy E-Zaraat in the field.

The World Bank had requested a brief on the project and based on the same have included ICT-based services on a pattern similar to E-Zaraat in their new project ‘Sindh Agriculture Growth project’ for Sindh province. This project is expected to be launched by the end of 2013.

1. Introduction

1.1 Agriculture in Pakistan

The importance of agriculture in Pakistan is manifold: it provides a livelihood to 64% of the population (Government of Pakistan, 2010), provides employment to 45% of the country's labour force, accounts for 21.4% of GDP, and supplies a substantial part of the foreign exchange earnings for the country (Government of Pakistan, 2013). Investment in agriculture is four times more effective than investment in any other sector in terms of its impact on poverty (World Bank, 2008).

Punjab is the largest province of the country on account of its population and its contribution to agricultural production. It is the best area for agriculture in the country, as its soil is very fertile and its irrigation system is relatively well developed. It comprises a quarter of the total land area of Pakistan, and 57% of the total cultivated land of the country (PARC, undated).

The challenges to the farming community include: environmental changes; soil erosion (Sheikh, Sheikh & Soomro, 2005); lowering the land to person ratio; archaic methods of flood irrigation; scarcity of water (Government of Pakistan, 2012); huge power shortages especially in summers; dependence on traditional production practices; and a lack of credit facilities and organized marketing. The impact of these problems is aggravated by low levels of literacy, shortages of financial capital, and growing population pressures and lifestyle changes.

The plight of the farmer becomes quite clear with the need to sustain and enhance their production within their given set of resources and constraints.

The Provincial Agriculture Extension Department is the main source of information for farmers on productivity issues. The mission of the Punjab Agriculture Extension Department is to improve the earnings and livelihoods of farmers through enhancing their capability to run their agricultural operations on a scientific basis. However, the Government extension services do not reach poor farmers owing to their small holdings, geographical spread and low motivation of the extension staff in serving them. The department is suffering from a variety of issues including the inadequacy of capacity and a lack of basic infrastructure to reach the farmers. That is why, according to the DG AE & AR, the Department is barely reaching 10% of the farmers in the Punjab province.

1.2 Existing Agriculture Extension System-Punjab

1.2.1 Organizational Structure

Agriculture extension in Punjab caters to the needs of 25,000 villages and more than 4 million farming families (Ali, 2013). Currently the channels used by them to reach the farmers include: face-to-face meetings, mass media including print and electronic media.

The Extension Department is headed by the Director General (DG). He is assisted by Executive District Officers (EDOs) / District Officers Agriculture (DOAs) at the district level. An EDO supervises District Officers (DOs) belonging to several departments – DO Agriculture Extension is one of them. Hence, a DOA is the representative officer of the Extension Department at the district level. A DOA is assisted by a Deputy District Officer Agriculture (DDOA) who looks after extension services at the tehsil level. A tehsil is administratively divided by the Extension Department into Marakiz (Urdu for 'Centers'). Extension services at a Markaz (Center) are led by an Agriculture Officer (AO). An AO is assisted by Field Assistants who operate at the Union Council level. The Organogram of this system is shown below in Figure 1 (Government of Punjab, 2010).

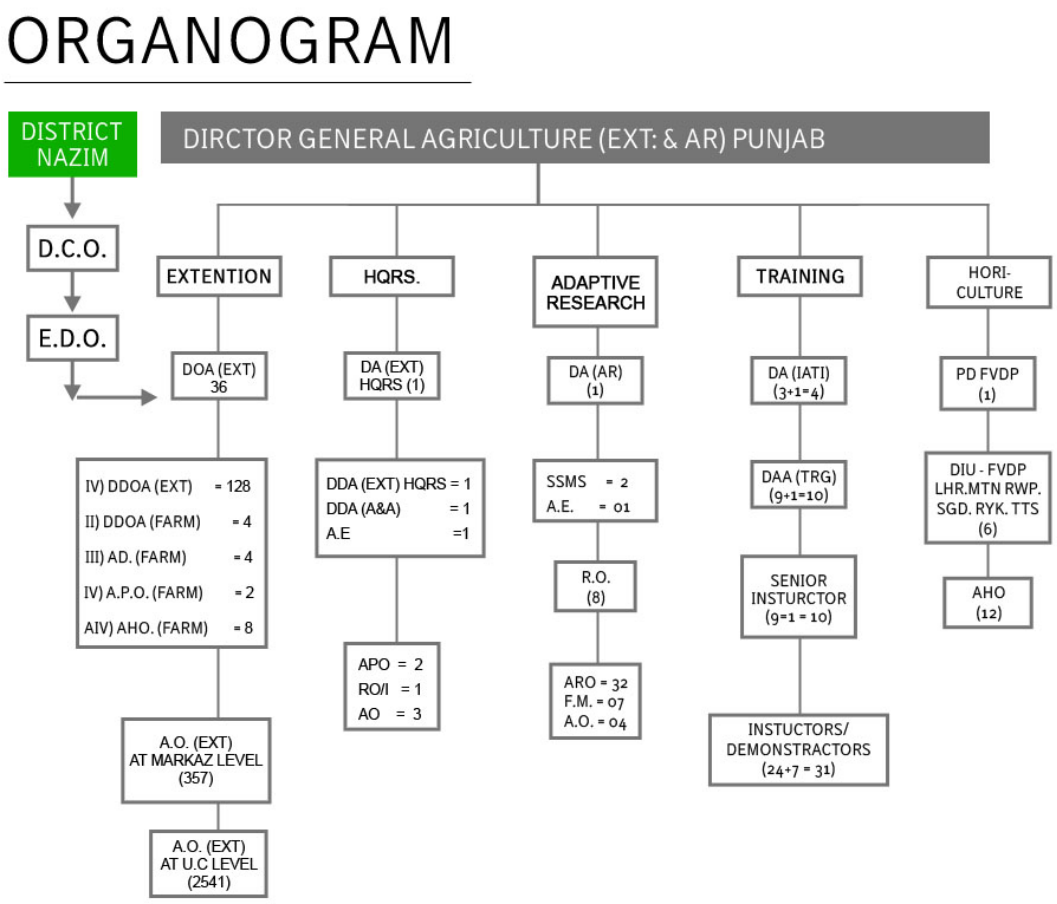

Figure 1: Organogram of the Extension Department

1.2.2 Coverage of extension services in Punjab

Although the Department has a fairly large organizational structure, the farmer base is also very large and hence the coverage and reach of the extension services is not as effective as the Department would wish. According to the DG (Extension) barely 10% of farmers manage to get extension advisory services (Ali, 2013). The E-Zaraat project aims to increase this coverage level from the existing 10% to 30%.

1.3 ICTs Environment in Pakistan

ICT is an umbrella term that generally covers computers, the internet, telecommunications infrastructure, cell phone, radio television, newspapers and digital libraries. The internet revolution on one side has proliferated information access to its users, on the other hand it has played a role in increase of information. Information processing and knowledge synthesis has become a very crucial economic activity itself. The role of ICT is of primary importance, it not only provides infrastructure but also provides necessary toolset to process and disseminate knowledge.

In the recent years, Pakistan has made enormous strides in improving ICT infrastructure, promoting its education and making it affordable for masses. The government policies have promoted innovation and further enhanced the business model of already offered services. The most noticeable efforts in this regard are favourable IT and Telecommunication policies. IT policies resulted in introducing and reducing internet access charges whereas telecommunication policy made cell phones a commodity for the poor.

ICT is regarded as the most important component of modern knowledge economy, in order to understand the use of ICT in socio-economic development and poverty alleviation we must recognize the roles of ICT in shaping the country's economy. ICT can be summarized as:

- ICT as Economic Sector: the commercial significance of the ICT industry for the country's economy encompasses hardware manufacturing and software development.
- ICT for Socio-Economic Development: The benefits of ICT are manifold as it contributes heavily in increasing productivity, increasing work efficiencies achieving economies of scale in every sector whether it is manufacturing, communication, education, rural development, etc.

However simple provision of ICT as a production sector will not aid the development agenda of a country, it is the provisioning of services on the available technologies that will affect the masses and create powerful social and economic networks by drastically improving the communication and knowledge exchange (Siraj, 2011).

1.4 Serving Farmer Needs: Linking Punjab extension with ICTs

To facilitate the Extension Department in improving its performance and reach, and thereby facilitate the farmers, CABI with funding from DFID launched a project entitled 'ICT Based Services for Agriculture Extension- Phase II'. This service has been named E-Zaraat. Zaraat is the Urdu word for agriculture.

E-Zaraat has been launched as a pilot in selected districts of Punjab. More specifically, the project area comprises three districts i.e. Vehari, Sargodha and Sialkot. The districts were strategically chosen to encompass the most well-known areas for growing particular crops: cotton and wheat in Vehari; citrus and wheat in Sargodha; and rice and wheat in Sialkot. These four crops are of critical importance to the economy of the country and livelihood of the rural poor.

The basic purpose of the initiative of E-Zaraat is to provide farmers access to timely, credible, and usable agricultural advisory services.

The outcomes of the project are:

- Improved reach and monitoring of extension services to the farming community at a lower cost
- Improved capacity of the Extension Department to collect, collate, analyze and share data
- A system whereby the public can register their level of satisfaction with the provided extension services with the extension managers

The objective was to extend the reach of extension services and introduce a mechanism for accountability and monitoring of extension activities to make these more efficient, timely and with a wider coverage.

To implement the project a variety of tools were developed: a web based MIS for agriculture extension; a mobile application to facilitate real-time data entry in the field; a helpline backed by a panel of experts, and mobile communication with farmers through voice and text messages.

These tools were developed to serve the needs of a range of stakeholders, specifically policy makers in the Government of Punjab, Directorate General Agriculture Extension and Adaptive Research; District Officers- Agriculture, Agricultural Officers; Field assistants, farmers and other institutional users.

DFID's research strategy 2008-2013 includes elements that focus on finding ways to utilize new technologies for poverty alleviation. The use of new technology in alleviating poverty will only be achieved if people are convinced of its value and if it is easily accessible, easy to use and affordable.

With a grant provided by DFID in 2010, research was carried out to identify factors inhibiting or constraining the adoption of new technologies and to identify mechanisms of overcoming these

constraints. The research study focused on testing the use of Information and Communication Technologies (ICTs), specifically mobile phones and, in providing actionable information to poor farmers, as part of the extension infrastructure in Pakistan. The research resulted in proposing a model for ICT based services for Agriculture Extension in Pakistan.

1.5 Model Description

Forty focus group discussions within the farming community in twenty villages of Punjab were carried out during the study carried out in 2010-2011. The focus group discussions aimed to understand the problems faced by the farmers, what information they needed and their view of the barriers to the uptake of new technologies. In addition to the forty focus group discussion, in-depth interviews were carried out with farmers and public extension workers in three districts of Punjab to pinpoint specific needs of the farmers. A separate series of interviews were conducted with public and private extension service providers to gauge their use of ICTs for extension purposes.

Based on the feedback received from the farmers and the extension workers the farmer queries could be broadly classified as:

- 'What' type queries, asking for standard information e.g. weather, prices, input supplier contacts, etc.
- 'How' type queries can be further classified as:
    - Standard practices, e.g. how to take a sample for soil test
    - Queries that need further assessment

The 'what' type queries lend themselves best to mobile applications. The others may need solutions ranging from voice (help line), field demonstrations or participatory training. In an integrated service approach the Punjab Government's extension services will address the need for field demonstrations or participatory training in their existing service provision processes.

Proposed Model

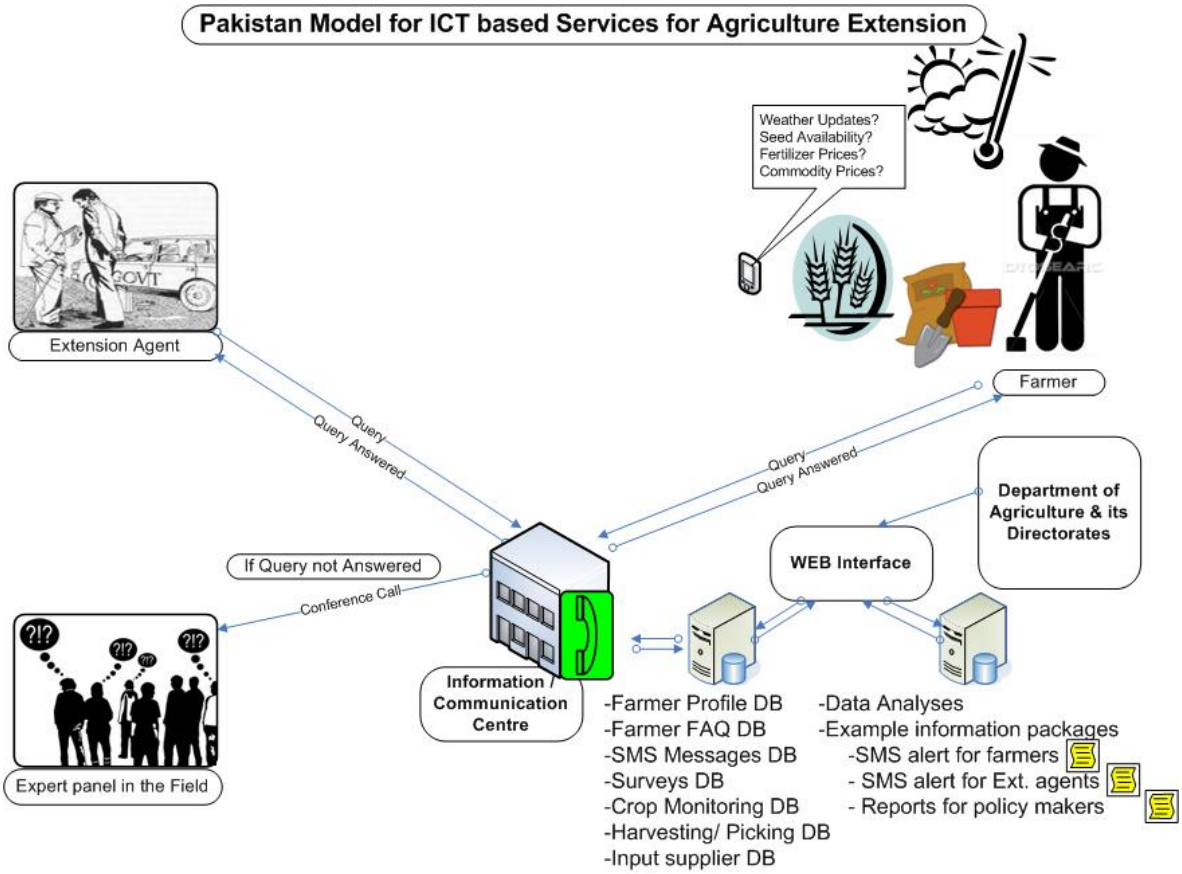

Figure 2: Pakistan Model for ICT based services for Agriculture Extension

The main components aim to address the needs of the user base; farming community, extension staff and governments agencies and to create user interfaces appropriate to the identified user base. Therefore it was proposed to create mobile applications for farmers and field extension workers and web based interfaces for the Directorate General Agriculture Extension & Adaptive Research and other institutional users. The model also proposed a call centre based helpline to provide solutions to agricultural problems which were diagnostic in nature. The helpline operators were to be backed by a FAQs database. For problems that cannot be answered by the help line operators, the call would be forwarded to an expert in the field. As a last line of defence, the queries that remain unanswered would be sent to an appropriate research institution. (Siraj, 2011).

In 2011, DFID provided further funding to pilot the propose model in three districts of Punjab-Pakistan. This project aims to improve livelihoods for farmers in target states in Pakistan through improved reach and monitoring of extension services to the farming community at a lower cost. This report covers the outputs of the pilot project.

2. Key deliverables of the Project

The logical framework of the project is attached as Annex-E. The key deliverables of the project were:

- E-Zaraat:
  - Business Analysis of the current Agriculture Extension system
  - E-Zaraat web based functional MIS for agriculture extension of Punjab
  - E-Zaraat mobile application for use by the extension providers
  - Kisan Dost (farmer friend) Help line for farmers
  - Kisan Dost (farmer friend) Voice message for farmers
  - Kisan Dost (Farmer Friend)Text messages for farmers
- Content for the system
- Training and capacity building of extension services
- Base line survey
- Follow-on survey
- Scale-up and sustainability plans leading to development of a robust model for adoption of the service in other states/districts

2.1 E-Zaraat

2.1.1 Business Analysis of the current Agriculture Extension System:

Semi structured interviews were conducted with the extension staff in the three target districts: Vehari, Sargodha and Sialkot to establish their workflows and their reporting and information requirements. The existing document chain and data collection methods were reviewed thoroughly to understand the district level context. This information was used to develop the first version of the business analysis document. However, during the field testing and deployment new requirements were requested by the extension department. In order to ensure the continuity of the pilot to a full-fledged programme for the entire province it was decided to incorporate these new change requests. This negatively affected the schedule of the training workshops. However; it has resulted in a better product and better acceptance by the stakeholders.

The Business Analysis document was revised accordingly with this feedback and is attached as Annex-A. Though the main document will remain the same, this is now intended to develop as a living document and as more districts or more crops are added the document will continue to be enhanced.

All the E-Zaraat services are hosted at the CABI campus in Rawalpindi.

2.1.2 E-Zaraat web based functional Management Information System (MIS) for agriculture extension of Punjab

The web based management information system (MIS) has been completed and is being used by the extension department. Demonstrations of E-Zaraat web applications have been given to the Secretary Agriculture, Director General, Agriculture Extension and Adaptive Research (DG, AE&AR), Planning and Development Department Punjab and Punjab Information Technology Board (PITB).

The application is now live and can be viewed at www.E-zaraat.org.The DG AE & AR has requested the Punjab Information Technology board (PITB) to host the application and to provide a government URL www.e-zaraat.punjab.gov.pk for the application.

The application has been developed and deployed in Vehari and tested in the other 2 districts (Sialkot and Sargodha). The users' training has also been delivered. The deployment was delayed beyond the original target date due to the change in requirements.

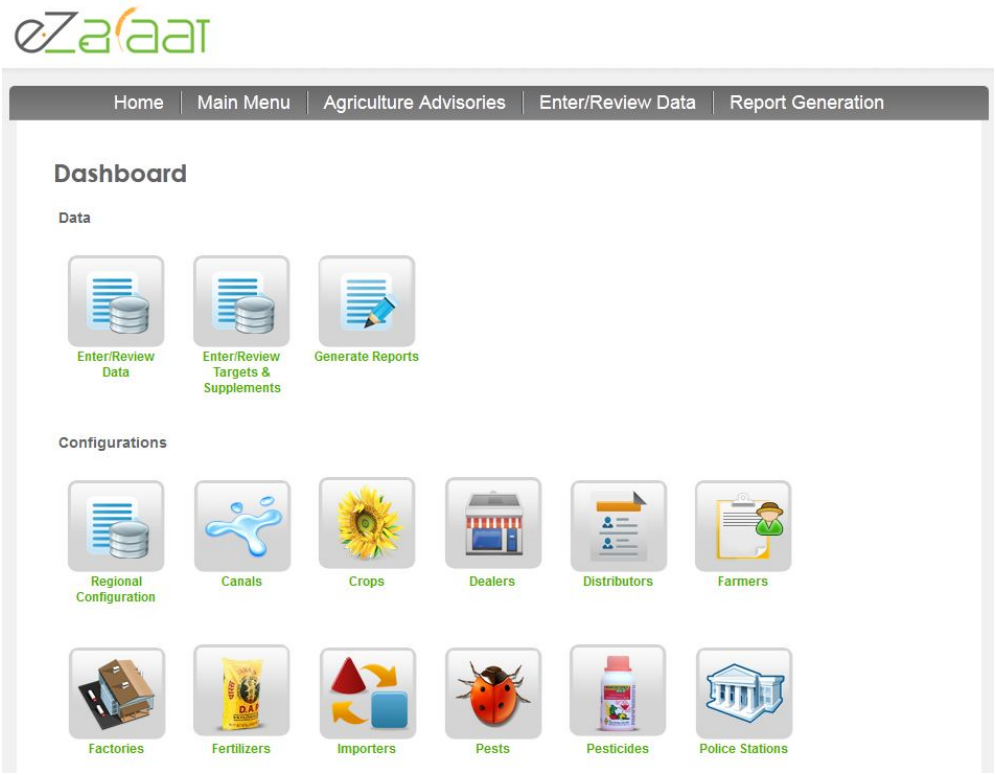

Figure 3: E-Zaraat Web Dashboard

E-Zaraat web application contains all forms that are available through the E-Zaraat mobile application and some additional forms where data is entered at provincial level. This interface has been provided so as to ensure that even if the mobile tablet malfunctions or if the officer responsible for data entry is not available (sick/on leave etc.) the data may still be entered via the web application. The web interface also ensures that E-Zaraat may be implemented in districts where mobile tablets are not yet available. For more information on features and use of the E-Zaraat web application please refer the User Guide available as Annex-B. Types of data collected via E-Zaraat web application:

Serial No.	Form Name
1.	Biological Control Card Records:
2.	Canal Status
3.	CLCV (Cotton Leaf Curl Virus) Observations
4.	Cotton Ginning Status
5.	Kitchen Gardening Kits Distribution
6.	Micronutrient Records
7.	Pesticide/Fertilizer Cases
8.	Pest Scouting
9.	Rainfall Recording
10.	Seed Grader Records
11.	Sowing Position Recording
12.	Urea Dispatch
13.	Weather Reporting

Table 1: Types of data collected via E-Zaraat web Application

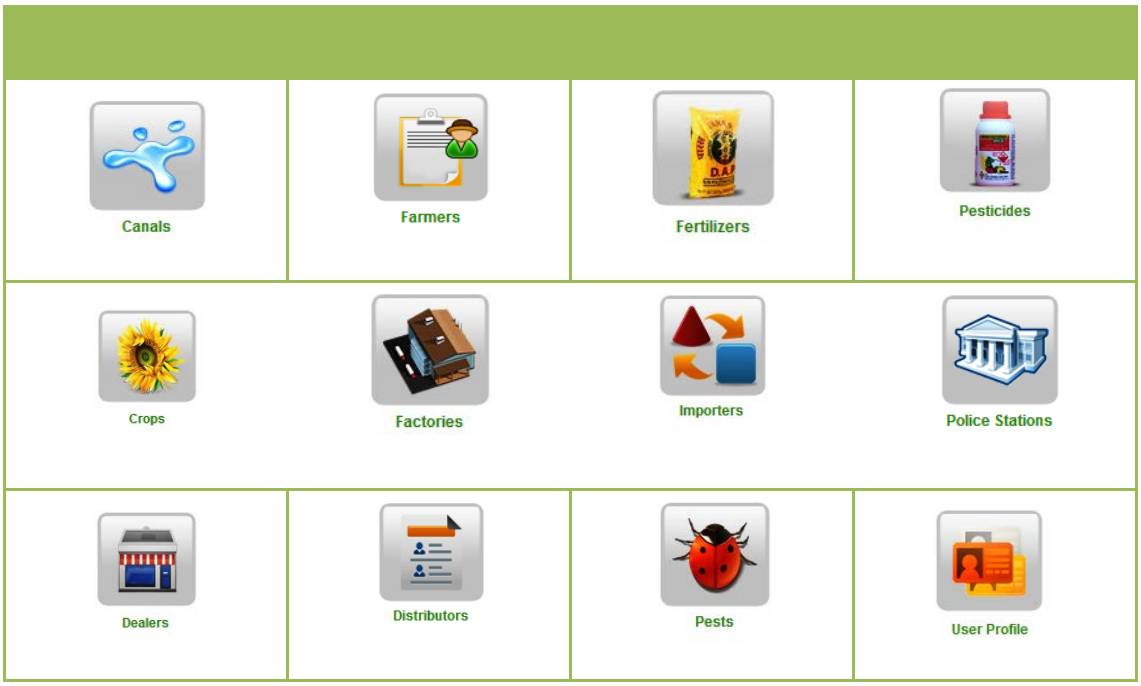

Figure 4: Type of configuration data collected and provided by E-Zaraat web application

2.1.3 E-Zaraat mobile application for use by the extension providers

The agriculture extension workers currently collect a variety of data in the field; E-Zaraat mobile application is designed to collect that information. The application was initially planned to be deployed on smart phones. However, during the business analysis phase, the data forms of the Directorate of AE&AR were reviewed. As the amount of data collected was found to be large and the forms were quite lengthy it was decided that it would be better to use mobile tablets. A variety of sizes were tested with the Extension staff and finally a tablet size of 7 inch was selected as most appropriate. The tablets were sourced through local vendors in Pakistan, with local contracts for on-going support and maintenance.

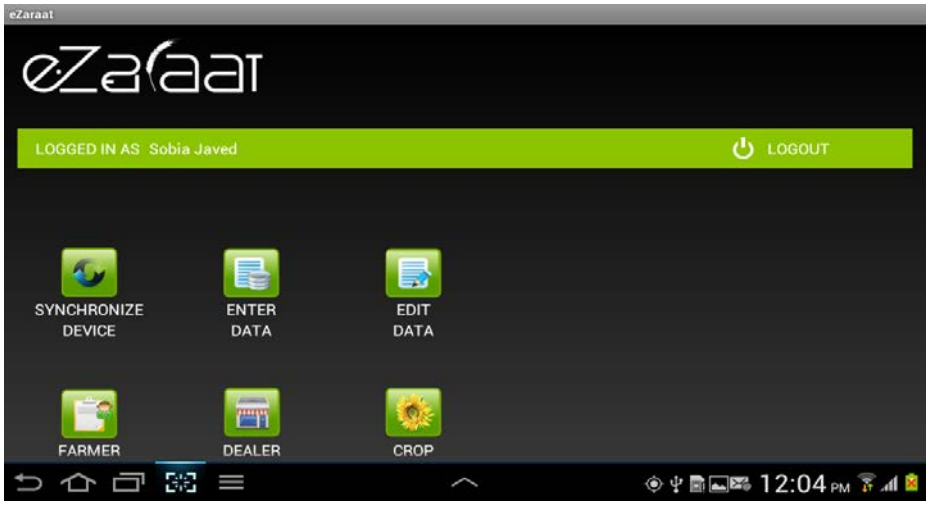

Figure 5: E-Zaraat mobile application dashboard

The mobile application provides up to date local information to the Agriculture Extension staff to facilitate their work. The E-Zaraat Mobile application is a unique mobile application that can be used both in online and offline modes as the mobile data connectivity can disappear when field workers work in remote locations. This means the field worker can enter data which is stored locally. Once s/he reaches an area where mobile or Wi-Fi connectivity is available the data can be synchronized with the main server. The Wi-Fi connectivity is available at the District office and Deputy District offices. This

single application serves two purposes: it allows collection of data from the field on prescribed forms (including time of record entry and the GPS location of the data entry person) and transmission to a central repository. These forms are pre-loaded on the mobile tablet through E-Zaraat mobile app. The type of data collected via E-Zaraat mobile application is the same as is collected via the web application as listed in Table 1.

All of the configuration data is designed to be entered centrally through the web application. Only the farmer information records can be entered both through the web application and also via mobile application. The configuration data for each location is synchronized onto the tablet of the field extension worker of that area. The field worker can then access the configuration information for their area on their tablets.

More information and graphics of the various input forms and on screen queries on the use of the mobile and web application is available in the User Guide attached as Annex-B. The Training Report attached as Annex-C provides details on the reports produced at Annex-6 of the report.

2.1.4 Kisan Dost (farmer friend) Help Line

The E-Zaraat Kisan Dost help line is based on a call centre model. The solution is based on open source software and uses Asterisk on Linux to provide the help desk functions. The Business Analysis document V2 attached as Annex-A has been expanded to include the requirement for the call centre. The call centre capabilities are discussed in section 5 of the Business Analysis document.

The users of the service call the help line where it is answered by a Call Service Agent (CSA). The help line is backed by Frequently Asked Questions (FAQs).

The workflow of the help line starts when the farmer calls. If the line is not busy the call service agent (CSA) answers the call otherwise it is put on hold.

When the CSA answers the call the farmer's basic information is collected to build a profile of the farmer. Such information is asked only from new callers. If a caller calls a second time, the CSA does not need to collect such information again, as it is already available in the system. The CSA then listens to the farmer's query.

The CSA then consults the available FAQs, which are organized by crops. The FAQs for each crop are grouped by categories like land preparation, sowing, fertilizer types and application techniques, quantities, production, harvesting, post harvesting etc.

If the answer to the farmer's query is available in the database of FAQs, then the CSA gives the answer and the query is closed. If the CSA is unable to find an answer to the query, then the call is diverted to the local extension agent of the area. Three extension officers from a district have been nominated to answer the calls. A roster has been created and each officer is 'on call' for three hours a day. The call now is a conference call where the CSA can also listen to the conversation between the Extension Officer and the farmer. If the query is resolved the CSA updates the FAQs and the query is closed.

The extension agent may ask the farmer to give him more information or may tell the farmer that he needs to actually see the problem on location. In both of these cases the CSA follows up with the extension agent and the farmer the next day to see if the query has been resolved. If it has been resolved, then the FAQs are updated and the query is closed. If the query is not resolved the problem is sent to the Adaptive Research Cell of Agriculture Extension and the CSA follows up with them for an answer. As soon as he receives an answer the farmer is informed, FAQs are updated and the query is closed.

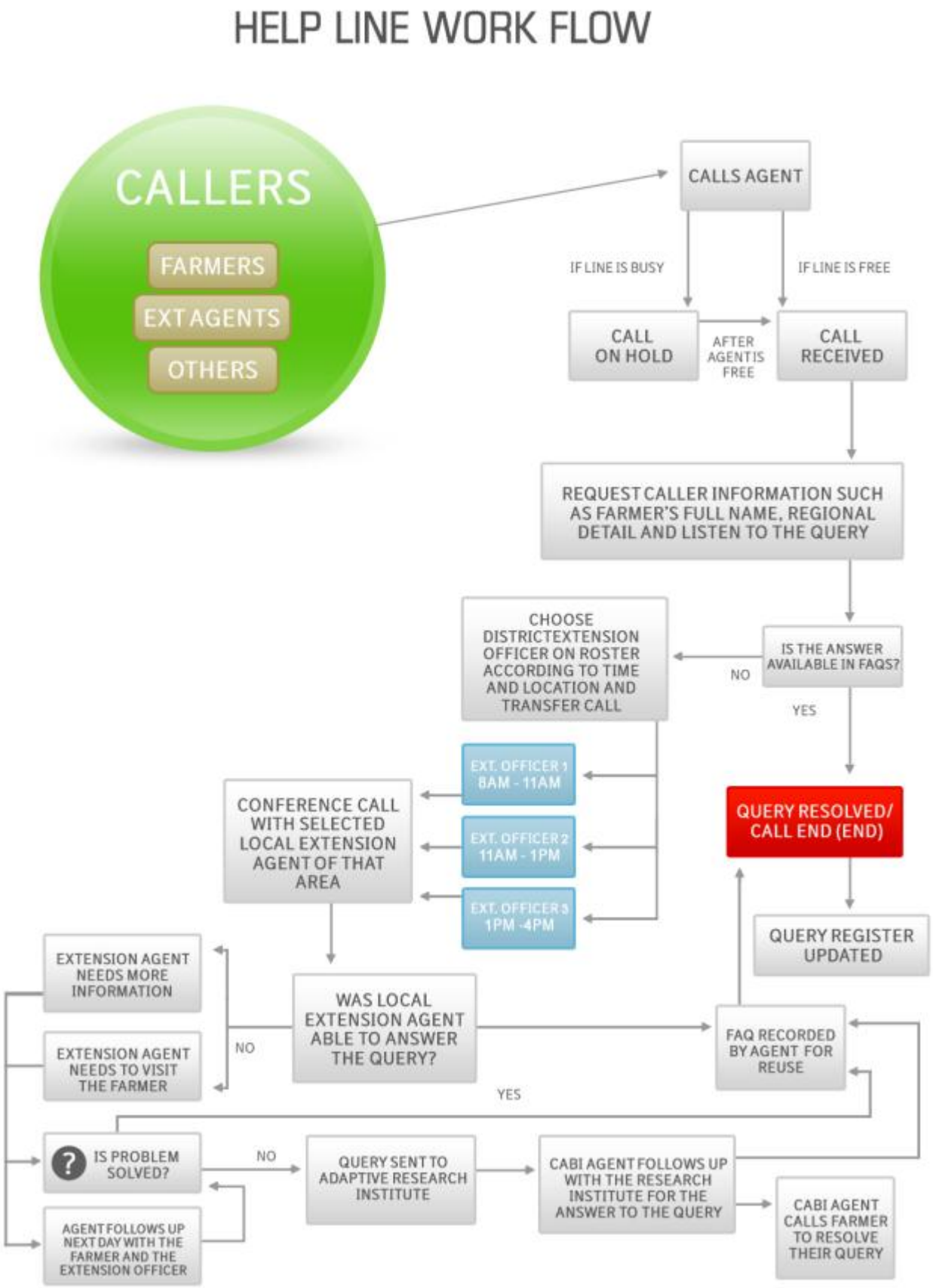

Figure 6: Workflow of E-Zaraat Helpline

The help line has received over 1200 calls up to the end of May 2013. Of these 840 are from Vehari, 250 from Sargodha and 150 from Sialkot. The help line currently is a paid for service. In the original design of the project, for the first six months the calls to the helpline and text and voice messaging were to be free in the target districts for the first six months. Mobilink Foundation, the Corporate Social Responsibility (CSR) of Mobilink a cellular service company had committed to provide free air time and free text and voice messaging in the target districts. However, due to conflicting commitments with some of their other projects they have not been able to fulfil their original commitment. Contacts have been made with other mobile companies to provide free air time to the project in future. Furthermore DG, AE & AR has committed to provide a 0800 number and official space at any district or provincial AE & AR office for the helpline.

2.1.5 Kisan Dost (farmer friend) Voice messages

E-Zaraat also runs an agro advisory voice message service for the farmers. The voice messages are in Urdu. These voice messages are provided to 1500 registered farmers. The voice messages are derived from the FAQs and also from the fortnightly agro-advisories issued by the Directorate General for AE & AR.

2.1.6 Kisan Dost (farmer friend) Text Messages

E-Zaraat also runs an agro advisory text message service for the farmers. The text messages are in Urdu. These text messages are provided to 1500 registered farmers. Like the voice messages, the text messages are derived from the FAQs and also from the fortnightly agro-advisories issued by the Directorate General for AE & AR.

2.2 Content Development

Frequently Asked Questions (FAQs) were developed for cotton, wheat, citrus and rice and were then used to support:

- Help line answers to queries
- Voice messages for farmers
- Text messages for farmers

The FAQs were developed and informed from:

- Three workshops conducted in the target districts with public and private extension workers
- The base line survey conducted in the three target districts
- Review of Agriculture Extension advisories issued by the extension department for the three target districts
- New questions asked by the farmer

Once the FAQs are developed these are further reviewed by the Adaptive Research department of the Directorate of Agriculture Extension and Adoptive Research Punjab for quality assurance and adherence to international and national guidelines on use of pesticides.

Over 530 FAQs had been developed for cotton, wheat, rice and citrus. When the farmers from the target district started calling the helpline their queries were not limited to the target crops; they asked about all of their major and minor crops. As a result over 220 FAQs on other crops such as: sugarcane, maize, onion, sunflower have been added to the FAQ list. The FAQs generated are attached as Annex-C.

450 text messages in Urdu have been prepared and are being delivered to over 1500 farmers in the three target districts.

The feedback related to the text messages has been very good in the follow-up survey. This is the service that the farmers liked best as they can store the messages in their phones for reviewing and also forward these to their fellow farmers.

The end of June target was to send 480,000 messages. However, only 192,084 have been sent since the start of the service in April 2013. The service start was delayed due to a) delay in approval of the messages and b) the Mobilink Foundation was unable to fulfil its commitment of providing free air time in the target districts. At the current rate it is expected that by the end of June 2013 over 243,000 messages will have been sent.

The recording of over 400 messages has been completed, however the target date was delayed as the quality assurance and checking took longer than expected and the service was launched in April 2013. The voice messages are being sent to farmers as per the message calendar and crop of interest. So far, 50 messages have been delivered.

2.3 Capacity Building

2.3.1 Overview of the capacity building programme

A comprehensive capacity building programme was launched for enabling the extension staff to use E-Zaraat. The training strategy involved the following key features:

- Selection of local champions: The criteria used for selection of these local champions included: Computer literacy, Regular employee of the Agriculture Extension Department, Previous experience of preparation of departmental reports, Ability to generate reports through the system
- As Vehari had been nominated as the focal district by the Department of Agriculture, the training was more intensive and frequent for this district
- Initially training was given to a batch of nominated local champions at the CABI Office in Rawalpindi
- One-day on-location training workshops were organized for the extension workers of all three target districts and for the provincial headquarters in Lahore
- The local champions were provided further technical support, via phone by CABI, which continued throughout the project. This initiative targeted the development of competence at the individual level
- The Users' Guide for E-Zaraat was revised and provided to all users of the system

The training was similar across districts and covered:

- Introduction of E-Zaraat's three components (web and mobile applications and the help line)
- Demonstration of the E-Zaraat mobile application
- Demonstration of the E-Zaraat web application
- Hands on training for the E-Zaraat mobile application. (only for Vehari)
- Hands on training for the E-Zaraat web application
- Reading and understanding the Users' Guide

The training workshops were well attended. Each workshop had the top level Agriculture Extension management represented. Therefore more training sessions were requested by the DG AE & AR and the respective districts; hence against a target of 4 training sessions, 8 training sessions (6 training sessions on E-Zaraat and 2 sessions on supervised data entry in a) field locations through tablets and b) through desktops) were conducted.

The training for the three target districts and the provincial headquarters in Lahore has been completed. The training was delayed due to the requested changes in the application. As a result the user's guide was revised.

The E-Zaraat application has generated quite a lot of interest at the provincial level. The DG AE & AR requested training for all 36 districts of Punjab with a view to launch E-Zaraat in the entire Punjab.

Hence a 2 day training workshop was held at the Provincial Headquarters of Agriculture Extension for over 100 staff representing all 36 districts of Punjab on May 21st and 22nd 2013.

The following table gives the trainees by districts and gender:

S. No.	District	Male Trainees	Female Trainees	Total
1	Vehari	36	0	36
2	Sargodha	13	0	13
3	Sialkot	18	1	19
4	Lahore	8	0	8
5	All 36 districts and trainees from Office of DG AE & AR Lahore	96 10	6 1	102 11

Table 2: Workshop trainees by district and gender

A revised user guide of the application has been developed and is attached as Annex-B. At the end of each training workshop a user satisfaction survey was conducted. The results of the survey and the survey form are presented in the training report attached as Annex-D. Overall more than 80% of the trainees rated themselves as 'confident' or as 'very confident' in using the training material.

3. Follow-on Survey

3.1 Purpose of the follow-on Survey

Vehari was nominated as the focal district by the Department of Agriculture, and the pilot project for E-Zaraat was commissioned in the context of growing recognition for equipping the farmers with timely, efficient, cost effective and workable information. The traditional delivery of extension services suffers from inherent problems of too few extension officers reaching only a small proportion of farmers with resultant high cost per unit. However, it would be premature to draw a cost comparison of the systems at this stage as E-Zaraat started operations only three months ago. Such an exercise should be carried out after running of the system for at least three years.

The pilot E-Zaraat service was commissioned first at Vehari in March 2013. The initial plan was to pilot it with 5 to 6 tablets per district. However with the Department of Agriculture's request to fully deploy the project in Vehari, all tablets were diverted to this district, with a total of 25 tablets deployed in Vehari district and 2 tablets in the DG, AE&AR's office in Lahore. The project's web application and helpline were launched in the other target districts in March 2013 and SMS and Voice messages started in April 2013.

The Follow-on Survey was designed and conducted with the following key objectives:

- To assess the effectiveness of the interventions from the perspective of the key stakeholders (including extension workers/staff and farmers)
- To identify issues with the implementation of E-Zaraat
- To suggest modifications in the design of the project for better effectiveness
- To review mechanisms for scaling up this model to other districts of Punjab

3.2 Survey Design

The project team designed and carried out the survey. Ten farmers randomly selected from the list of help line callers were interviewed. No woman was found amongst the help line caller group. Hence, it was not easy to find any direct female beneficiary of the project. However, the project team did locate one woman farmer during their field visit: her interview was carried out.

The survey exercise employed the qualitative methods described below:

- Face to face interviews with selected farmers. Each interview lasted for a period of about half an hour
- Key Informant interviews (KII) with Director General, Agriculture, EDO and DO of the project. Each KII took, one hour on an average
- Focus Group Discussions with the extension staff directly involved in delivering the project. Sampling was not done for the FGDs with the extension staff. Rather, all officers including the AOs and DDOs were included in the exercise. FGD lasted for duration of about two hours

In addition, the database of callers was used to analyze the trends of calls. So far 661 callers have called the helpline – some have made single calls and some have made multiple calls.

3.3 Interviews with key stakeholders

Data was collected from four key stakeholders of the project:

1. Farmers
2. Director General, AE & AR-Punjab
3. EDO-Vehari and DOA-Vehari
4. DDO-A and Agricultural Officers

3.3.1 Farmers

The interviews consisted of in-depth face to face interviews with 10 farmers who had used the services of E-Zaraat. A semi-structured approach was used involving a loosely structured set of questions to ensure comparability across interviews while allowing room for deeper probing wherever required. The main purpose of this exercise was to understand what the expectations of beneficiaries (i.e. the farmers) are, and how they perceive the use and usefulness of E-Zaraat.

3.3.2 DG AE & AR Punjab

A one hour long face to face key informant interview (KII) of the DG AE&AR- Punjab was carried out. The purpose of the interview was to obtain the views of the top Agriculture Extension managers about the usefulness and effectiveness of the system, and to gain knowledge of the future plans of the DG AE and AR, to improve the efficiency and effectiveness of the extension services.

3.3.3 EDO-Vehari and DOA-Vehari

Similarly, key informant interviews were carried out with the EDO and DO for one of the pilot districts(i.e. Vehari) to assess the level of their efficacy in relation to the operation of the system, understanding how they are using it, and identifying issues they are facing in its use. These interviews were conducted using thematic guidelines to extract the required information

3.3.4 Deputy District Officers-Agriculture and Agricultural Officers

Focus Group discussions were conducted with three Deputy District Officers- Agriculture (DDO-As) and 23 Agricultural Officers (AOs). The AO is the most important tier in the organizational hierarchy (of the Extension Department) for this particular project. They act as the link, on the one hand engaged in coordinating all the activities carried out by the Field Assistants and getting the feedback and data from them, and on the other hand, being responsible for uploading and feeding in all this information using the mobile tablets. This information is then shared at the highest level in the Extension Department. Hence, their views on the use and effectiveness of the system are of critical importance.

3.4 Benefits of E-Zaraat identified by the participants

Perceived benefits of E-Zaraat include the acceptance of change. The respondents from the category of extension workers identified several benefits of E-Zaraat (which included capacity building of the staff, improvement in the reporting system, preservation of records, retrieval of data, quick and easy access to extension material, and capacity building of materials), indicating that the degree of acceptance of change is on the higher side. The benefits identified by them are discussed below:

3.4.1 Capacity building of staff

Enhancement of the competence of the extension staff, and their exposure to the e-environment, were highlighted by the participants of the FGDs as major benefits of the E-Zaraat project. The District Officer-Agriculture, Vehari also endorsed this view. See his statement in the Box.

> *"The project has enhanced the capacity of the staff of the extension department, which is helping the department in improving its performance"*

Figure 7: Comments on 'Capacity Building' - District Officer-Agriculture-Vehari

3.4.2 Effectiveness of Training

All of the beneficiaries of training rated its effectiveness as high. Quote *"Training was effective. I am very much satisfied. We did not let anyone leave the training room until he had demonstrated the ability to enter data successfully in the system by using the tablets"* DOA- Vehari. Quote "The only area in which they are less proficient is report generation". DOA Vehari. All AOs expressed satisfaction with the quality of training they received.

3.4.3 Use of mobile tablets by extension officers

Effectiveness of E-Zaraat depends upon the ability of the field staff to use the tablets. Through FGDs and interviews, it was revealed that about 20 officers are using the system satisfactorily and with confidence, while three are doing it with less confidence. About 70% of extension officers are in the age bracket of 35-45 who are well-versed with computers and E-Zaraat, the remaining 30% are over 45, and not all of them are proficient

> *"Initially, we faced difficulties in using the system. However, hesitation fizzled out with the passage of time… More training and more usage has helped us to overcome difficulties. Lots of support was available from CABI which made it easy to learn new skills."*
>
> *Focus Group discussion with AOs in*

Figure 8: Use of E-Zaraat applications: Views from the FGD with AOs

3.4.4 Use of computers by extension officers

Usage of the tablets is linked with proficiency of the extension officers in using computers. Computers were provided to DDO offices in 2005. However, not all officers developed competence to use the computers. The DO added *"Those who graduated in the more recent past, are all computer literate, as computer courses are now part of the graduate degree requirements".* He further added, "*At the moment, the ratio of such officers is almost 50%.*"

During focus group discussions it was revealed that more than half of the AOs were not computer literate prior to the commencement of the project. In view of this, they were given extensive training to enable them to operate the system.

Development of capacity was not easy as the field officers took time to develop a good working knowledge of the systems and services. They were provided with thorough and follow up training and on-the-job technical support.

The data in the current database is growing and is structured in the following datasets:

Data Sets	Number of records
Canals	4
Canal Minors	130
Dealers	551
Distributors	383
Factories	137
Farmers	24,313
Fertilizers	1,665
Importers	70
Insects	13
Pesticides	886
Police stations	31

Table 3: Data Sets

Transactional data i.e. records that are entered multiple times e.g. rainfall, sowing position are also being entered on a daily/weekly basis.

3.5 Reporting system

The participants of the FGD believed that E-Zaraat was creating a positive impact on the quality and efficiency of the reporting system. DO Vehari said, "*Reporting system has improved. Reports preparation is taking less time."* However, through discussions with respondents including the DO, it was found that the reporting system comprises three stages i.e. reporting from field staff to AO, from AO to DDO and from DDO to above. According to the respondents, E-Zaraat has resulted in improved reporting at the second stage only, as stated below:

- **Field staff to AO:** Usually, it takes 4-16 days. Timeliness will not improve, unless data entry facility is made available to FAs
- **AO to DDO:** Before E-Zaraat, it usually took three days, now it does not take any time. Hence, the project will add value at this point.
- **DDO and Above:** The MS-Excel based reports were already communicated through emails. However, through E-Zaraat, only the data review (no data entry is done at this stage) is required at this stage as the reports are generated automatically.

One of the AOs/CIs (Jehangir, 2013) said:

> *"Canal status report is prepared by AO periodically. A FA visits the canal (may have to cover a distance of many miles), then comes back, prepares a report and sends it to the AO. Then the AO can compile a report based on several reports from FAs and send it to the DO or anyone else. After the introduction of E-Zaraat, the situation is going to be different. The AO will take the tablet, visit the canal, and send the report on the spot to all concerned. AOs and FAs used to take a long time in reporting. Now the time required for reporting has drastically reduced".*

3.5.1 Preservation of record and retrieval of Data

The preservation of the records was a critical challenge for the field offices as well as the central office of extension department. Data includes:

- Periodic / regular activities reports – farmers gatherings, workshop, meetings, and so on

- Status of the crops, spread of diseases
- Reports on field demonstration plots for the farmers
- Feedback of the farmers on various issues
- Surveys on current issues
- Crop reporting – assessments etc.
- Field advisories from the Provincial Headquarters

Conventionally, data is stored at four levels. Markaz (Center) level data is stored with the AOs, Tehsil level data is kept in DDO-A offices and district level is at the DO-A offices while province level aggregated data is managed in DG Office.

Now with the introduction of E-Zaraat and availability of tablets up to the level of AOs, it has become easy to preserve the record and retrieve data. Taking stock of such benefits, one of the AOs/CIs (Jehangir, 2013) said:

> *"Data of previous periods is available in the system and we can get access to data any time. Earlier we had to take out old files from the dusty cabinets and compile data which used to consume a long time and the task was a bit frustrating too. However, now it is a matter of a few seconds. I can access the data any time and from any place. I don't need to be in the office for getting the data."*

A series of feedback from AOs and CIs show their views of the benefits of the system:

> *"If we have taken a sample of adulterated pesticide from the sale point of any dealer and we want to know about the history of the dealer and the pesticide company concerned, or about their involvement in such cases in the past, at the moment, we didn't have any way of getting access to such information. However, now we can get a history (including court cases, decisions etc…) of that dealer and company in no time."*

> *"With the passage of time, the database will keep growing. After a few years, we will have a very powerful database of advisors, farmers, input processes, dealers, pests, diseases, yield, production, trends… and so on…"*

> *"Advisory material is available on the system. We can access and use it. We can keep ourselves updated". He added, "If we are finding some problem for which we don't have expertise, we can refer it to the helpline. Experts will provide appropriate advice. I did not know about Cotton Dusky Bug, I got details about it from the helpline."*

They also believed that extension workers (from AO to above) now have quick and easy access to advisories and other extension material available on the E-Zaraat web application and also on the mobile application on the tablets.

3.6 Helpline

3.6.1 Use of the system

The responding farmers overall expressed their satisfaction with the usefulness of the helpline. They stated that if this service remains available, they would be able to get technical advice from the Extension Department on a timely basis, which would enable them to improve their earnings.

"E-Zaraat has improved outreach of the farmers. With the helpline more farmers can get the advisory services".

A farmer stated that awareness regarding the helpline among the farmers is increasing. It is expected that the number of beneficiaries will keep growing. The project is building the capacity of the farmers in using non-conventional ways for seeking expert knowledge.

Sultan Mahmood is a resident of 159 WB, Vehari. He possesses 31 acres of farm land in tehsil Vehari. In his last cotton crop, per acre yield was 44 maunds (1760 kg) for the Bt variety and 20 maunds (800 kg) for the non-Bt cotton variety).

He read, many times, about the helpline painted on a roadside burji but never paid any attention to it. He says, "I was worried about the attack of weeds in my cotton fields. I consulted an official of the Extension Department and acted upon his advice. However, the issue did not resolve. A couple of days later, I noticed in my neighbour's farm that there were no significant attacks of weeds. When I contacted the farmer, he told me that he got advice from the helpline. So, I also contacted the helpline and got help. I implemented their advice and it worked.

Now I am convinced that any advice sought from the helpline is more effective. During the last two months, I have contacted the helpline and sought help related to the production of cotton, mango and jambolan (Syzygiumcumini)".

Referring to problems he said, "*Helpline is very expensive (it costs upto PKR 7/ minute), which is a major barrier for farmers to use it. Farmers, especially small ones, are very reluctant to take benefit from it. Another issue is the waiting time, which sometimes prolongs to such an extent that the caller decides to abort the call".*

Figure 9: Experience of Sultan Mahmood a farmer from 159-WB Vehari

Imtiaz Hussain is a small farmer and hails from TibaSultanpur, a small town of District Vehari. He says,"*I got information about the helpline through a Field Assistant of Agriculture Extension."*

Regarding the effectiveness of the helpline, he said, "*Helpline is very useful facility for the farmers. Instead of visiting the office of Agriculture Extension, you can directly call the helpline on the spot. I have found it very helpful. I got advice related to the use of fertilizer (especially phosphorus) and control of whitefly pest. I have recommended two fellow farmers to take benefit of the helpline*."

He is of the view that farmers are not much aware of this facility. He suggests that a strong awareness campaign should be launched by using newspapers, radio and TV.

While referring to the difficulties in the use of the helpline, he said, "*I have mostly faced difficulty in getting contacted with the helpline. Secondly, it is costly".*

Figure 10: Help line: Experience of Imtiaz Hussain, a farmer from Tibba Sultan Pur

The help line received over 1200 calls to the end of May 2013 since March 2013. Of these, 840 are from Vehari, 250 from Sargodha and 150 from Sialkot (Figure 7). The help desk is currently a paid for service. In the original design of the project, for the first six months the call to the help desk was supposed to be free. Mobilink Foundation a cellular service company had committed to provide free air time and free text and voice messaging in the target districts. However, due to some of their other projects and conflicting engagements they have not been able to fulfil their commitment. Contacts have been made with other mobile companies to provide free air time to the project. As such there is no cost charged from the farmers for the helpline. However, they have to incur cost of their calls.

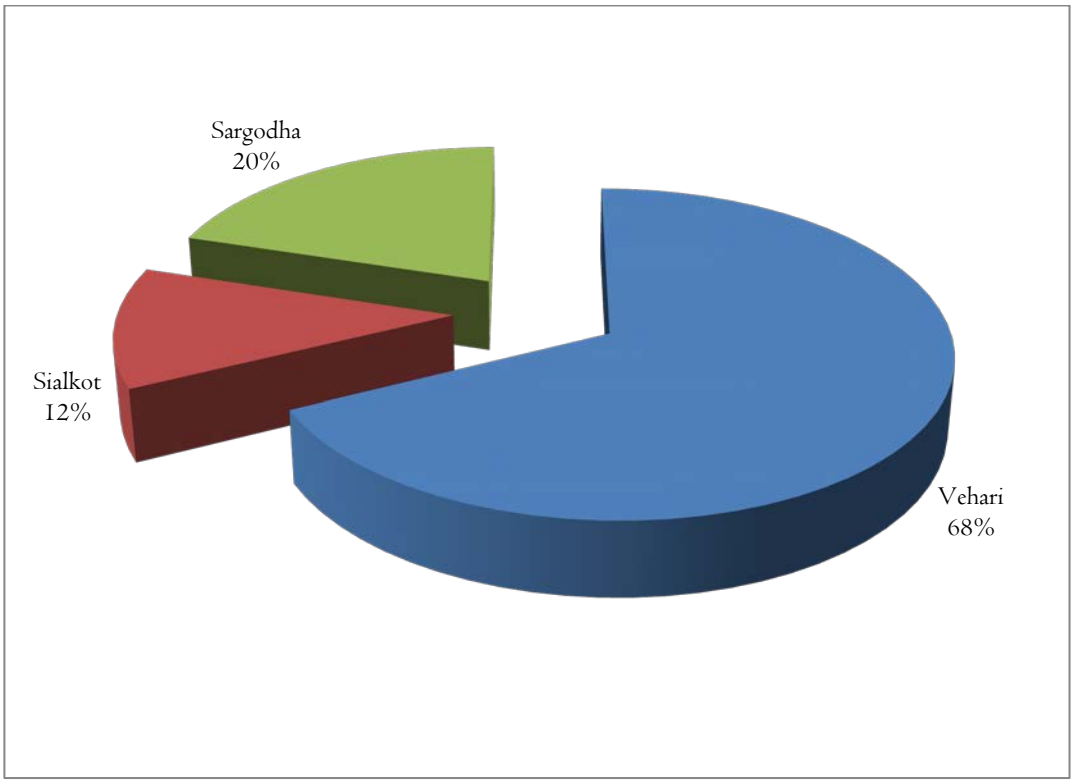

Figure 11: Distribution of calls by district (n+1200)

3.6.2 Situation in district Vehar

The tehsil Vehari accounts for 76% of all calls to the helpline, emerging as the tehsil with the largest number of beneficiaries of the helpline (Figure 8). The number of calls to the helpline grew by 138 per cent in April. However, the number of calls received by the helpline declined in May (Figure 9). The decline is perhaps attributed to the completion of the sowing of the cotton crop. It is expected that usage of the helpline will increase from June onward, as farmers would be in need of exploring options for fighting pest attacks on the cotton crop.

In total, 661 farmers from District Vehari called the helpline during March-May 2013. Most of the farmers (84%) called the helpline once, with around 16% of all callers making more than one call to the helpline (Figure 12). One per cent of farmers called the helpline six or more than six times. When a farmer calls more than once, it means that he/she has found the facility useful. Hence, presence of multiple calls made by the farmers to the helpline indicates that the perceived usefulness is increasing. Statistics show that many farmers are finding the facility useful and effective.

The project's focus was to provide help on 4 target crops: cotton, wheat, rice and citrus. The helpline users however asked questions about all the crops they planted. As the workflow of the helpline was designed in a way where new queries could also be catered to, these new queries resulted in the generation of 220 new FAQs. Figure 11 shows the distribution of calls by the crop. In Vehari District, farmers sought help from the helpline for more than twenty farming lines (including major crops – wheat, cotton, sugarcane, maize, rice; minor crops – pulses, jawar; fruits; vegetables etc.).

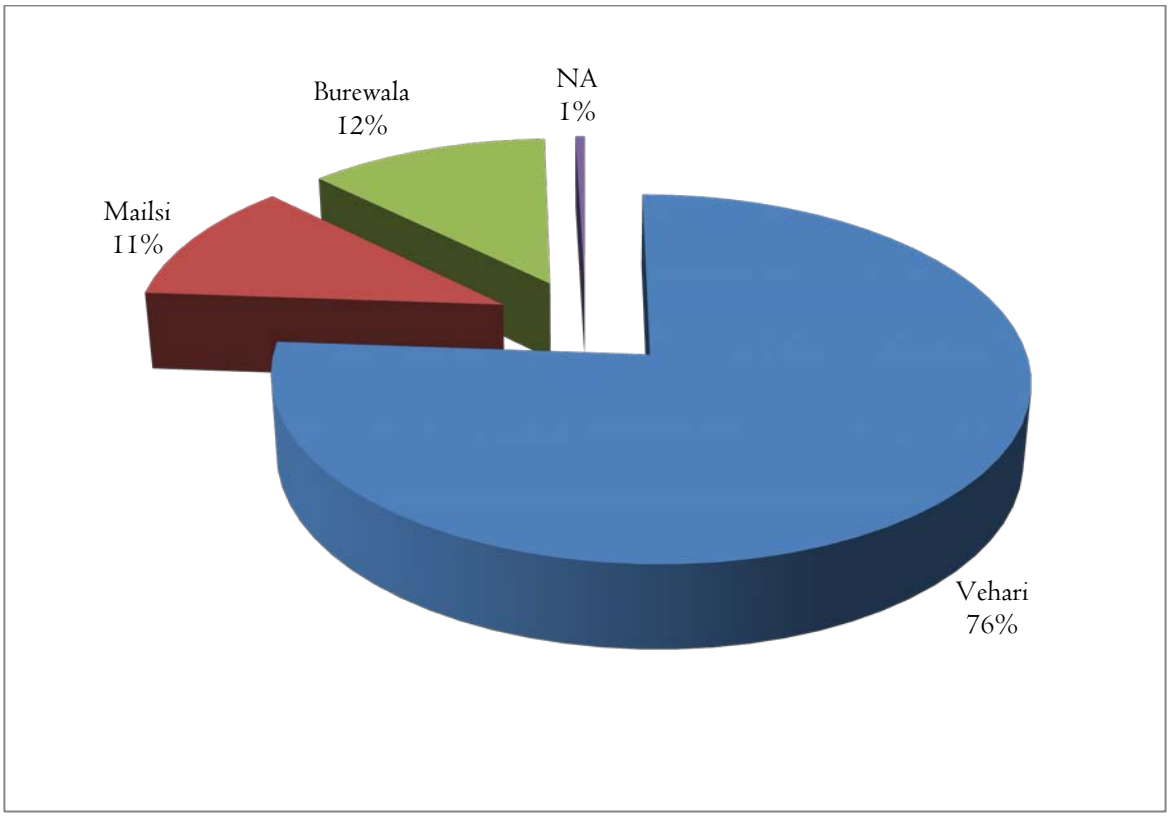

Figure 12: Tehsil usage of helpline

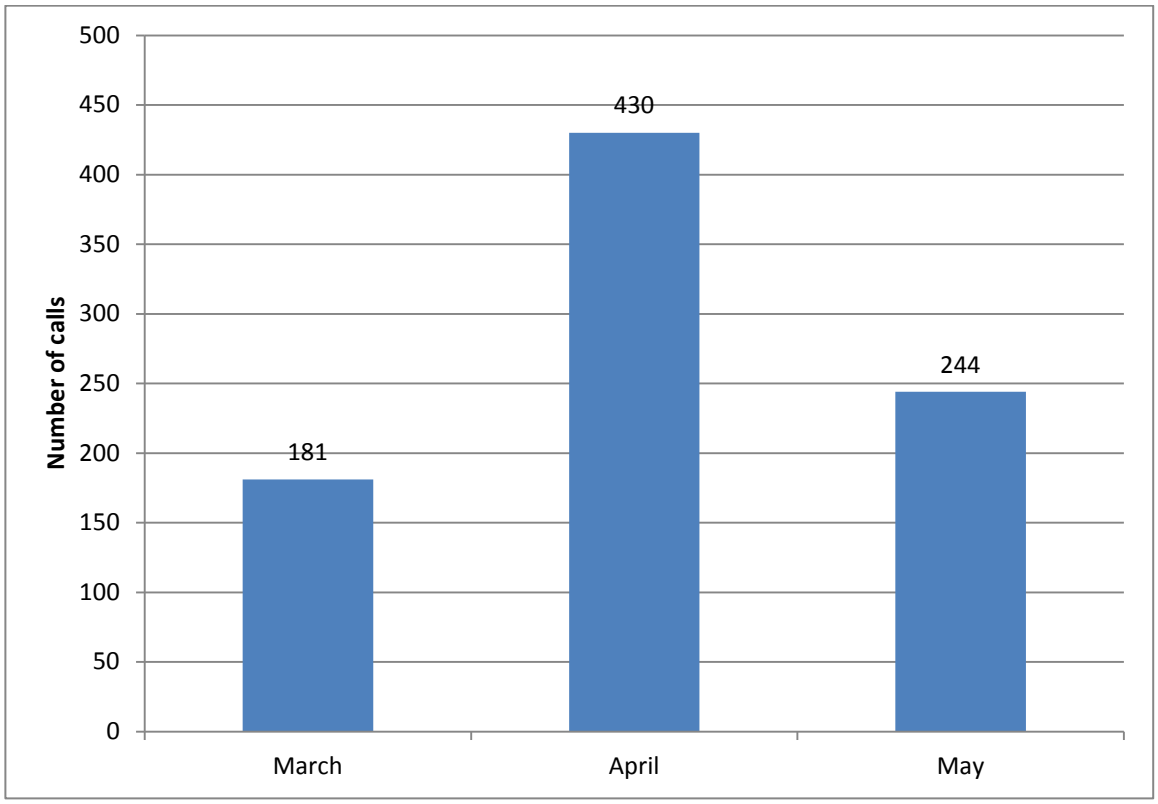

Figure 13: Monthly usage of helpline

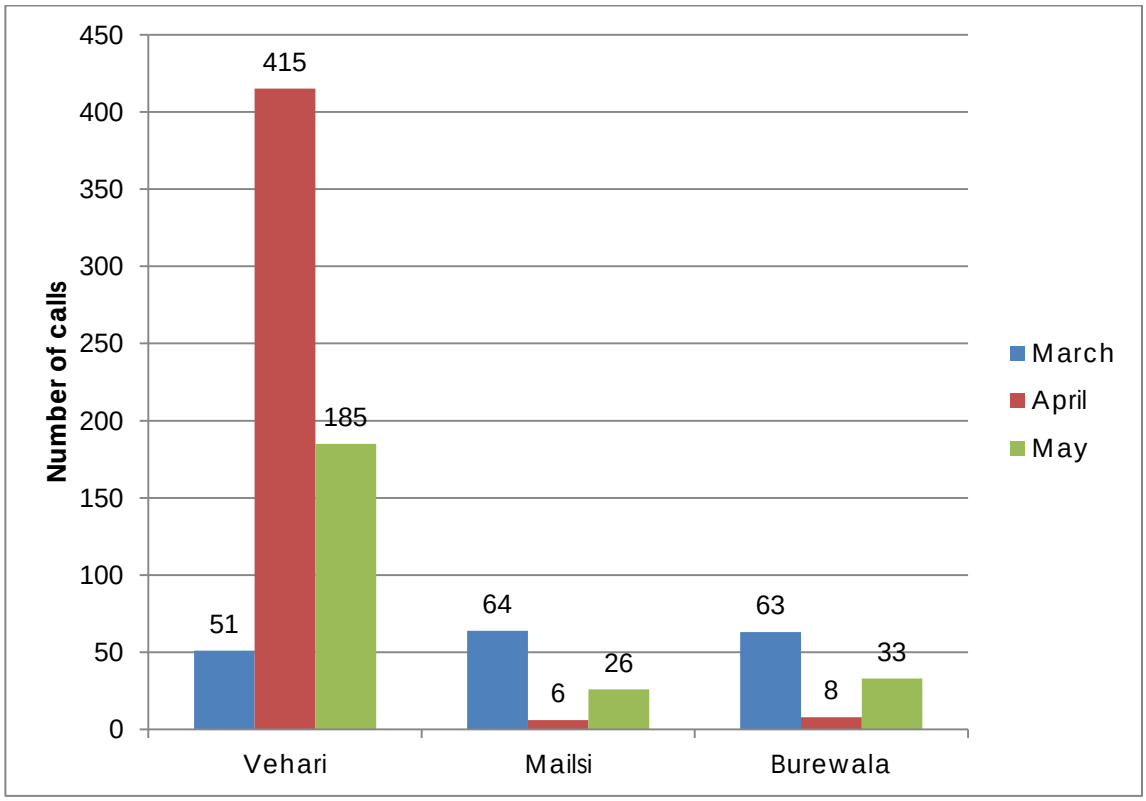

Figure 14: Tehsil and Month-wise usage of helpline

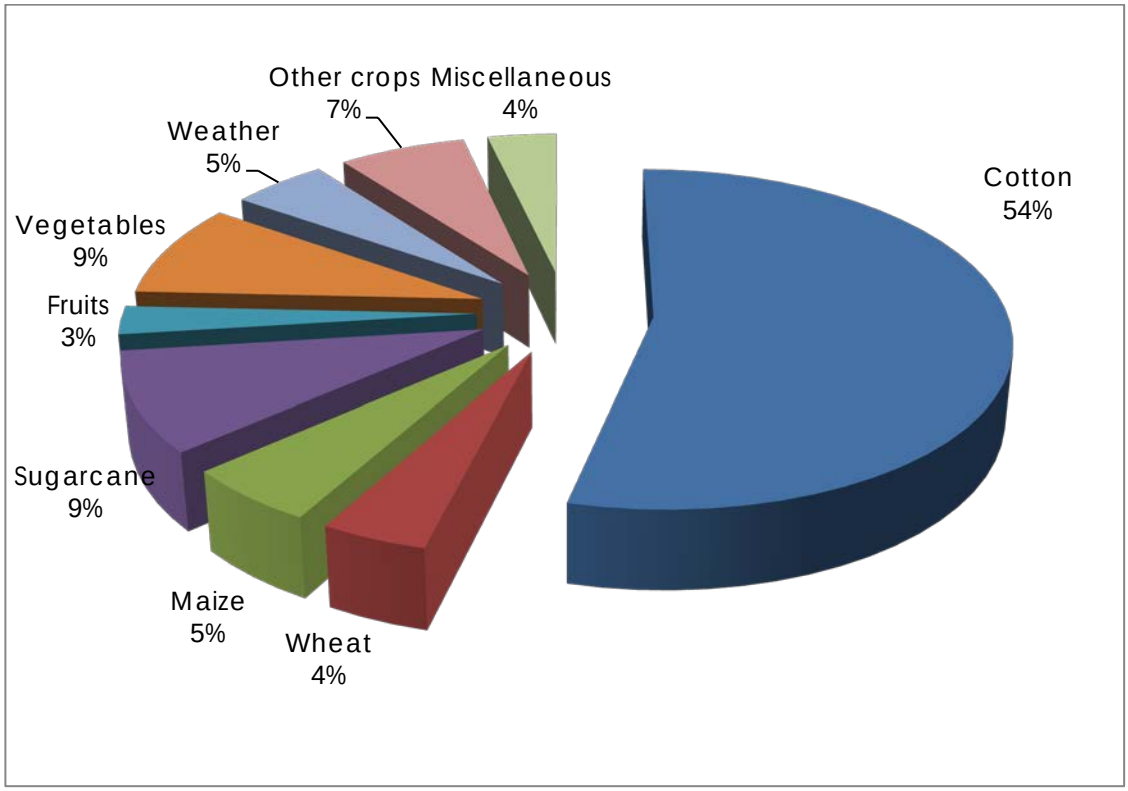

Figure 15: Crop distribution of calls

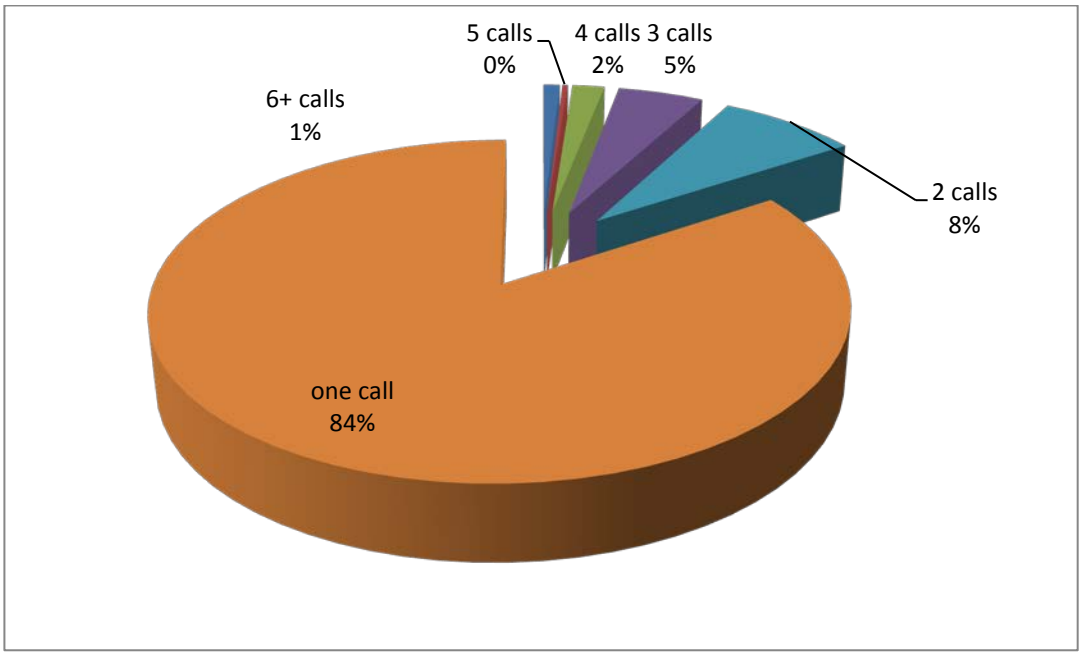

Figure 16: Number of calls per person

3.7 Text Messages

About 450 text messages have been developed for each of the four selected farming lines i.e. cotton, wheat, rice and citrus. All messages have been developed in the Urdu language so that everyone can easily understand. These messages contain the recommendations of the experts for various stages of the selected crops. So far 130 advisory messages have been transmitted to 1503 farmers in District Vehari (as of 12 June 2013) against the target of 1200 farmers by 30th June 2013. Hence, the number of beneficiaries has exceeded the target. This achievement has been made despite the fact that the service provider Mobilink was unable to fulfil its commitment to this project by providing free messages to the farmers. Eventually, the project had to divert funds from its budget for this task by paying another mobile operator for sending the messages.

Delivery of text messages to a large number of farmers was the most dynamic feature of E-Zaraat. Both categories of respondents (i.e. farmers and extension workers) rated usefulness of text messages very high. The farmers also mentioned that text messages are saved in their cell phone so they can refer back to these whenever required. Moreover, they can also forward these to their fellow farmers who are still not in the database.

None of the respondents from any category gave any negative feedback related with text messages.
In order to improve the effectiveness of the text messages, the extension workers gave the following suggestions:

- Messages should be more responsive to the localized / regional (up to AO level) needs of the farmers, especially the weather updates. Weather information comes from Metrological Department. However, localized information is not available. Usually, weather information is available for a district; sometimes such information may not be valid for all tehsils equally. Hence, utility of such information diminishes. This issue cannot be sorted easily. However, the issue needs to be taken up by the DG Extension with the Metrological Department for assessment of its feasibility
- AOs mentioned that they get a lot of calls for weather updates. They suggested that they should be given access to such a database so that they can provide readily available information on the weather forecasts to the farmers on a request basis

3.8 Voice Messages

Voice messaging is the third component of the E-Zaraat project. The service has been recently launched. The pace of implementation for this component has been deliberately slowed down so that farmers don't feel overloaded with information and eventually lose interest. About 50 voice messages have so far been sent to over 1500 farmers.

3.9 Text vs Voice Messages

There was a clear indication of a preference for text messages as opposed to voice messages. They were all of the opinion that despite a popular belief about low literacy levels in farming communities, the next generation is more academically advanced. Therefore, even the farmers who cannot comprehend the messages, have people around them who can read the messages (FGD, 2013).

The advantage of text messages was stated to be its ease of storage. Thus, the farmers can read it as and when convenient and needed. The case of voice messages is different as these cannot be stored on the farmer cell phones and the farmer is able to listen to it only once.

Similarly, another drawback of the voice messages identified by the respondents of the study was potential distortions in communication due to noise, low volume, difference in dialect etc.

The recommendation in this regard was that whenever a voice message is to be sent, it should be followed by transmission of the same message in text form.

3.10 Web Application

The web application provides systems for data entry (nature of data is already explained in previous sections), data review and report generation (nature of reports is already explained in previous sections). The evaluation of this feature yielded positive comments from most of the targeted stakeholders, the extension workers. The DG extension and EDO Vehari were very excited with this development. DG was of the view that this kind of organized effort can substantially bring down the cost of reaching the farmers. EDO Vehari, mentioned that when E-Zaraat is fully operational, it would be able to cut down their cost by 40% and would enable them to finance more development projects and enhance their service base for the farmers. It is very difficult to work out the cost of reaching one farmer. The project team is working on ways to deal with this limitation.

The information uploaded on this web page is centralized and standardized to work as a point of reference for all extension workers. They have been provided access to real time information which enables them to take timely decisions.

Data is critical to the success of planning and execution, therefore, a reliable set of data would support a steadfast planning mechanism.

Another positive feature of this system is monitoring and evaluation of the extension activities. This would make each individual extension staff accountable for his activities and therefore would improve the overall efficiency of the department.

Farmers were not aware of the web page; therefore, they could not evaluate this feature. However, they were told about this facility and some of them were excited about the availability of this service.

3.11 Awareness campaign

A multipronged strategy was employed the Agriculture Extension Department for creating awareness regarding E-Zaraat (helpline) among the farmers, which included sending messages through mobile phones, displaying messages on the roadside burjies, announcements through mosques' loudspeakers, farmers' training programmes and corner meetings of farmers:

- **Burjis (towers)**: A burji is 4x2ft mud/bricks made structure erected on roadsides carrying messages from the extension department for the farmers. After every two km there is one burji, on which messages have been put for creating awareness. There are 200 burjis in the district
- **Village mosques:** Messages were announced through 777 village mosques in the district twice a week
- **Farmer training programmes (25+ farmers):** 100 meetings / week, totally about 10,000 farmers in a month
- **Corner meetings (15-20 farmers):** 500 villages, totalling 7500 to 10,000 farmers in a month

According to DOA-Vehari, so far the message has reached 10% of the farmers in Vehari.

4. Impact of education and literacy on the use system

Literacy is low among farmers, although men are more literate than women. In Punjab, female literacy rate is mere 51% as compared to male literacy rate i.e. 70% (Government of Pakistan, 2013). Low literacy among the farmers impacts the use of system in different ways:

- It has been observed that low literate farmers use local dialects in asking questions, sometimes, it is difficult for the callers to understand the essence of their questions. Similarly, they also may face difficulty in understanding the answers given in different dialects of Punjabi language. On the other hand, more literate farmers can ask questions in Urdu and can understand answers very well
- Text messages are communicated in Urdu language. In every family, the younger generation is usually more literate. Hence, the farmers informed that they get help from their sons or daughters in reading and understanding the advisory messages

5. Women's Perspective

Women account for more than half of the population of the country. However, they are suffering from a variety of problems, many attributed to a lack of empowerment. Figure 13 shows the status of women's empowerment in Pakistan (Government of Pakistan, 2012). It reveals that 0.1% of women are employers and about two thirds of women are unpaid family helpers, whose contributions are rarely recognized.

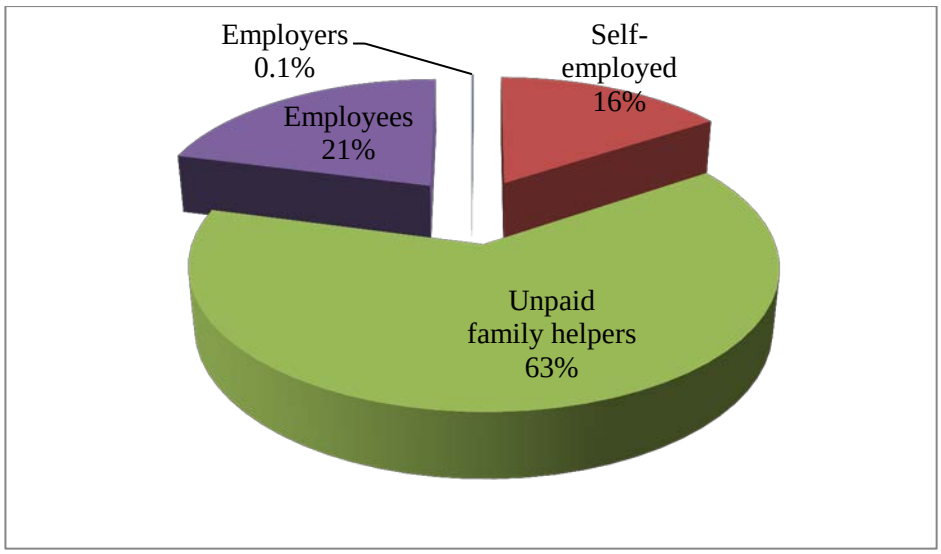

Figure 17: Employment status of women in 2010-11

Source: Economic Survey of Pakistan

5.1 Women in agriculture extension:

There are very few women in the agriculture extension department. In district Vehari, no women participated in any training. However, there were seven female participants in the all district training and there was one female participant in the training conducted at Sialkot district.

5.2 Women in farming community

Women in rural areas of Pakistan perform a variety of roles: they act as farm labourers, entrepreneurs, and care-givers besides their social roles as a mother, wife and daughter. Women are the backbone of the agrarian economy yet they are denied equal opportunities in terms of land ownership, credit facilities, access to agricultural advisory services and training and so on. It has long been established through various studies that investing in rural women can significantly increase productivity and improve their livelihood (HerProject, 2010); nevertheless less attention is paid to it.

The gender roles are so deeply entrenched in the society that women accounting for 70% of the farm labour are still not acknowledged as the dominant land owners and lead farmers (Begum & Yasmeen, 2011).

Women perform a variety of tasks related to agriculture as well as livestock. However it is difficult to find women prepared to participate in leading roles in farm related business decisions, especially with external projects. This is evident from the call log of the helpline, which shows that not a single woman called the helpline to seek any guidance in farming. There is a need to encourage women farmers to take benefit from the services being provided through E-Zaraat.

Women need to be mainstreamed into the project. The project team needs to work with extension staff in drawing up a list of women farmers in the area and interact with them for communicating concept and benefits of the project. Women only focus group discussions and training would be attempted in the future.

6. Issues and Suggestions

The main challenges identified during the survey are discussed below:

Table 4: Issues and Suggestions

Issue	Who identified it?	Comments or actions taken	Suggestions
Accessibility: The helpline is often found engaged, so callers have to make several attempts to get connected	Farmers	At the time of follow-on survey, there was one telephone line and two operators dedicated for the helpdesk. However, based on the findings of the follow-on survey, the number of telephone lines has been increased to three and number of helpline operators increased to two.	There is need for monitoring the traffic of calls and anticipating the workload.
Non-availability of helpline facility after office hours (08.00 to 16.00) and on public holidays	Farmers / Extension Staff	This indicates that demand for the helpline is high (Farmers, Extension Staff)	Helpline opening times extended to 0900 to 1900. Operating times of the helpline should be widely publicized
Callers incur high calling charges and may be considered too expensive for the small farmers. Call charges may reach Rs. 20/call (GBP 0.13/call), discouraging farmers to call the helpline again.	Farmers / Extension Staff	When calls are received at the helpdesk, they are diverted to relevant experts where the calls are sometimes not picked up and the waiting time increases. [1]	Measures should be identified to reduce the cost of calls. Such reducing waiting time and calling the farmer back when relevant expert is available.
Language barrier: Sometimes, some callers face difficulty in understanding the message. Helpline operators also report that sometimes, it becomes hard for them to grasp the message of some farmers.	Farmers / Extension Staff / Call centre	In most of its western parts of Vehari, Siraiki is spoken. However there are so many regional dialects of Urdu, Punjabi and Siraiki languages that it is hard for the call service agent to communicate well with all the farmers.	There is need for some basic training of call operators in different dialects of Punjab and Siraiki languages. Alternatively, a solution could be to locate the help line operators in the local areas.
Awareness campaigns among farmers: So far the awareness campaign has targeted only 10% of the farmers. Is there a reason for that?	DO(Vehari)	It is not easy to get access to farmers living in far flung areas	Print and other forms of media (like radio, TV) should be used for creating awareness among the farming community.

[1] Provision of free calls carries risks. A recent study conducted in Uganda (Hellstrom, 2010) shows that when free the service had over 2 million queries when it was free, but usage dropped substantially when charges were brought in. Hence, it would be more viable to keep price pegged.

Issue	Who identified it?	Comments or actions taken	Suggestions
Capability to use E-Zaraat: Some of the Extension Officers are still struggling to develop capability to use the E-Zaraat. The respondents identified a lack of computer literacy as one of the barriers to quick learning of the new automated system.	Extension Staff	DO Vehari recommended that "Online workshops should be regularly organized". *Onsite training has been provided and help is available on the phone as well.*	Organize refresher training courses for them. The Department should **periodically** review usage of the tablets and the system.
Workload: Some of the AOs complained about an increase in workload. They suggested that additional staff should be hired for the entry of data into the system, at the Tehsil level.	Extension Staff	There is a need to reinforce the message that capturing the data once, now digitally instead of on paper, is more efficient. It is an issue of accepting and adapting to the change. Supervisory officers do not agree with the views of the complainant AOs. DO Vehari said, "That is not right that workload can increase. It is impossible. Rather, it will decrease it, as traditional work was being done manually. AOs had to compile data generated by field staff and prepare reports, manually".	Periodic reviews, coaching and on-the-job-training should be put in place. Involve the senior extension staff to create more buy-in by the junior staff.
Data entry at FA level: The AOs and DO Vehari suggested the equipping of the Field Assistants (FAs) with tablets so that they can perform the task of data entry. The DG extension also mentioned the eventual plan to spread out this automation to the roots of the extension system i.e. the Field Assistants.	Extension Staff	It will improve the efficiency of data entry in terms of time, as FAs are the prime contact points for the farmers and the field. They also opined that it will reduce the workload of the DOs. *However the number of Field Assistants is quite high. Therefore providing them with mobile tablets will require quite a large funding commitment*.	This activity should be left at the discretion of the provincial government; the government has shown interest and intentions in extending the automating of extension system down to FA level.
Software Issues –The respondents were of the view that E-Zaraat lacked user friendliness. Farmer list display needs to be classified further by adding father's name. For report generation, query criteria need to be provided, these do not generate automatically. Initially it was not possible to enter data on non-working days and after 1800 on working days.	Extension Staff	The farmer issue has been resolved. The report generation actually is flexible, whereby user can enter criteria like period and area for which the report is required. The staff expected reports listed as "weekly report for Vehari' etc. This would make the report generation very static. Now field staff can enter data even after office hours.	Software development process is always iterative in nature. It gets maturity and stability through trials, feedbacks and improvements. Moreover, more training would also be helpful in enhancing the users' ability to use the system and the reports.
Internet speed: Many of the respondents pointed out that internet speed was often very low and it took a long time to upload reports.	Extension Staff	The bandwidth at the district offices is low.	The bandwidth at the district offices needs to be upgraded

Issue	Who identified it?	Comments or actions taken	Suggestions
Availability of technical material: The respondents suggested that the DG office should regularly upload technical material (advice, publications etc.).	Extension Staff	DO Vehari does not agree as "It is being regularly uploaded, on a fortnightly basis". Technical material other than the fortnightly advisories may be required online. It is an important output but not a major output from the context of project.	The fortnightly advisories are uploaded regularly. The mobile tablet users need to sync their tablets regularly so that all data on their tablets is up-to-date. The system should be made flexible to hold other types of extension material (e.g. booklets) onsite.
Availability of input supplier data: There is provision in the system for maintaining a database of the input suppliers for seeds, fertilizers, dealers, flow of water in canals, and so on.	Extension Staff	Demand for such information is very high, as revealed through interviews of the farmers. Functionality is available in the web application for the entry of input supplier data for fertilizers, pesticides etc.	AOs need to be encouraged to collect input supplier data (including pesticides and fertilizers) and enter into the system.
Lack of participation of women in the programme	Project Team	The decision makers in the farming community are predominantly men. There are a small number of women farmers who have important operational roles in farming.	With the help of extension staff, a list of women farmers in district Vehari should be prepared and a special awareness workshop should be organized for them. Women only events and processes identified.

7. Way Forward

7.1 Communication of project deliverables to stakeholders of other regions

A communication strategy has evolved gradually during the project. The Department of Agriculture has been fully engaged in the pilot and the roll out of the service and has communicated with the project team on a regular basis. The project was presented at a seminar: "What can Telecoms do for Agriculture?' hosted by Pakistan Telecommunication Authority (PTA). The seminar was well attended by local and international donor agencies/NGOs, government agriculture agencies, telecom companies and technology companies. Presentations were made by Pakistani and international speakers from Sri Lanka (LIRN Asia) and Bangladesh. The presentation of the project was very well received. This was a good opportunity to present the work funded by DFID. It was also an opportunity to network with other organizations that may wish to collaborate in this project. The project team was part of the panel to answer questions from the audience.

A presentation was made at the "12th IT and Telecom Exhibition and Conferences Asia at Karachi-Pakistan. This is perhaps the longest running conference in the country on this subject. Almost all important brands and businesses display their products/solutions/services in the exhibition. The event provides an opportunity for business-to-business alliances and a leveraging of mutual strengths. Throughout the project regular presentations were made and discussions initiated with the Directorate of Agriculture Extension and Adoptive Research. A presentation was made to the Secretary Agriculture, Department of Agriculture. Presentations were made to Punjab IT Board.

The current dissemination strategy involves communication and coordination with agriculture department and other actors. The project team has held a meeting with Punjab Information Technology Board, as they showed interest in the E-Zaraat. They indicated their interest in utilizing the E-Zaraat applications in their forthcoming project on improving Governance in Punjab.

The project results will be disseminated widely so that others can also benefit from this system. Information about the success stories related with the project deliverables will be communicated to farmers of other regions through the website, writing and broadcasting a documentary, presentations at conferences.

Progressive farmers are expected to have access to these channels. However, for other farmers, extension workers and others would provide indirect links to these sources by providing them information on E-Zaraat benefits.

Findings will also be disseminated among key stakeholders of the agriculture system in Pakistan, especially the research institutions (including Pakistan Agricultural Research Council, Central Cotton Research Institute) and the universities (including the University of Agriculture Faisalabad, Arid Agriculture University Rawalpindi, University of Agriculture Peshawar, University of Agriculture Tandojam, Sindh). It is expected that research and academic institutions would initiate research activities related with such innovative means of extension services, especially for reaching the unreached.

7.2 Scale Up and Sustainability

Transforming the traditional system to an e-environment presents many challenges and barriers. However, it is encouraging to note that the degree of interest among the key officials of the Extension Department is high.

DG, EDO and DO expressed their all-out support for the project and were of the view that the project is expected to change the entire facade of the extension department. They expressed their satisfaction with the progress of the project and were enthusiastic to see the results of the project. DG extension

stated that the project would increase performance of the department and accessibility of the farmers to the extension services. He said that it would also enhance accountability and hence improve the delivery process.

The Director General Extension plans to introduce structural changes in the department from the top down, starting with equipping the extension offices at the Tehsil level with the required infrastructure, and then strengthening the extension operations at the FA level. The DG AE & AR has committed to provide an 0800 number and office space for the helpline to support the increase in reach of the helpline to all districts of Punjab. A MoU between CABI and the Department of Agriculture will be signed whereby, rights to data, hosting of application and support to the application will be agreed upon. The DG has also requested the PITB to host the application and to provide a government url: http://www.e-zaraat.gov.pk to the project's web portal (Letter no. 1200 dated May 24th, 2013 from DG AE & AR to Chairman Punjab IT Board).

"We want to create awareness of this project in the whole of Punjab and target the creation of an appetite of such reforms in all other districts. And with the success of this model we want the e-governance model at the earliest in entire Punjab."

A SWOT analysis is anticipated at the earliest stage so that the project is replicated to other districts too. The preference would be to bring those districts on board first which have greater cropping intensity, fewer farmers and greater productivity challenges. On the basis of these criteria, priority districts would include Lahore, Multan, Faisalabad, Gujranwala and Sahiwal. As far as the mechanism for financing the project is concerned, the DG showed his optimism for seeking funding from the donors and getting reasonable financial allocations from the government too.

In a meeting with the DG AE & AR office staff, PITB, in principle, agreed that through another project they will be providing the staff of Agriculture Extension from HQ to the AO level, with mobile tablets and the AOs with smart phones thus complementing the project by drastically reducing the cost of essential hardware required to deploy E-Zaraat in the field.

The current requirement of tablets at the field level for overall Punjab is:

Staff Categories	Number of Staff
HQs	12
DOAs	36
DDOAs	128
AOs	538
Field Assistants	2981

Table 5: Estimated requirements of mobile tablets for Punjab

Currently the tablets cost in the range of Pak rupees 28,000/tablet (GBP 186/tablet). The costs would reduce significantly if these are purchased in bulk.

One key lesson learned is that scaling up should be done in accordance with the agro-ecological zones, which will help to ensure greater coverage of the farmers and to reduce the cost of reaching them. Secondly, it will also be easier to launch awareness campaigns.

The training requirements are quite high in an initiative like E-Zaraat. Therefore it is estimated that if the funding is in place, it will take around four years for the Department to have a fully-fledged infrastructure and the capacity to run the project on its own.

It is planned that E-Zaraat will eventually be owned and run by the Directorate of AE and AR. The helpline and other information products that can be generated from the project MIS have the potential to generate an extra income stream. It is estimated that it will take another five years for the information to be collected to such an extent that it becomes commercially viable. Based on the MoU the roles of various stakeholders will be decided.

E-Zaraat has generated a lot of positive interest amongst different stakeholders. The World Bank has been in touch with CABI over the last year. They requested a brief on the project and based on the same have included ICT based services on a pattern similar to E-Zaraat in their new project for Sindh province. This expansion of the E-Zaraat services is expected to be launched by the end of 2013 (Riaz, 2013).

8. Conclusion

The project has made significant advancement towards achievement of its goals. The call centre/help desk has been established and started operations. During a short period of time (about three months), the help line received 1200 calls from the farmers. Most of the queries are related to cotton crop. More than 720 FAQs have been developed and added into the database. The FAQs are being used at the helpline. Whenever any new question (not earlier available in the database) is received in the helpline, it is added into the database. Advisory messages are also being sent to the farmers. So far 192,084 messages have been disseminated among 1500 farmers.

The project has developed capacity of the extension staff in the use of E-Zaraat through repeated and rigorous on-the-job and off-the-job training.

The project is well acquainted with the issues and concerns of the key stakeholders including the farmers and the extension staff. Most of the issues have been addressed by the project team through an iterative process. The project team is committed to address other issues and concerns too.

For the scale-up and sustainability of the project, there are some positive and encouraging signs. The leadership of the Extension Department (from DO to DG) is taking a serious interest in the project. The government is considering expanding the E-Zaraat to other districts of the province too. Besides, PITB has also shown interest in the project. In addition, the World Bank Islamabad Office has also shown a keen interest in the project.

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10. Annexes

Annex-A Business Analysis V3

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Business Analysis

E-Zaraat: ICT Based Agri-Services for Agriculture Extension in Pakistan-Phase II

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Contents

List of Figures

Author

Zubair Ahmed

Business Analyst & IT Consultant, CABI

Abdul Wahab

Software Engineer, CABI

Mahrukh Siraj

Coordinator, Knowledge Management, CABI

CABI

Opp 1-A, Data Gunj Buksh Road

Satellite Town

Rawalpindi

T: +92 (0)519290132

E: m.siraj@cabi.org

Acronyms

AO	Agriculture Officer
DG AE & AR	Directorate General of Agriculture Extension and Adoptive Research
DOA	District officer Agriculture
DDOA	Deputy District officer Agriculture
EDO	Executive District officer
FA	Field Assistant
IVR	Interactive Voice Response
EDR	Entity Relationship Diagram

0. Document Management

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27/03/12	**V0.1**	**BRS**	**Zubair Ahmed** **Mahrukh Siraj**	**Mahrukh Siraj**
18/04/12				**Mahrukh Siraj**
16/05/2012				**Phil Roberts**
15/10/2012	**V0.2**	**BRS**	**Mahrukh Siraj** **Abdul Wahab**	
09/11/2012				**Mahrukh Siraj**
16/12/2012				**Phil Roberts**
31/01/2013	**V0.3**	**BRS**	**Abdul Wahab** **Mahrukh Siraj**	
				Mahrukh Siraj

1. Overview Introduction

The role of agriculture in poverty alleviation and economic growth is well documented and understood. In a developing countries like Pakistan, it is recognized as a cross cutting sector playing an important role in fuelling other economic sectors but also directly employing half of its population. Agriculture technology is expected to change in order to keep pace with factors like population growth, social, economic and environmental challenges. The role of Agriculture Extension (AE) becomes of paramount importance in this regard. The AE's significance in Pakistan has been badly affected by fewer numbers of people to service a large farmer community, unavailability of experience staff, and lack of resources (e.g. transport) to reach the needy farmers etc. The weak linkages between the extension workers and farmers were limitations identified by the study in phase-1 **(1)**. In this phase, it is aimed to strengthen these by piloting the model in three: Vehari, Sargohda and Sialkot districts of Punjab, Pakistan.

The recent interviews **(2)** with the field extension workers has revealed that most of the extension knowledge is disseminated on mobile phones in an on-demand fashion with most of the calls from farmers landing on the extension worker's mobile set. Most of the originating calls from extension worker's mobile set are for conducting various surveys. In addition to phone calls, field visits are used as tools to collect valuable information about crops, yields and area cultivated.

The extension department is equipped with basic IT facilities (Desktop, Internet and Printer), but these are unfortunately only used for composition purposes. Every deliverable is first composed using these facilities and then mailed to intended recipient. Email can be thought as a second most useful application in the current scenarios. Email shrinks the time taken for a file to travel from one city/area to another but suffers from reliability issues. A file may be requested again and again as they overlooked (all emails look the same) by people operating the desktops, each operator needs to keep conversation record thus resulting in thousands of files in his/her mailbox. Reports are consolidated manually (but still digitized) by all the above efforts at various levels (DDOA & DOA offices) and are then converted into paper form for perusal. Information on paper obviously loses advantages gained by earlier digitization **(2).**

These are just few of the problems plaguing efficiency of the extension department. With funding secured from DFID, CABI intends to automate all extensions activities and alleviate extension department from all inadequacies of paper flows, collation and analysis. The intended solution envisages a move towards demand based extension services thus helping extension agents to reach out to the most critical problems quickly and effectively. Currently, Pakistan is suffering from larger issues such electricity shortage and higher fuel prices. The intended automation efforts will thus result in helping Pakistan conserve already strained resources.

1.1 Objectives / Business Goals

E-Zaraat's business goals are manifold, the biggest remains poverty alleviation by ensuring that small/medium scale farmers are better equipped with credible and actionable agriculture advisory information while working in the fields. The following are more obvious Business goals:

- E-Zaraat will serve to have better linkages between extension experts and needy farmers
- The above will enable the farmers to enhance their yields' quality of produce and thus help them to get a better market price for their crops.
- Extension advisory is more of a scheduled effort at the moment, farmer trainings are planned well before the crop season. E-Zaraat will enable a more on-Demand extension advisory model that will help delegate scarce extension workforce to where they are more helpful and needed.

1.2 Intended Audience

The document serves to expose its benefits to interested parties as what may be useful to them. We identify the following as envisioned in the study of the phase-1**(1)**

- Directorate General of Agriculture Extension and Adoptive Research (DG AE & AR)
- Government and Policy makers who need timely and processed information for effective decision making.
- Telecommunication operators who can launch exciting new mobile applications for farmers.
- Private extension may be the biggest beneficiary as they can easily strategize their business priorities for prospective customers.

1.3 Stakeholders

User Name	User Type	Access Need	Roles
Farmers	Primary, Beneficiary	R	Primary beneficiary of the whole automation effort, can call to Call Centre or receive mobile based advisory information
Extension Workers	Supporting	CRUD	Information collection and dissemination
Mobile Network Operator	Supporting	Call Metering	Provide necessary air interface for voice and data based services
Directorate of Agriculture, Punjab	Beneficiary	CRUD	Primary beneficiary of the whole automation effort
Institutions users	Beneficiary	R	Perform analysis on provided information
Private Extension	Beneficiary	R	Farmer's information
Provider (CABI)	Supporting	CRUD	Lead and negotiate issues arising from conflicting business interests

1.4 Business Dependencies and Constraints

The project's success is dependent on number of variables as outlined below:

- The project's sustainability depends on suitable settlement of suitable revenue sharing (per call/sms) with mobile operators; Mobilink has shown commitment for free air time till the duration of this phase. As suggested in the first phase, E-Zaraat services are suggested to be kept at bare minimum in the start hence suitable phased revenue sharing mechanism needs to be struck among stakeholders at a suitable time.
- Availability of electricity seems to be the biggest constraint that can undermine project's usefulness. With increasing electricity load-shedding in rural areas of Pakistan it can seriously affect project's progress.

- DG AE & AR is both primary and supporting user in E-Zaraat project. DG AE & AR's staffs' familiarity with IT based systems and their agility in providing required data can be considered as factors that may affect project's completion time.

2. Current Processes

This section includes observations from previous study already published as "A Model for ICT based Services for Agriculture Extension in Pakistan" **(1)** in which the limitations of the existing efforts in Telecommunication and Agriculture domains were highlighted and an ICT based model to improve upon these inadequacies was proposed. This section is also augmented by a recent and more detailed study that involved three of the model districts i.e. Vehari, Sargodha and Sialkot. Most of the work presented here comes from Vehari district as it was found to be more automation ready than other target districts.

2.1 Business Process Descriptions

Already highlighted in [http://www.dfid.gov.uk/r4d/Output/187171/Default.aspx], currently no system exists that provisions support to farmers and extension workers combining strengthens of three domains i.e. Telecommunication Network Operators, Directorate of Agriculture Extension and Agriculture Research Institute like CABI. Moreover there is no specialized Agriculture Call Centre existing in public or private domain working to provision specialized timely and actionable agriculture related information to farmers as depicted in the below diagram.

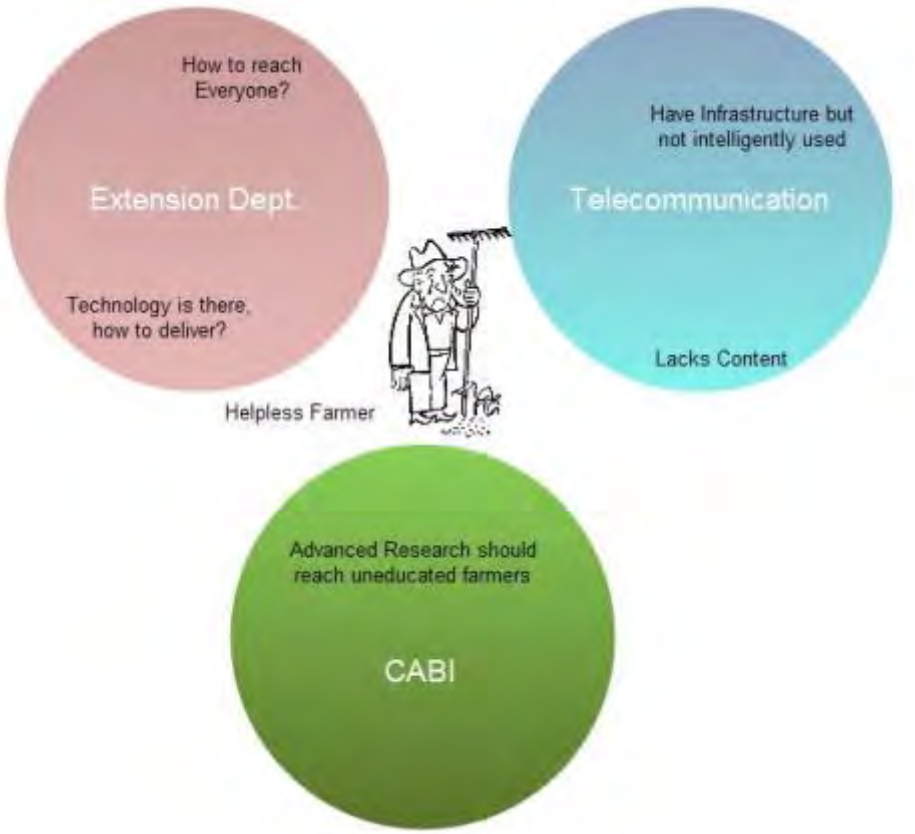


Figure 1 : Current situation

What is discussed below is concise description of what we has already been discussed in report of phase-1 **(1).** The description is further augmented by the recent study of the target districts.

2.1.1 ICT based Agriculture services by Telecommunication Operator in Pakistan:

Currently all five mobile operators have launched some form of agriculture advisory services for fellow farmers. Nearly all the services are IVR based; usefulness of these services is affected by lack of content and technology constraints.

Agriculture content development is a specialized field in its own which was something telecoms didn't anticipated earlier. This resulted in launch of services that were not useful and have therefore not been successful. Secondly these services are only Interactive Voice Response (IVR) based, this poses a problem as agricultural advice, sometimes diagnostic in nature cannot all be delivered through a single, IVR based approach only. Content development was thus more difficult for such IVR based services. Telecoms have started looking for other lucrative and manageable business models for similar services where their role is more of a participatory nature. Mobilink, a leading telecommunication operator has agreed to partner E-Zaraat project with CABI.

2.1.2 ICT based Services by Agriculture Directorate:

Department of Agriculture, Punjab is divided into various sub directorates. This work involves improving and automating practices at two such directorates, Directorate of Agriculture Information (DAI) and Directorate General of Agriculture Extension and Adoptive Research (DG AE & AR). As identified in **(1)** weak linkages exists between the two directorates. Though both the directorate provide agricultural advisories to the farming community the major differentiation between the two is that former is tasked with finding ways and means for better information dissemination (publications, radio programmes etc.) whereas the latter actually delivers the information by physically meeting/training the farmers onsite.

Already highlighted, DG AE & AR is facing severe issues in reaching all the farmers due to increasing costs, lack of skilled man power, large area covered by each extension agent and a lack of resources etc. In order to overcome these limitations they have tried ICT based services. An interesting development (ICT based) at Vehari District was use of SMS messages for disseminating agriculture advisory information. The deal was negotiated with Telenor Pakistan and advisories were issued almost 5000 mobile phones numbers on Telenor Network. However the service could not continue due to differences on tariffs between the two parties. It was also discovered that there is no record of the messages that were delivered using this service.

Much of the work conducted by extension department begins at the lowest level by personal and group visits by field's assistants and agriculture officers. The impetus of these meetings is to deliver the advisory guidelines and announcement of various schemes for the farmers by the DG AE & AR. The field extension staff also collects data and compiles reports for the DG AE & AR. Annex-1 lists the reports that Vehari's District officer Agriculture (DOA) is produces for the DG AE & AR.

2.2 Current System Context Diagrams

Currently the process is completely manual. Fields assistants are the ones who have the closest contact with farmers. All of the information they keep is on paper, to be exact, in diaries that are maintained by each field assistant. The information is then again collated by hand in a more clearer and structured manner in registers maintained by respective Agirculture Officers (AO). The AOs when prompted for a particular report information (report list can be found in Annex-1) lookup these respective registers and provide information to respective Deputy District Officers Agriculture (DDOA).

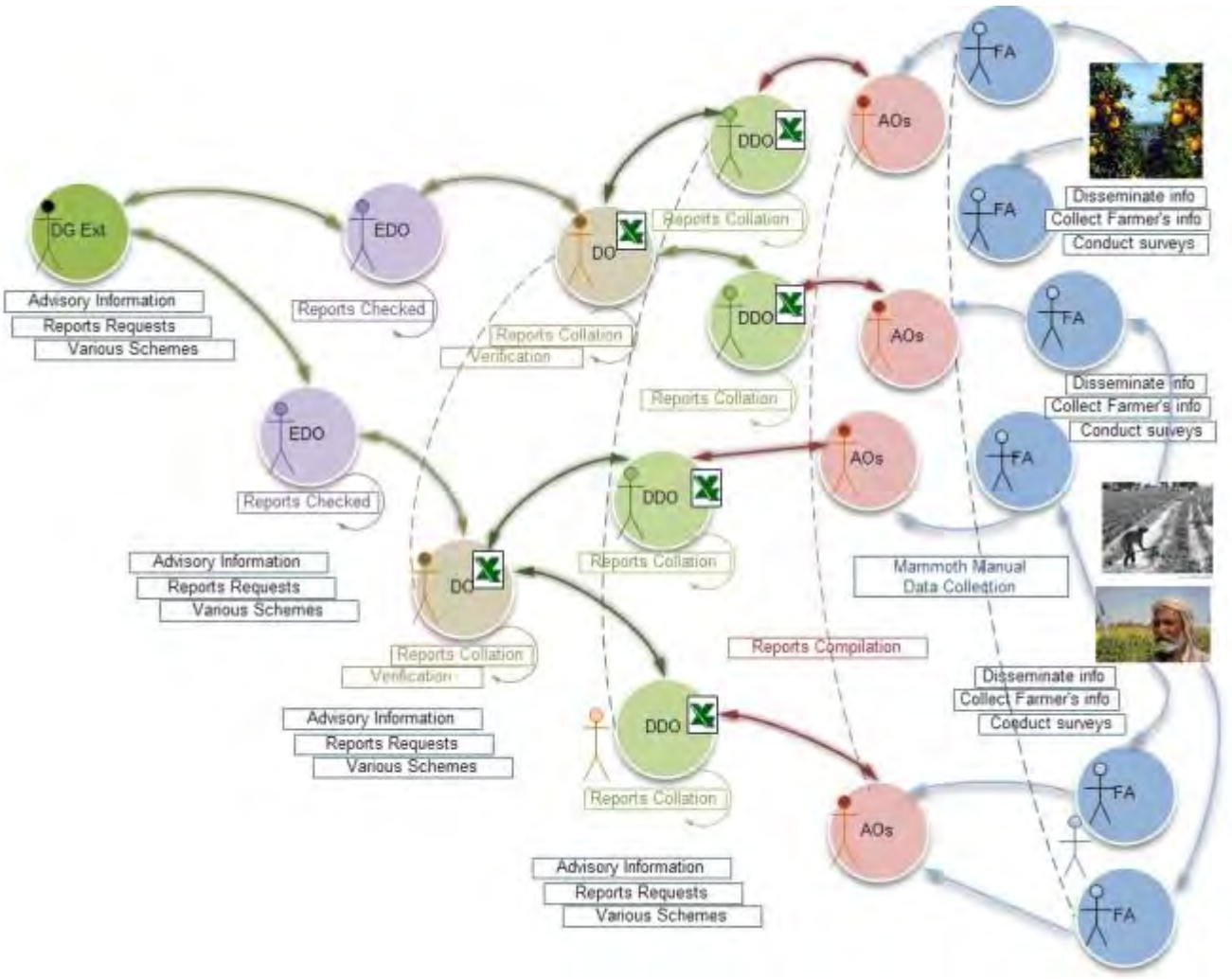


Figure 2 Current extension department workflow

DDOAs sit at Tehsil level and are provided with basic Information Technology setup i.e. Internet connection, Desktops and Printers to manage their ongoing activities. DDOAs thus compile these reports in electronic formats after consulting paper registers and reports provided by AOs and email it to District Officer Agriculture (DOA). Distrcit Office is where all the major collation and compilation takes place. Any issues of missing information is communicated to respective DDOAs and AOs through phone and emails. At Vehari, the processes for first filing every correspondence from Director Generals office and then moving it in both ways were found to be in place.

As depicted in the above diagram, agriculture advisory, report requests and agriculture scheme announcements first travel downwards and then upwards from each Field Assistant (FA) to the DG AE & AR. As can be observed, there is a huge data collection on paper at the field assistant level and most of the compiliation in MS-Excel form takes place at DOA office. The process obvisouly suffer from severe paper based issues, such as duplication, redundancy and incase of an AO or an FA being transferred or loss of a diary the effort needed re-capture the information has to be practically started from a scratch.

3. Business Requirements

Following is a summary of what was covered in the earlier study of in phase-1 **(1)** to develop a better understanding of the functionalities discussed later.

3.1 Background

As depicted in the below the aim is to better facilitate better communication between farmers, fields assistants and higher authorities involved in policy making.

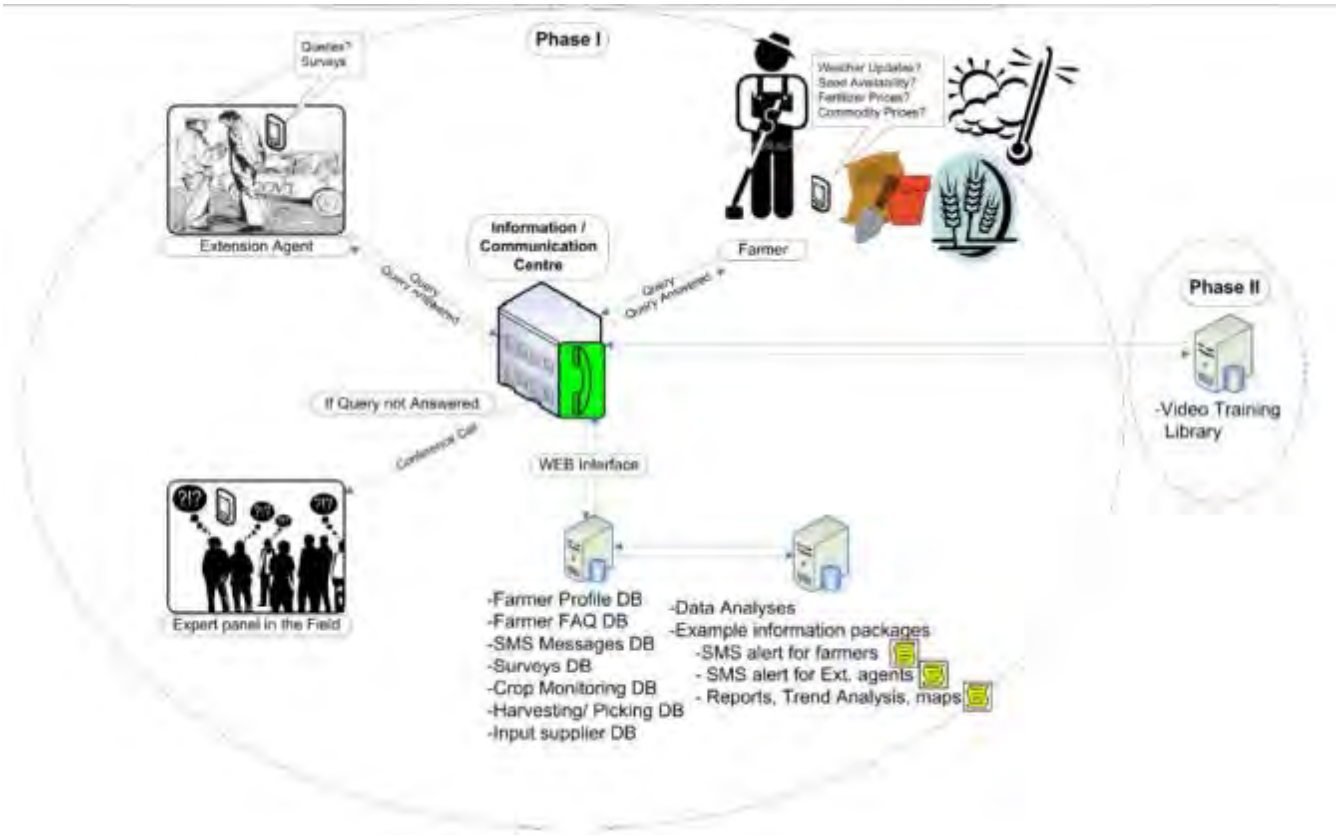


Figure 3 Model for ICT based Agriculture Advisory Information Dissemination

The current focus is to pilot the model proposed Phase I. Information and communicatoin center (A Call Center Setup)is the hub of all the comunication that takes place between the farmers and agriculture extension workers. The functional and non-functional requirements are outlined in more detail below.

3.2 Functional Requirements

The project can be segregated into three major component that are linked to complete the whole picture.

1) **2G technology Based Mobile Applications**
2) **3G or Smart Phone based Mobile Applications**
3) **Call Center Solution to answer live phone calls initiated by farmers which may be converted into conference calls to liaise with extension experts.**
4) **A portal for Punjab Agriculture Extension and Adoptive Research**

A more detailed description of the functional requirements in above categorizations are listed below:

3.2.1 2G Mobile Application

1. Farmer should be able to receive agriculture advisory messages in both textual(Urdu),voice and Voice messages. The message should be composed and be vetted by an agriculture expert.

3.2.2 Smart Phone Mobile Applications

a. Field Assistants equipped with smart phones can input survey information.
b. Field assistants should have already synced advisory information that they can provide to respective farmers.
c. Field assistants should have already synced input dealer's information.
d. Field assistants should have already information on approved seeds information by Govt.

3.2.3 Call Centre

a. Every call to the Call Centre is first checked for caller information in the caller profile DB. If this information does not exist the caller will be prompted via IVR input his/her basic information. The data requirements are discussed later in a separate section.
b. As Call Center agent may be hired for different crops and speaclities, it will be divereted to an approriate agent.
c. The calls must be logged for quality and transcription purposes.
d. After above selections, Call will be picked by a Call Center agent and his/her display will be fed with relative agriculture advisory information.
e. The prospective caller may be asked to rate the solution provided by Call Center Agent.
f. The Call Center may also serve as monitoring facility, as comments can be taken to assess usefulness of Field Assistant and Agriculture officer in Caller's vicinity.
g. The Call Center's transactional data will enrich the data warehouse that can archive it to query information over a longer period of time.

3.2.4 Punjab Agri. Extension & Adoptive Research (PAEAR) Portal

a. A dynamic portal based on the Enterprise Resource Planning principle is to be constructed that can automate all the workflows and prevalent practices at provincial level
b. Initially the portal's interfaces will be used to collect data about farmers, input dealers, contact number of warehouses, fertilizer depots etc.
c. The above information will be made updatable at each district level to reflect the current scenarios
d. Separate web interfaces will be provided to show and maintain localized information at District and Tehsil levels
e. The flow of various reports is to be automated through the intended portal
f. Portal should allow the login/logout functionality to each staff member of DG AE & AR and its field offices
g. Portal should allow Head office to generate any kind of reports based on the data inputs provided by the field staff.
h. Portal should provision support to transfer all the transactional data of the season to a warehouse.
i. Reports generated at each level (e.g. AO level) can be checked and verified for accuracy/completeness at a higher level (DDOA in this case) and may be rejected for rework.
j. The portal should provision readymade forms for use at FA/AO levels. In particular cases e.g. pest scouting reports, these may be already filled by Fields Assistants who use Smart phone apps for enter the data

3.3 Non-Functional Requirements

The following non-functional requirements are deemed utmost important to the project's success.

3.3.1 Cost

The first and the foremost concern will be the project cost. The scope of the project is vast and therefore needs a clear understanding of various cost elements involved in the project such as software development, mobile phones sets, Servers, web-hosting and premises to host Call Center setup are just a few to be highlighted.

The project from the beginning was envisoined to run on open source technologies, negotiating free Air-Time (from Mobilink) during testing the various mobile apps and involving DG AE & AR's resources; staff and additional hardware for the successful project deployment.

This factor will be most dominant non-functional requirement in coming days of this project.

3.3.2 Reliability

The application should be reliable in many ways. First it should not breakdown as it houses more data or as more users start using it. Secondly, the most important function would be guarantee against any data loss. Although 100% reliability is hypothetical and seems very difficult to achieve but using already tested and tried methodologies can help in this regard. Mobile applications are intrinsically resilient to data and power loses by design. Web technology is quite mature and can provision better results with current tools and technologies available.

3.3.3 Security

Security is a multi-tiered concern. The physical, virtual and citizen level security needs to be addressed in this application. Physical security is quite obvious and can be achieved by providing replication and backup according to the application needs. Virtual security here means, access control to all application interfaces. By assigning access maps delineating user rights and privileges protected and controlled access can be provided to each user. Citizen level security is normally protected by legislation and ensuring compliance to it we can ensure that citizen's information is not shared without his/her own permission to interested parties.

3.3.4 Availability

Electricity seems to be one of the biggest challenges in current times for Pakistan. In order to cater to this problem it is planned to enable the application on mobile phones and tablets etc. In addition to these, power generator and Uninterruptible Power Supply units may also be added for successful deployment. Enterprise application availability seems minor problems as plethora of technology options are available to remedy this issue.

3.3.5 Usability

Usability heavily dominates the current business analysis efforts. Users' limitations and technology constraints are studied in greater detail to make the application more acceptable by personnel at all levels in DG AE & AR. Trainings have been built into the project plan. It is planned to test the level of training required with a select number of field extension staff. This will help in either modifying application interfaces or putting in more focus in preparing better training material.

3.3.6 Scalability

Application is destined to be implemented at three model districts i.e. Vehari, Sialkot and Sargodha however the aim is to eventually implement it at the province level. System's architecture is designed to cater this important requirement in mind. The application design can be equipped to be more resilient to growing hits and lagers data volume requirements. It is always easy to buy expensive hardware and solve scalability issues but better application design such as concurrency, parallelism, better memory use, and minimizing useless I/O can yields better results.

3.3.7 End User Acceptance

The end user acceptance is vital part of the deployment of the services. A plan for end user acceptance testing will be developed. The major criteria for end use acceptance are:

a. The choice of the device for collecting data from the field is very important. Interviews with the field extension worker and the state of electric power in the districts clearly suggest use of mobile devices for data entry. Various models of smart phones with different screen sizes will be field tested in Vehari district to select the most appropriate device for use in the field.

b. Once developed each use case will be tested and approved by a focal group of the extension staff the 2G applications will be tested with a focal group of farmers.

c. The web portal will be tested and approved by the DG AE & AR and DAI staff based at the provincial headquarters.

d. All the functional and non-functional requirements listed in sections above will form part of the end user acceptance testing plan.

4. Proposed Process

E-Zaraat has been described in detail in the business requirements section. At a higher level, it envisions combining efforts of three domains as their combination can yield better results.

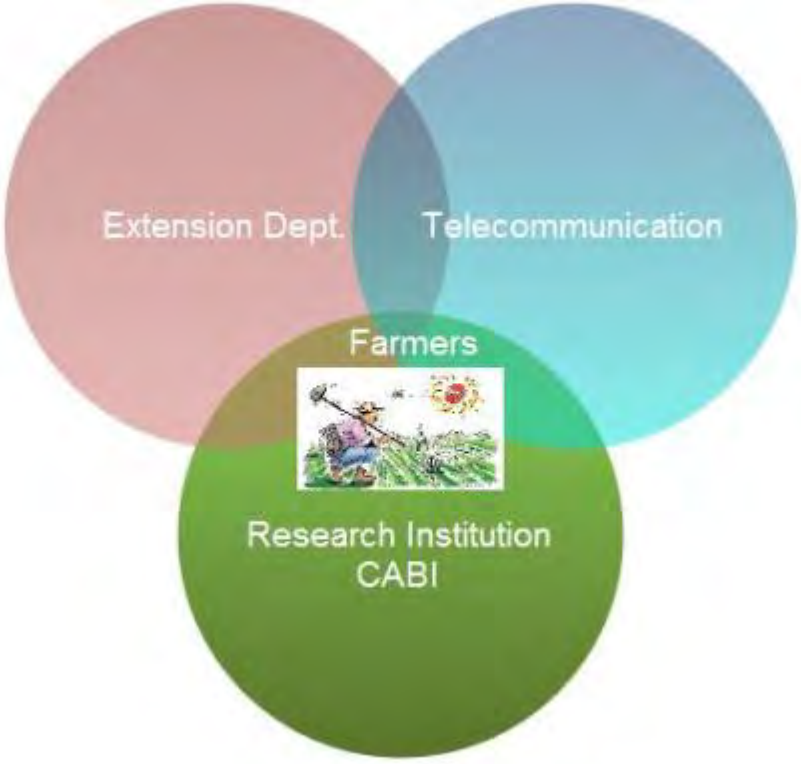


Figure 4 E-Zaraat's eventual aim

Proposed business process includes what has been depicted by figure 4 and is now augmented by study to automate DG AE & AR's internal working for reaching farmers working in fields. The diagram below (figure 5) has a close resemblance to current system context diagram captured in figure 2.

As depicted in figure 2, agriculture extension staff is already using MS-Excel to compile reports at the DDOA's office. The information is then emailed to DOA office where all the information is collated and then sent from EDO to DG AE & AR to be further compiled and collated. It is after such as huge manual and time consuming effort that the DG AE & AR has the final information on the situation in the field.

As depicted in figure 5 the digitization starts at the FA level. Field Assistants are provided with mobile phones for entering their day to day information. The application requirements are kept flexible at this end, as there might be cases where FAs don not have mobile phones and are instead provided with internet enabled forms which can be filled after successful login to the application at DDOA's office or any other place internet facility is available. The Agriculture Officer (AO) thus gets information that is already filled in by FAs hence his job may be limited to viewing it over the web, making amendments if required and validating the data for use at the next level. The AOs input will then be collated at DDOA level. DDOA thus has a similar role of checking/verifying what has been sent by the AOs. A caveat can be DDOA rejecting certain report during scrutiny of the compiled report and may ask a particular AO to resend his/her report with amendments. It is after amended report's arrival and its collation with the rest of the reports' data that a successful compilation completes. DDOA will accept the report and it will become available for use at the EDO office. EDO's role is almost similar to DDO and after his/her acceptance it is forwarded to the DG office for final collation at the provincial level.

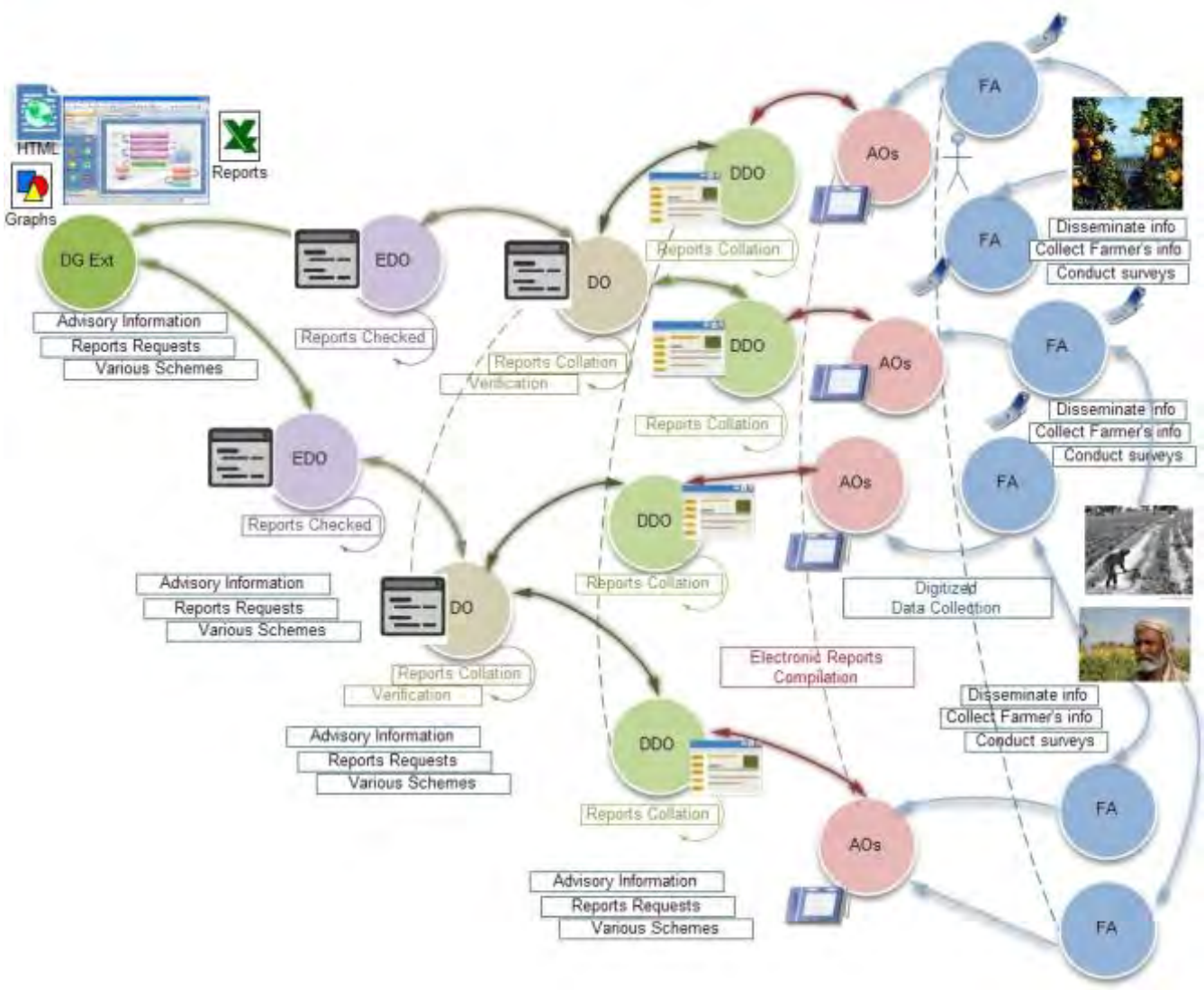


Figure 5 Proposed system context diagram for DG AE & AR automation

4.1 Proposed Software Architecture

4.1.1 Components Identified

The below discussion covers, already mentioned processes thus reflects in our initial formulation of The Software Architecture of E-Zaraat. Two of the most major components of EZaraat project are highlighted below as:

- A mechanism to generate variable format (columns) reports that are kept centrally at the DG level.
- A mechanism to move the data bundles from one entity (AO, DDOA, DOA etc.) to another.

The first component was identified after visits and interviews with extension staff at Vehari and Sargodha, as some of the report formats that existed earlier were changed to newer ones. The second component is pretty obvious from the above diagram as information bundle has to move forward and backwards. Two competing technological solutions exists to handle the later one and are known as workflow and Business Process Management (BPM). Workflow technology has seen quite a period but is dominated by relatively new BPM products. As the analysis is going to take on perspectives of the headquarters in the next stage, it is planned to choose a suitable BPM solution to suit eZaraat's needs.

A working prototype is developed at CABI South Asia, Pakistan office to create variable formats for data input forms that can be used for survey data collection on mobile devices. The application is

developed in Android operating system due to its open source and free delivery mechanisms. The functionality can briefly be summarized as follows:

4.1.2 Server Side

- Login/logout facility for overall administrator
- After successful login, administrator, through a web panel, can review the record entries by the extension personnel for a variety of forms, that are more or less same for all districts, except for a few crop-specific forms which depend a lot on the geographical aspects of the district, for example, citrus in Sargodha, rice in Sialkot and cotton in Vehari are all prime examples of crop-specific forms that the user's feed data into.
- The administrator can assign this form to a particular field staff by entering his/her basic information, his/her password and also his/her mobile device IMEI number. This would make sure that the application if installed would still not be able to run if it is not allowed by the administrator.

4.1.3 Client Side

- The field staff logs in with credentials maintained at the server side by the administrator.
- As he/she logs in, the forms created for him/her are synced on the device for data entry.
- In the absence of the Internet, the data remains stored in the client device's local database.
- The field staff after completing the data entry and connecting to the internet connectivity (autonomously by WiFi) will upload the data.
- As the field staff, captures survey data, timestamp and GPS/WIFI/Internet coordinates are also captured automatically.
- The field staff can also take image of the desired location/plant etc.

The same application is also available as a web panel option where users can choose the form and insert data to it. The interfaces for both the mobile and web application have been kept as similar to each other as possible in order to ensure that any new users don't feel alienated from their screens on both the PC and tablet devices.

4.1.4 E-Zaraat Survey App: Client Object Model

The mobile application development approach is proposed to be modified to a completely modular approach. The application is to be divided into packages, each of which signifies the 5 separate layers of the application. At the top most layer, sits the user interface or the application screens. The operation functions sit below the aforementioned layer which aid in the retrieval and generation of data from the layers below. The enumerated functions at the layer below identify the types of various functionalities that are to be processed from the layers below and pushed to the above layers. The data object classes which are the exact replicas to the ones in the web application sit on the next and the fourth layer. These are to be utilized by the application's last layer, the configurations, which communicate with the internal device database and the web to synchronize the data between the device and the web application.

Support for multi lingual form is proposed to be added to the web and Android application. This would add the ability to fill out forms, produce results and display data in multiple languages, in the current scenario the "multiple languages" would be Urdu and English. Each form's base class is the most important one that represents the structure of that form (already configured on the server side) that has to be synced on a field staff's tablet. Each form has their own data fields precomposed on both the web and mobile interfaces.

Further additions to both the web and the Android user interface controls include: the Date Picker dialog which would allow the user to select dates from a scrollable calendar, pop ups and dialog boxes are be added to the application to view the "Loading" and similar messages to the user while the device is busy processing data. A splash screen with a video animation has been integrated into the application, signifying the e-Zaraat application's logo. The other classes are self-explanatory as Device

class captures characterises of a particular device supported by the solution, either its supports GPS location or not. Session abstracts a particular time when a user is recording survey data in the survey application. The data stored is in the local database of the mobile phone as internet connectivity is not usually available in the rural areas. Annex-3 contains images from the website (http://www.e-zaraat.org) and E-Zaraat Survey App.

The class diagrams of various Android Activities and Database Accesses classes for SQL Lite is attached as Annex-4.

4.1.5 Entity Relationship Diagram

Entity relationship diagram (EDR) depicted in figure 8, includes support of the Use Cases and the Survey Application proposed for E-Zaraat application. For most of the cases that for each new form created and assigned to a field staff, no changes are required in the existing database i.e. no new table is required to be created. We may also like to clarify that this database schema can be thought of more as a transactional store and warehouse structure will be different from it.

As depicted in the EDR diagram, there are two separate entities to store farmer's and Extension department personnel's (user table) information. The user type captures various designations and function description of these staff members. The location is identified by one to many relationships from province to village level. It is only at Tehsil level that information about various input dealers is kept and hence there is only have Tehsil's ID in Dealers table. One dealer can supply various input as captured by DealerType entity. It is the same table from where different surveys originate at the Tehsil level. Roles and userRoleMaps are tables that are dedicated for access control privileges. The project enrolment tables are for recording the data of the various schemes announced by the Govt. of Punjab for farmer to improve agriculture methods and enhance their yield quality.

Each form's table has been allotted separate space in the database, with their relevant fields and specific data types. Some of these tables have identifying foreign keys and those who are entered in from a mobile device have their coordinates recorded in a separate table for coordinates. Each form table has a field for the user who entered the data, the timestamp when that data was received by the server and a date field in which the user enters the date from the input form itself.

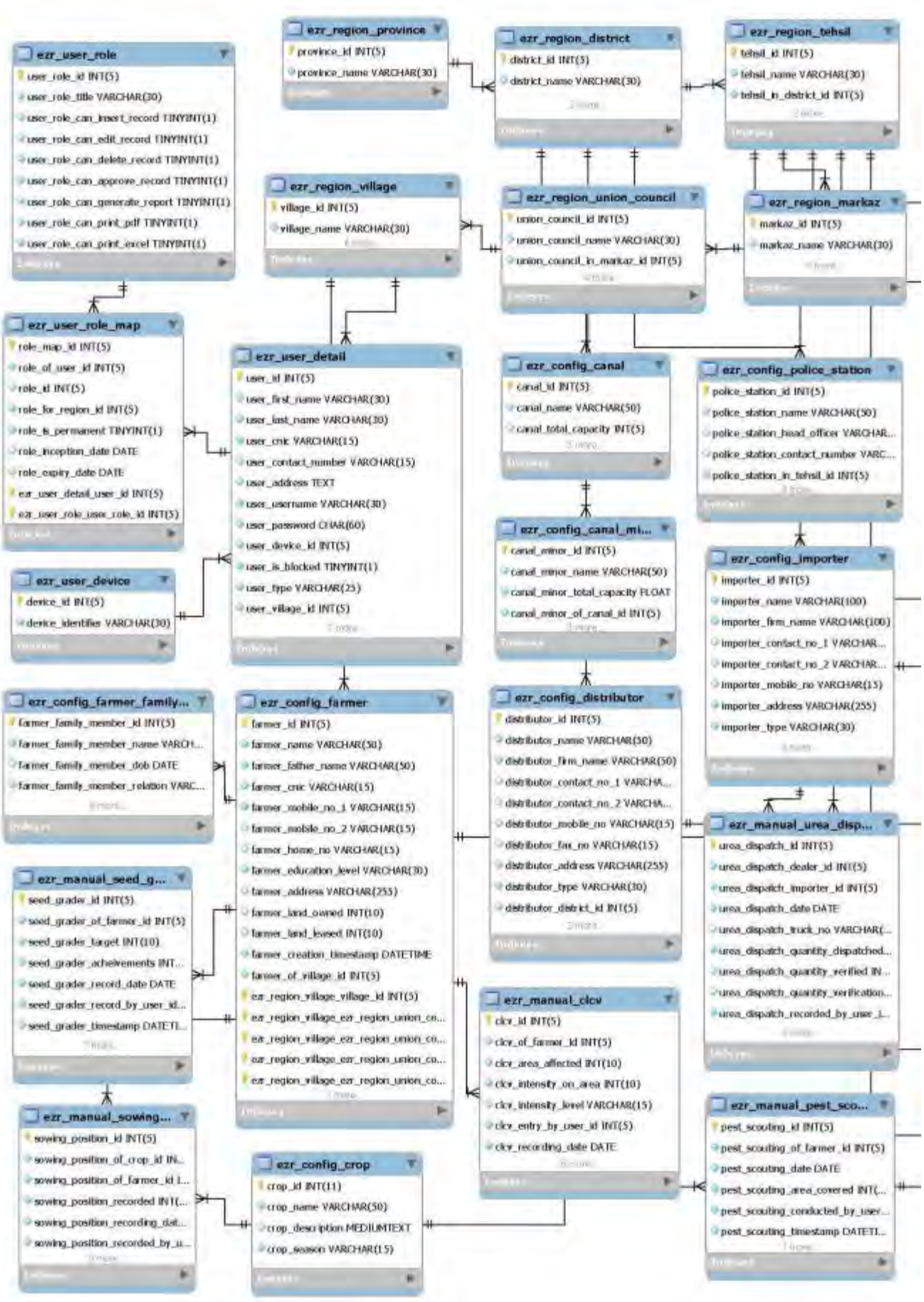


Figure 6 Entity relationship diagram (part 1)

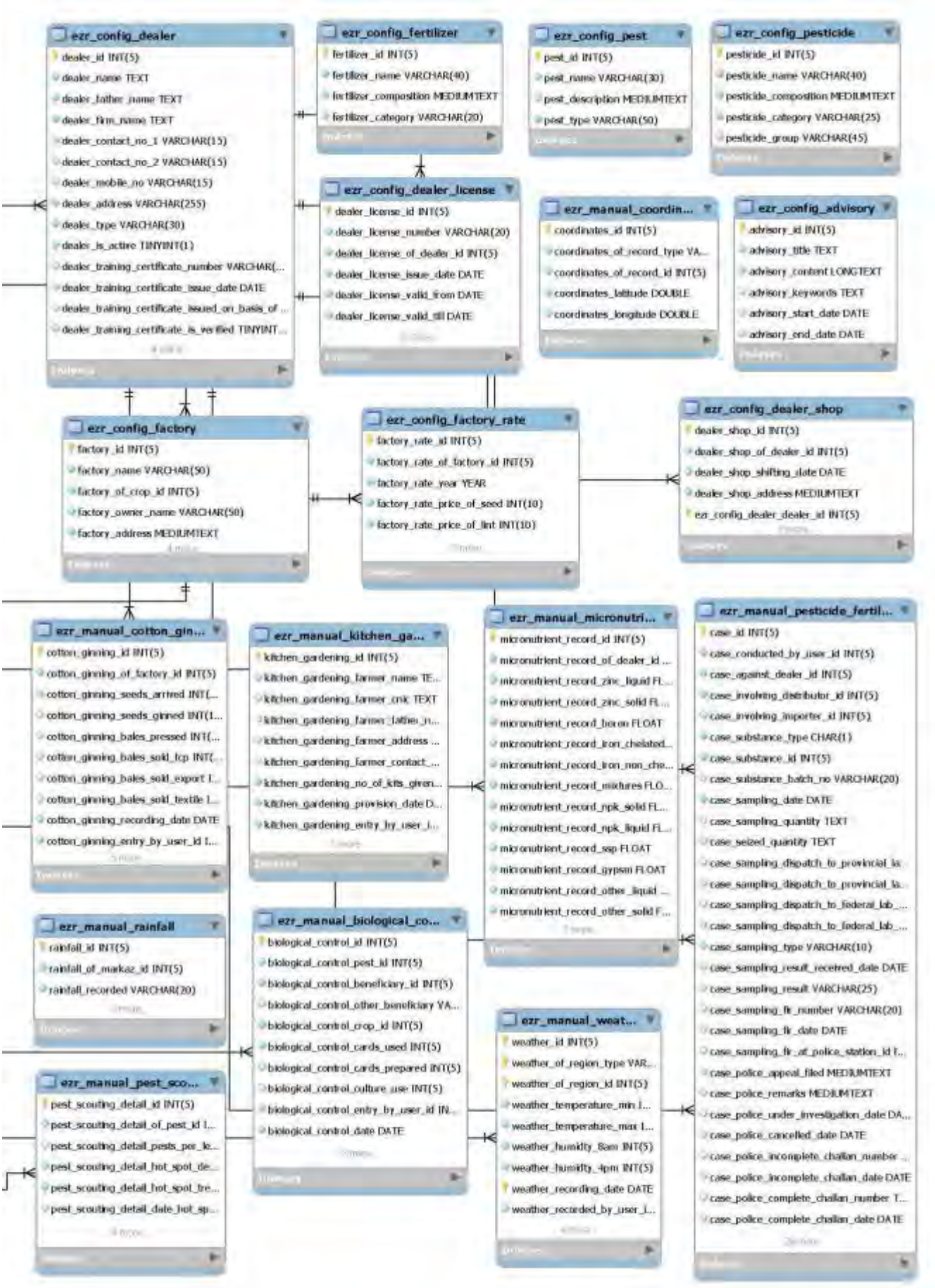


Figure 7 Entity relationship diagram (part 2)

5. E-Zaraat Help Desk

CABI's help desk solution is designed for receiving and transmitting a large volume of calls. Inbound calls can be made by customers, for example field agents or farmers to obtain information or ask for some help. In contrast, outbound calls are made by call centre agents to field agents or farmers. Call centre staff will organised into a multi-tier support system for more efficient handling of calls. The first tier consists of operators who will initially answer calls and provide general information. If a caller requires more assistance, call will forward to the second tier (in the appropriate department/field agent depending on the nature of call). In some cases, there can be three or more tiers of support. Typically the third tier of support is formed of highly skilled technical support staff. Below diagram will explain the inbound call flow.

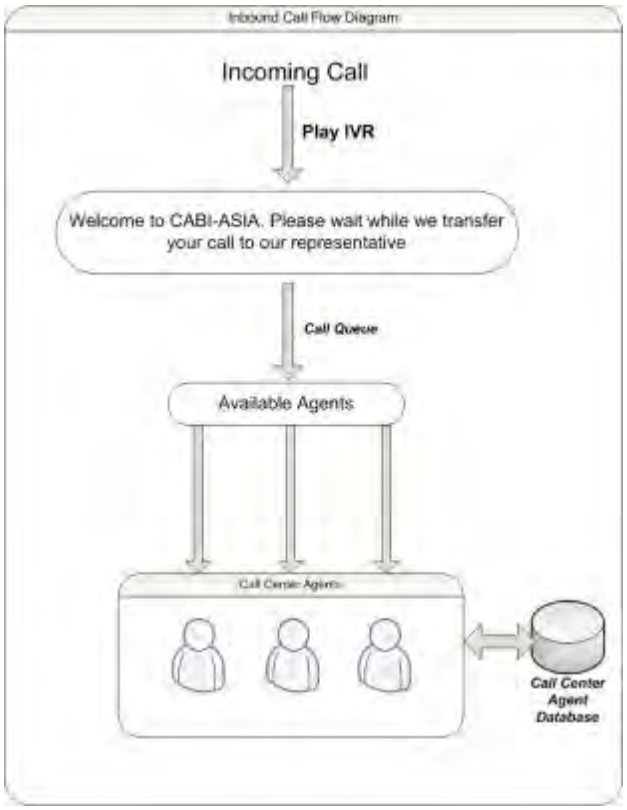


Figure 8 Inbound call flow

The help desk is proposed to be an Asterisk based call centre solution. Asterisk is a Linux based, Open Source and free Call Centre software, that provides all the features expected from a fairly complex Call Centre. Asterisk is designed to allow new interfaces and technologies to be added easily. Its goal is to support every kind of telephony technology possible (4).

SIP, Session Initiation Protocol, is used as VoIP Protocol for the help desk. SIP is an application-layer control (signalling) protocol for creating, modifying and terminating calls.

Database, mysql is used as the database for Asterisk. Database is proposed to be configured/installed on the same server on which Asterisk is installed. The database will store following type of data:

- Call Center Agent ID/Password
- Stats of Call Center Agents i.e. number of calls handled or answered by a call center agent

5.1 CABI Help desk capabilities:

System should be scalable enough to handle multiple Call Centre Agents with 100 simultaneous inbound/outbound calls. Additionally, the help desk should be able to cater to the following requirements:

- Incoming call
- Outgoing call
- CLI
- Internal calling
- Caller Line Identification Presentation
- Call Transfer
- Three way calling
- Ring Group
- Multiple IVRs and Auto attended
- Multiple Music on Hold
- Multiple Queues
- Call Recording
- Time based announcement/IVR
- Pickup group
- Call forwarding
- Abbreviated dialling
- Conference Room
- Incoming call screening
- Call monitoring
- Call recording
- Auto Dialler
- BLF (Busy Lamp Field)
- Echo cancellation

5.2 Reporting:

Call Center System should provide following type of reporting for Call Center Agents:

Total number of answered calls	Total number of answered calls in a queue and total number of answered calls by an agent.
Total number of abandoned calls	Total abandoned calls in a queue
Total talk time of an agent	Total talk time of an agent
Total answered calls of an agent	Total number of answered calls of an agent
Total and average hold time	Report should give full information of total hold time of calls that remained in a queue unless it was attended and average hold time for all calls landed in a queue.
Hourly, Daily, Monthly and yearly base call log of agents	All upper reported should be available in Hourly, Daily, Monthly and yearly basis.

6. References:

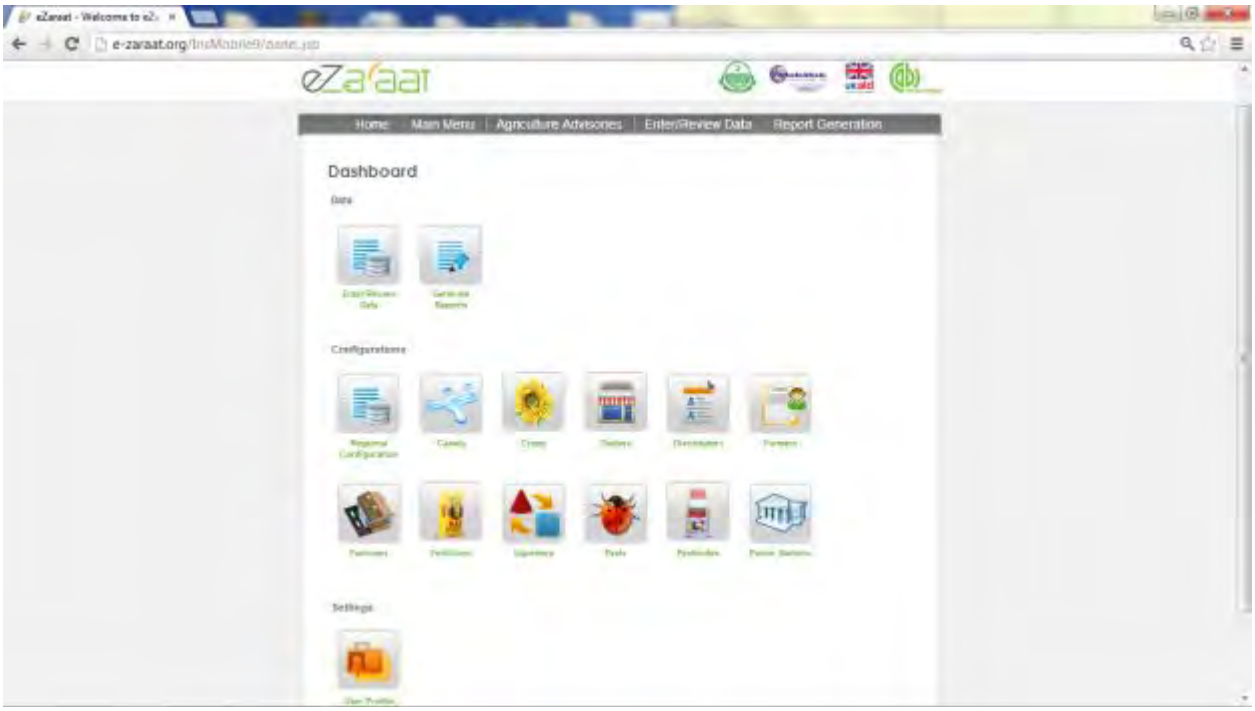
1) Siraj, M. A model for ICT based services for agriculture extension in Pakistan. R4D. [Online] March 2010. http://www.dfid.gov.uk/r4d/Output/187171/Default.aspx
2) Extension Dept in Vehari, Sargodha and Sialkot. January and March 2012.
3) Mahmood, Tariq, et al., et al. Meeting to Review the E-Zaraat Design. CABI-Rawalpindi, October 4th & 5th, 2012.
4) Digium the Asterisk Company. [Online] www.digium.com

7. Appendix

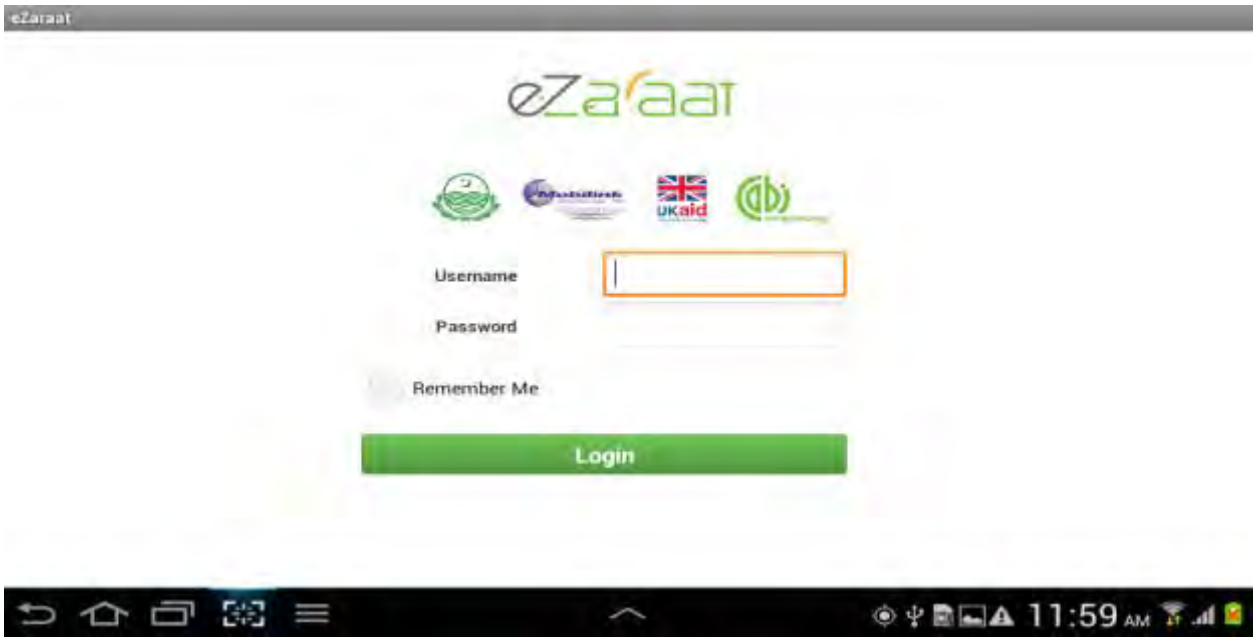
Annex-1 List of Reports from Vehari District Office

	Report Description
1	Daily ABC Urea
2	Daily Progress of Kitchen Gardening Sale of See Kits
3	Rain Fall as and When
	Weekly Reports
4	Monitoring of Fertilizer Rates
5	Canal Water Supply Position
6	Sowing position of Rice Crop
7	Sowing position of Maize Crop
8	Sowing position of Sugar Cane crop
9	Sowing position of Sunflower
10	Sowing position of Wheat Crop
11	Sowing position of Cotton Crop
12	Pesticide and Fertilizer Sample Drawn
13	Pest Scouting of Cotton Crop Drawn
14	Farmer training programmes
15	Progress of Seed Graders
16	Stock Position of Fertilizers
	Monthly Reports
17	Crop Situation
18	Pesticide Sample
19	Fertilizer Sample
20	Weather Data
21	Maintain record of fertilizer micronutrient products
22	Monitoring of anti-adulteration Campaign of Pesticide on A & B Performa (Inspector-wise)
23	Monitoring of anti-adulteration Campaign of Fertilizer on A & B Performa (Inspector-Wise)
24	Monitoring of urea Fertilizer Activities against high pricing during
25	Summary of fertilizer cases status wise from 1998 to _____
26	Summary of fertilizer cases from 1998 from September 2011
27	Pesticide fertilizer raids from January to fortnight summary of samples
28	Pesticide fertilizer on Performa ABC & A to G Performa
29	Temperature data

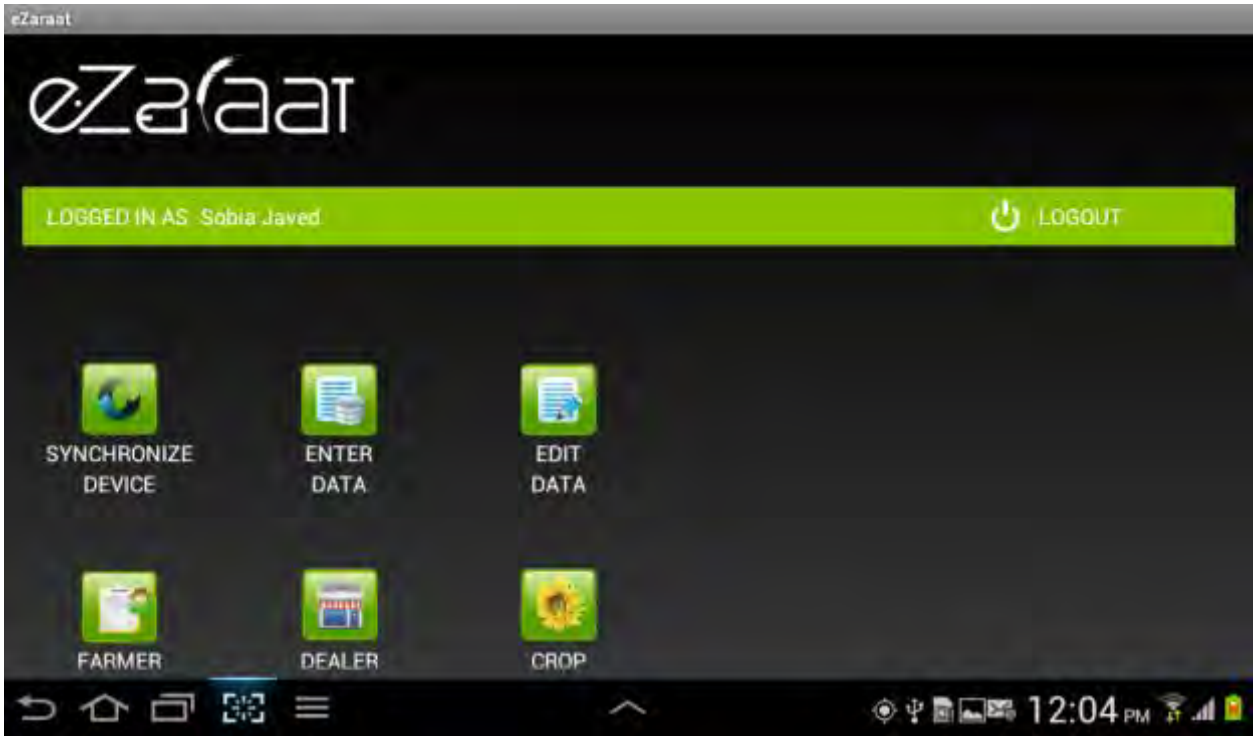
Annex-2 E-Zaraat Web App Interface



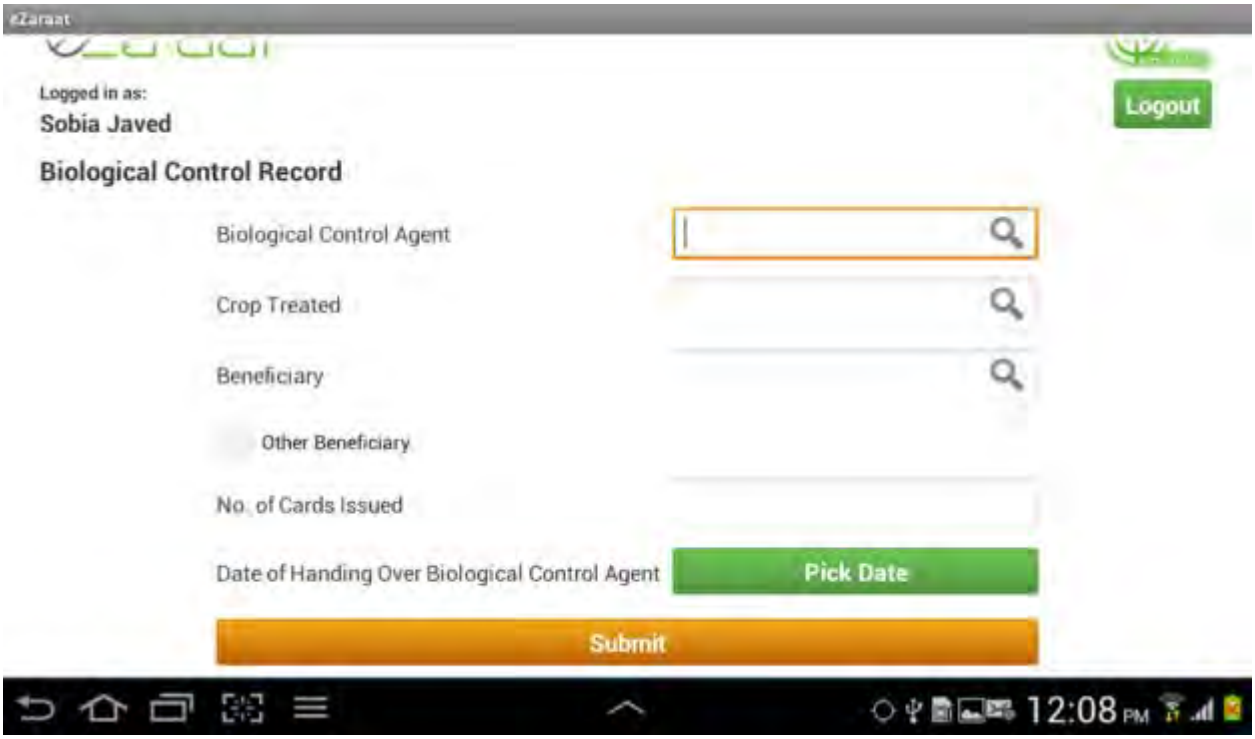
Main Dashboard



Login Screen

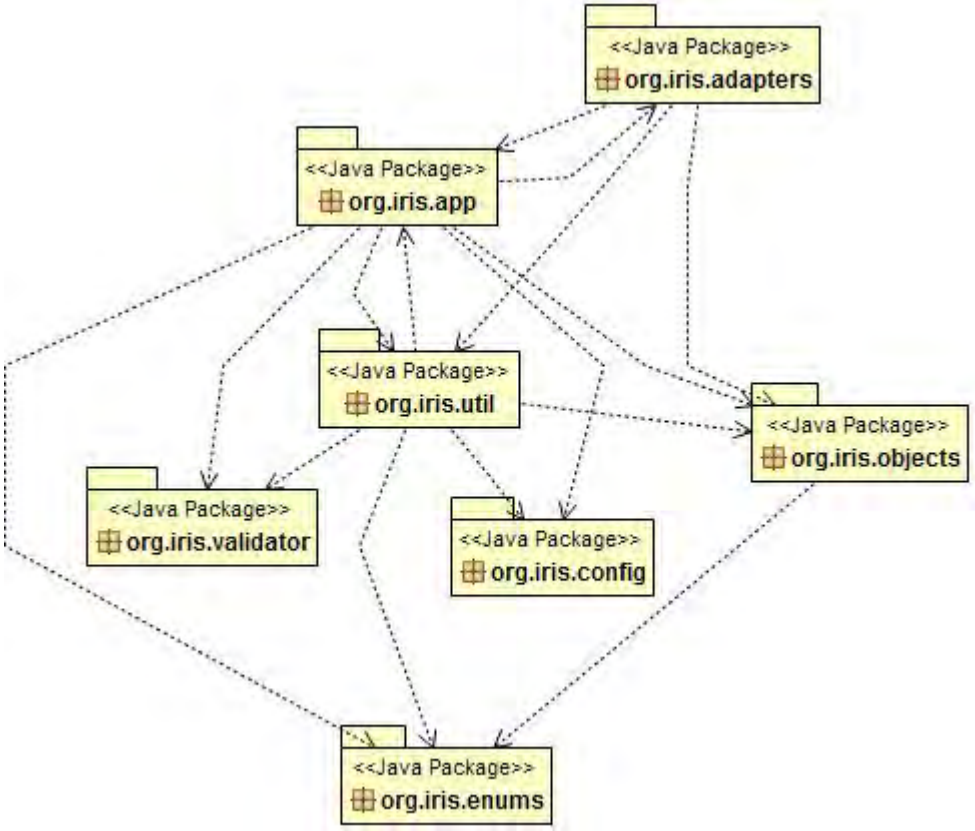


Welcome Screen

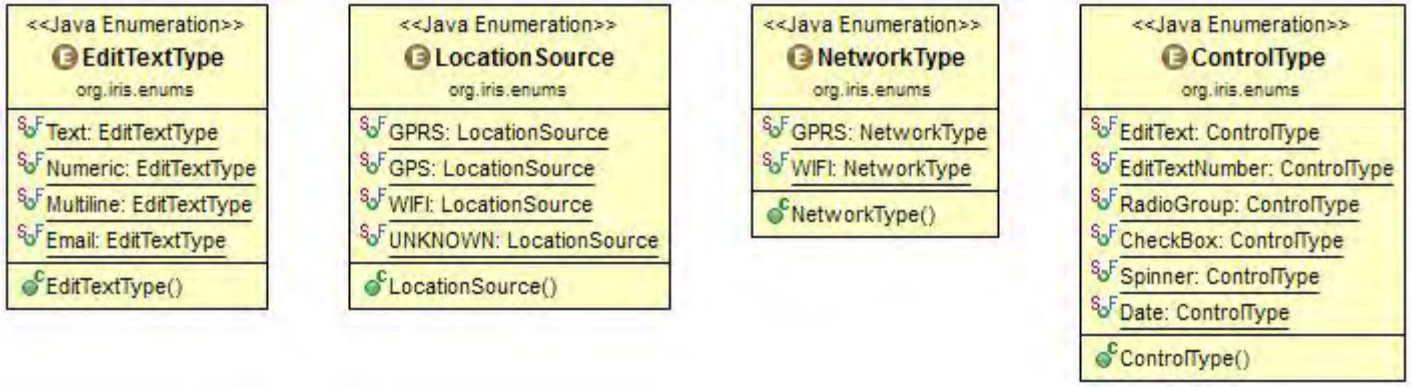


A Sample Survey Screen

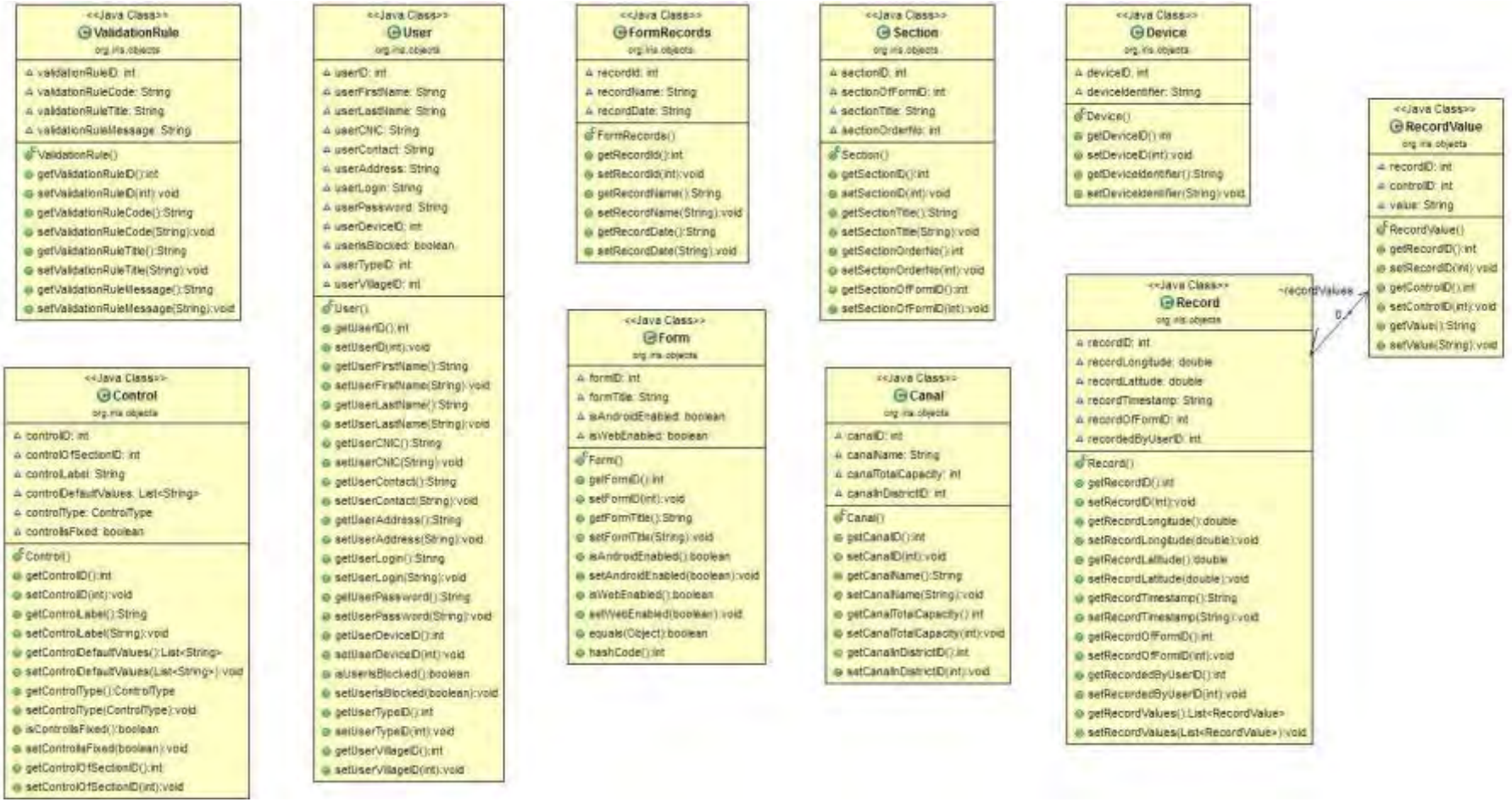
4A. Application Packages

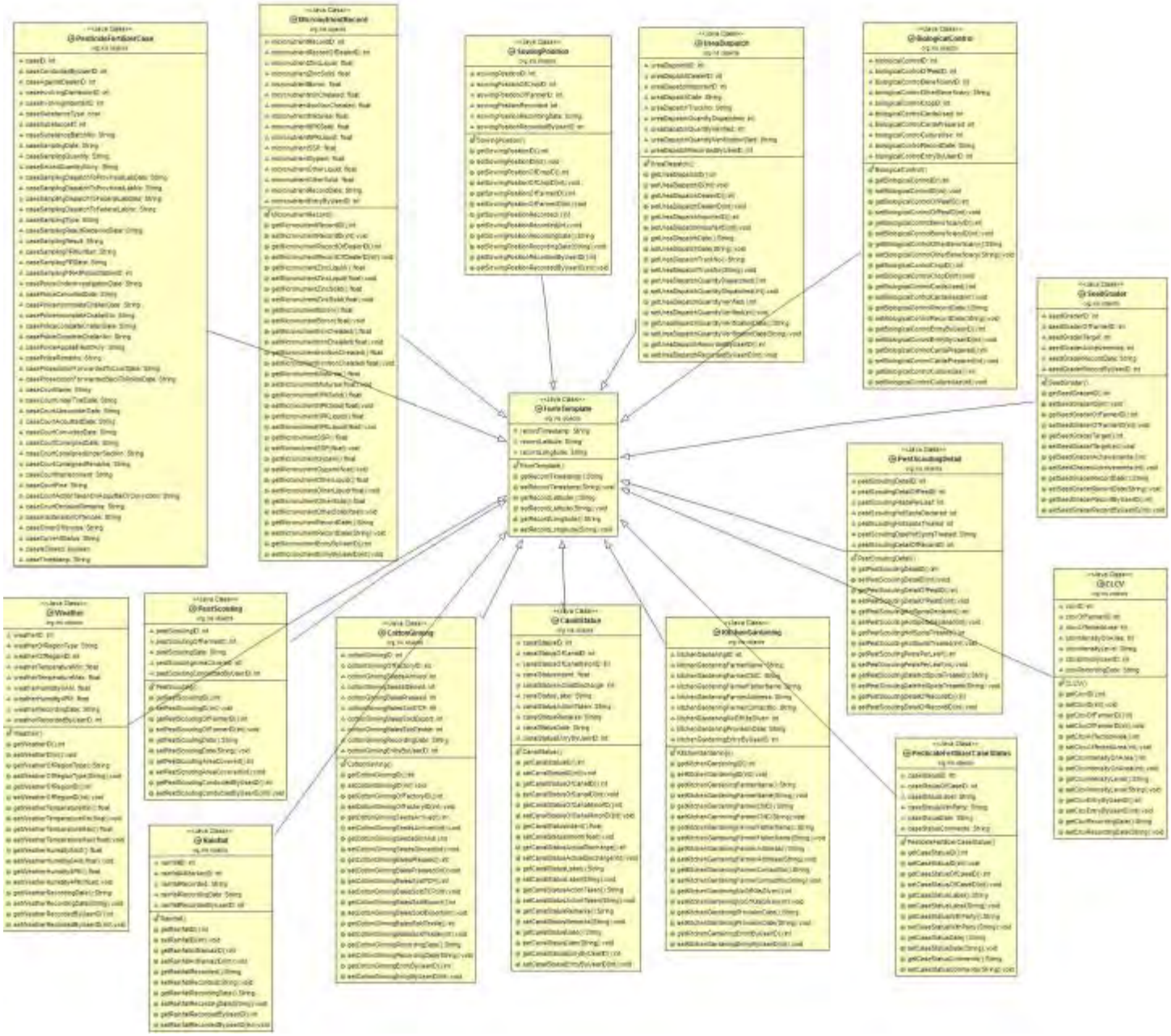


4B. Enumerated Data Types (org.iris.enums)



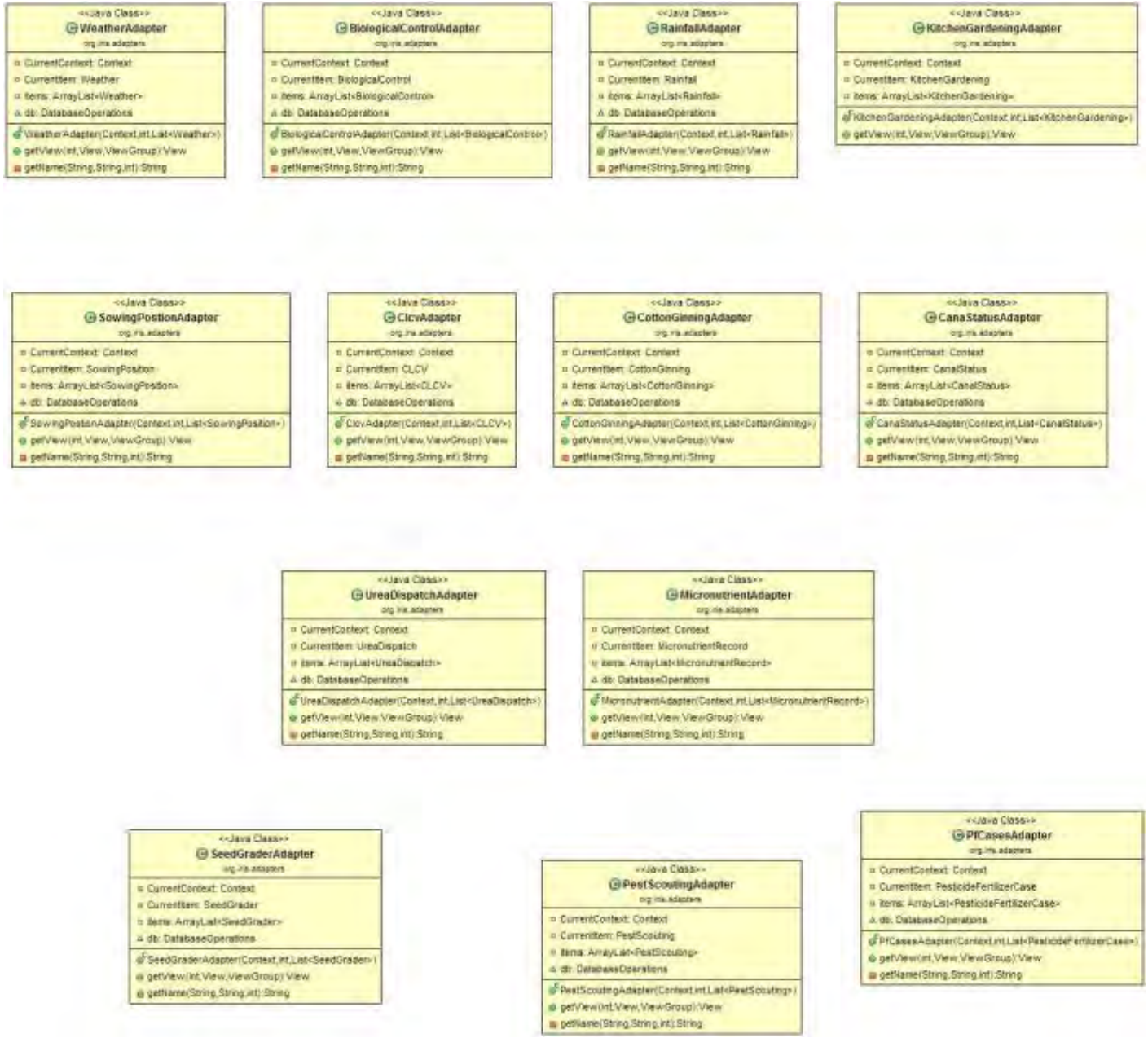
4C. Form Entity Objects (org.iris.objects)



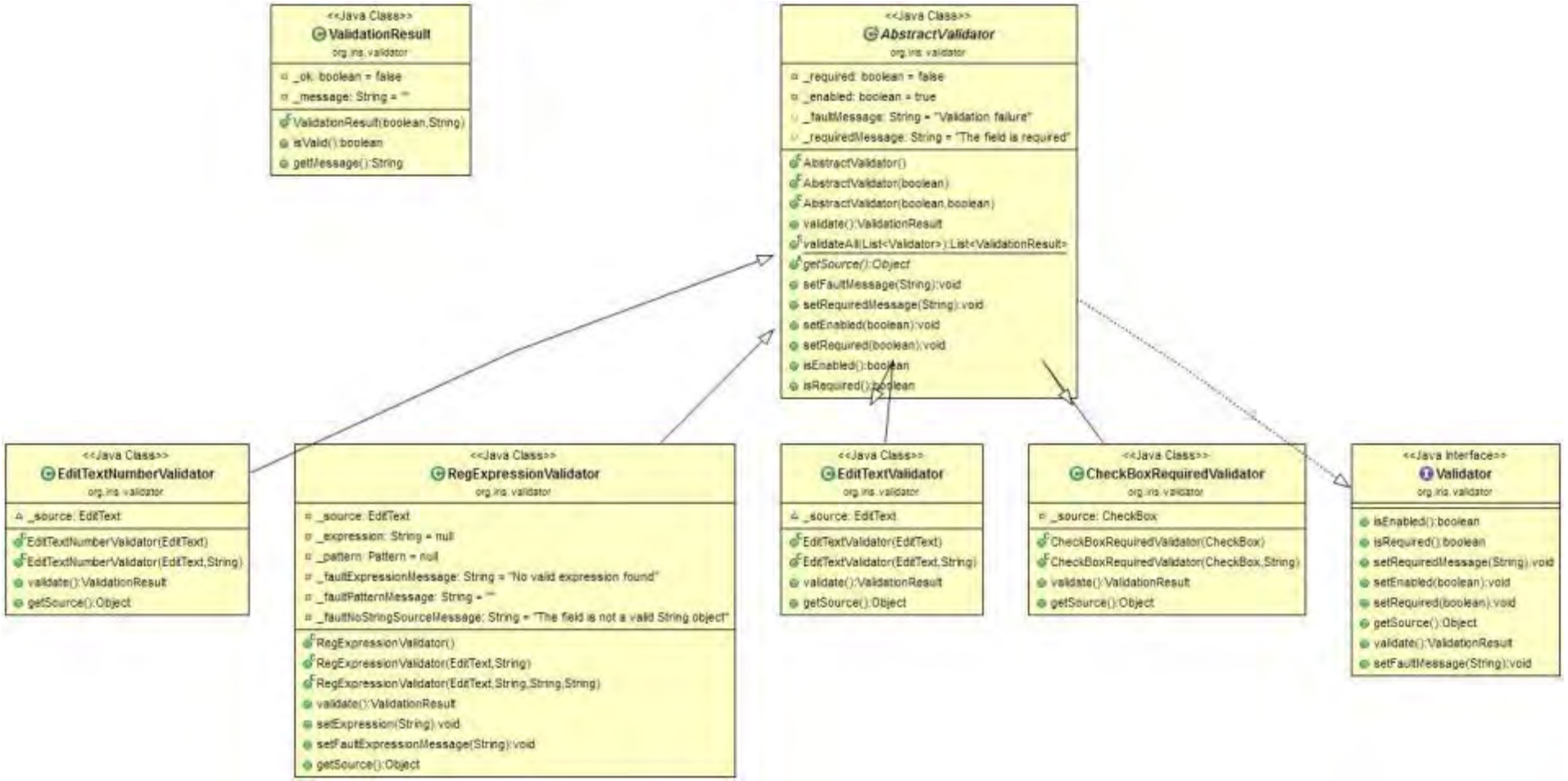


4D. Configuration Entity Objects (org.iris.config)

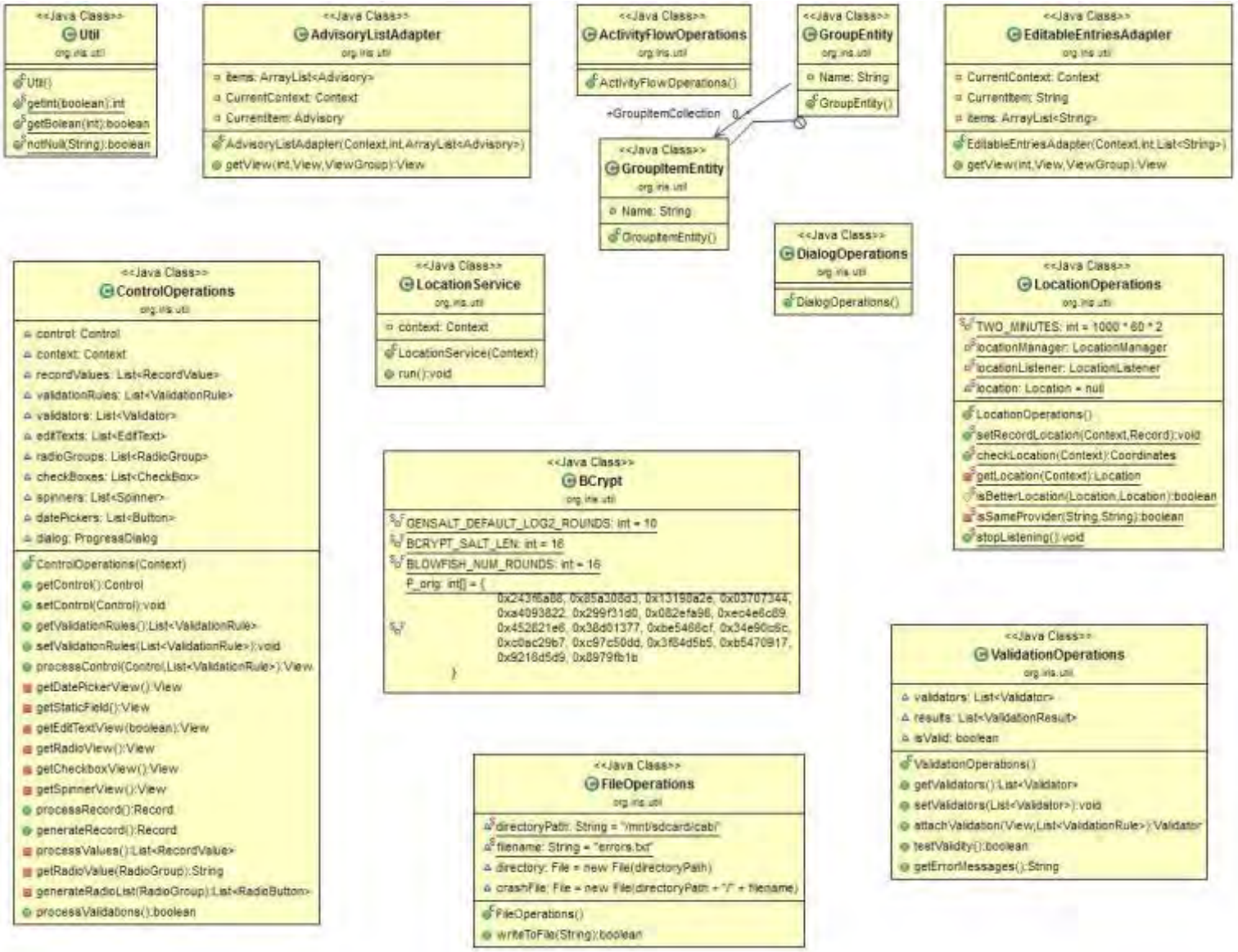
4E. Adapter Classes (org.iris.adapters)

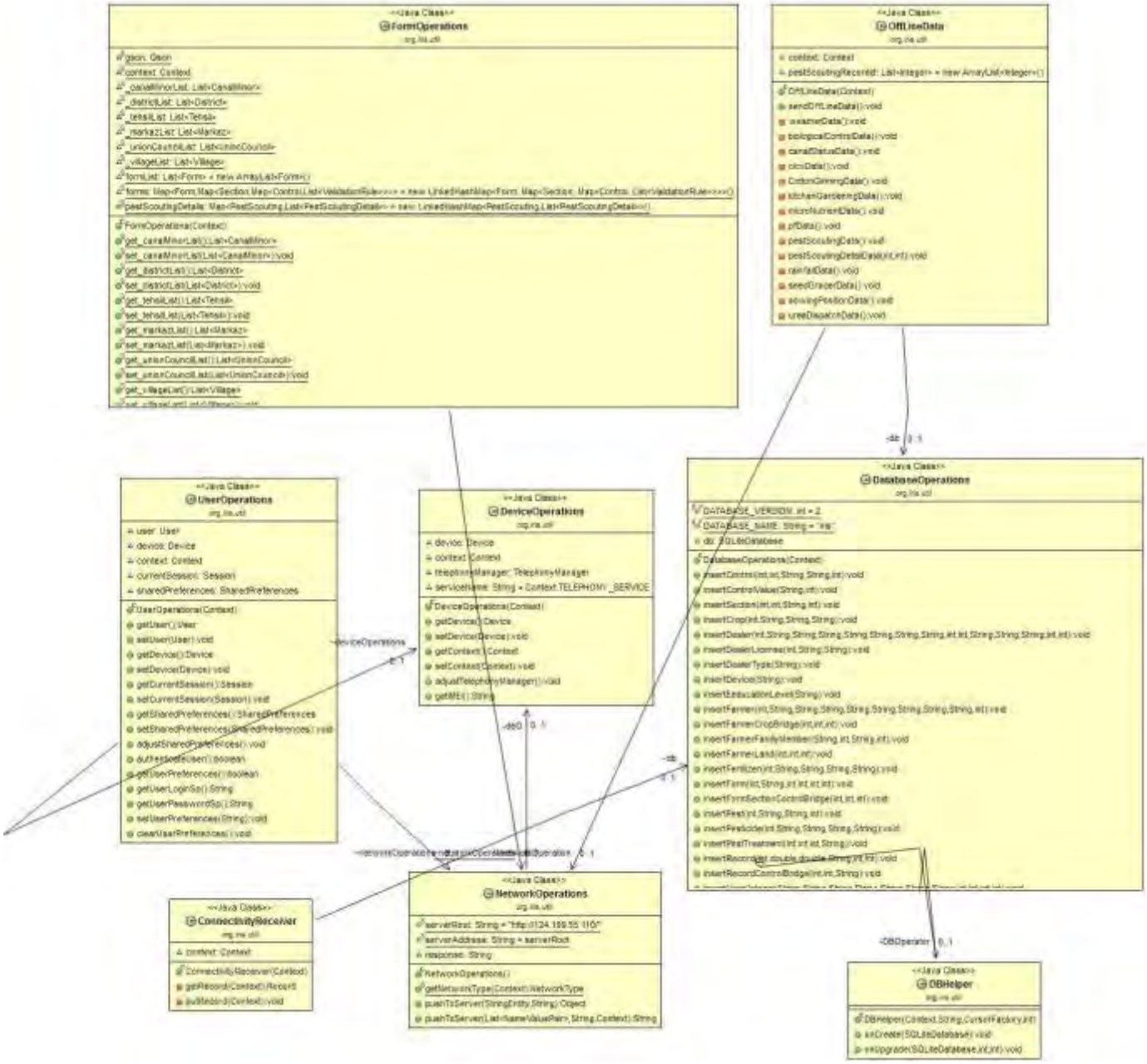


4F. Validation Classes (org.iris.validator)

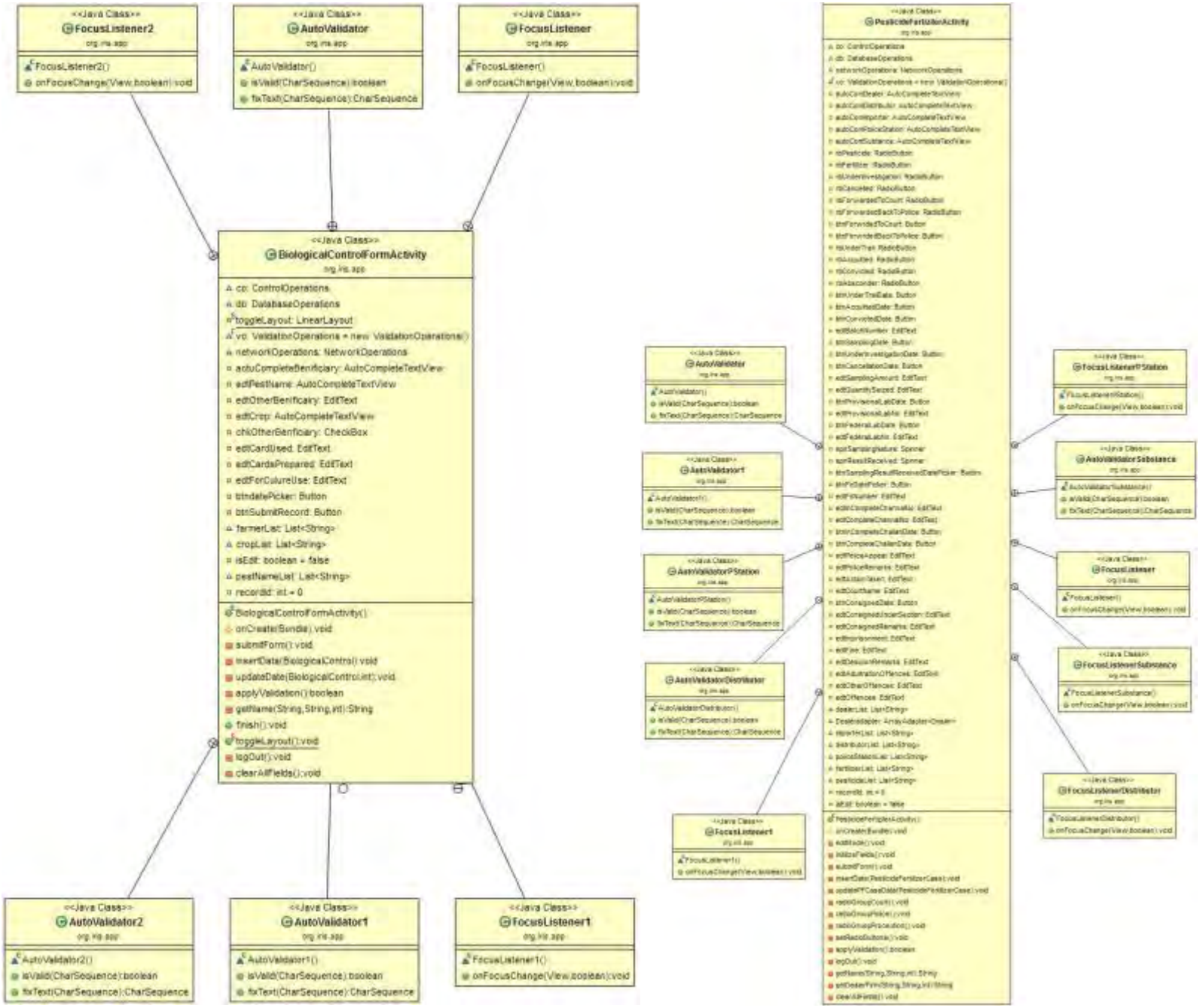


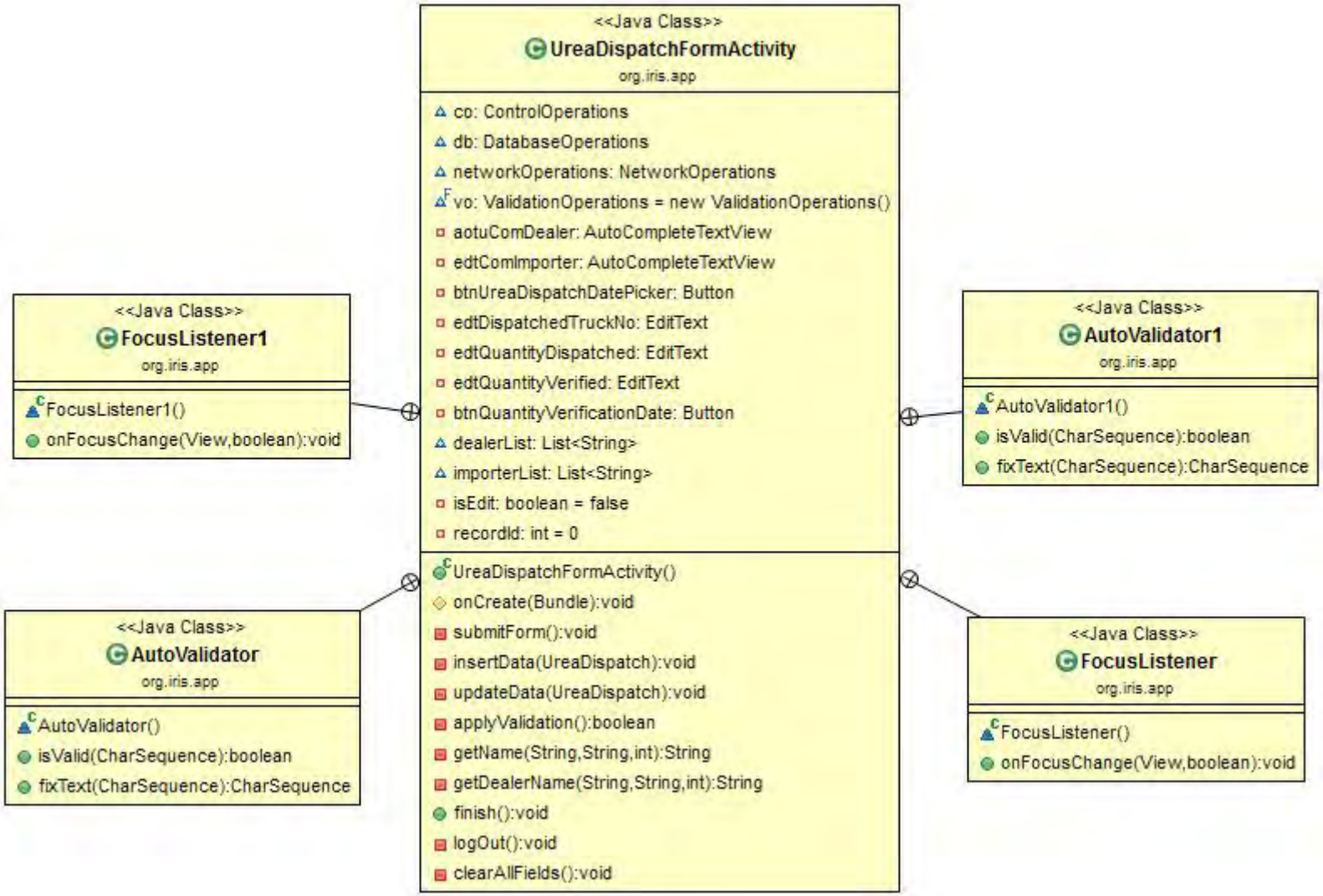
4G. Operation Functions and Utilities (org.iris.util)

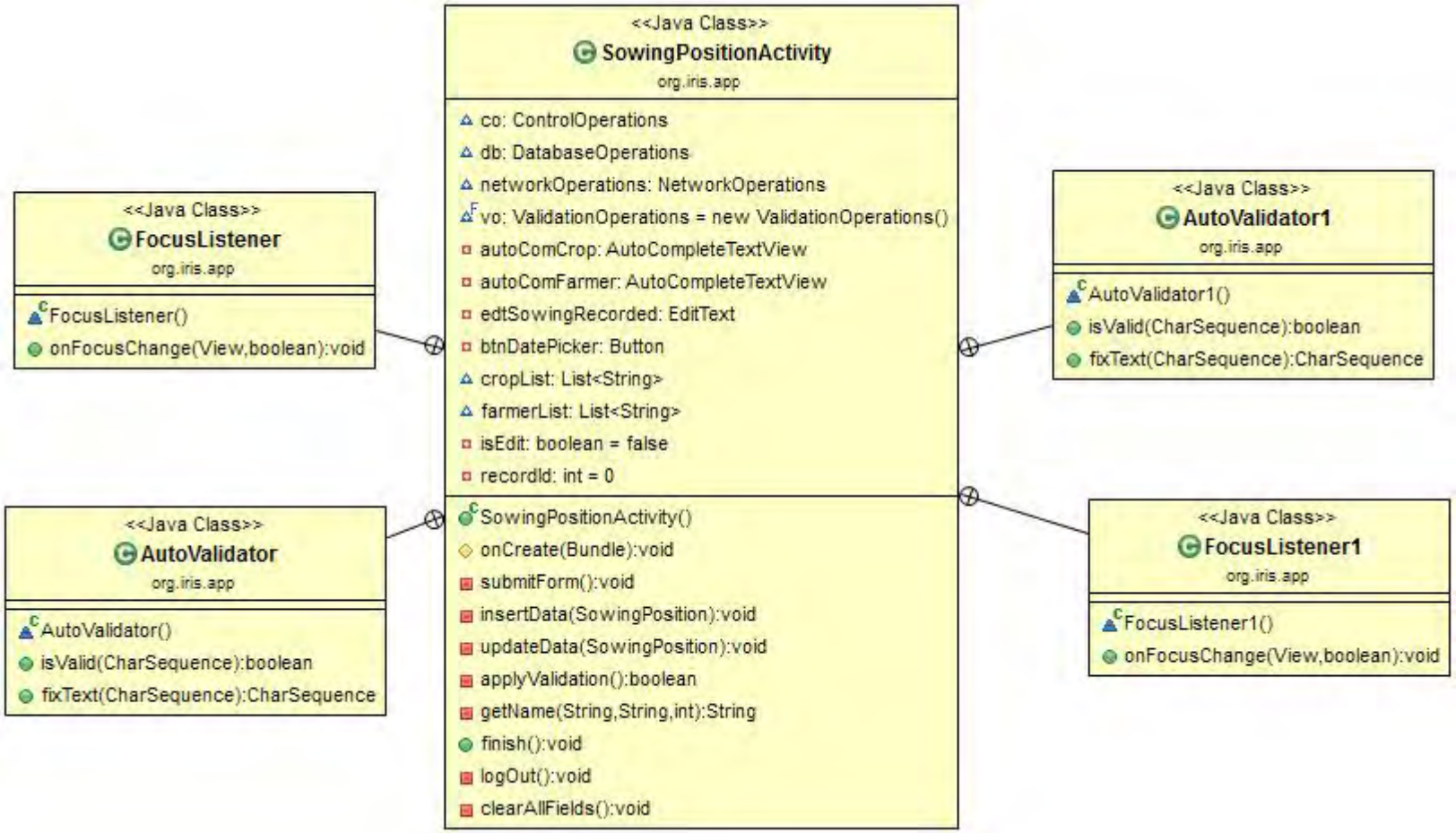


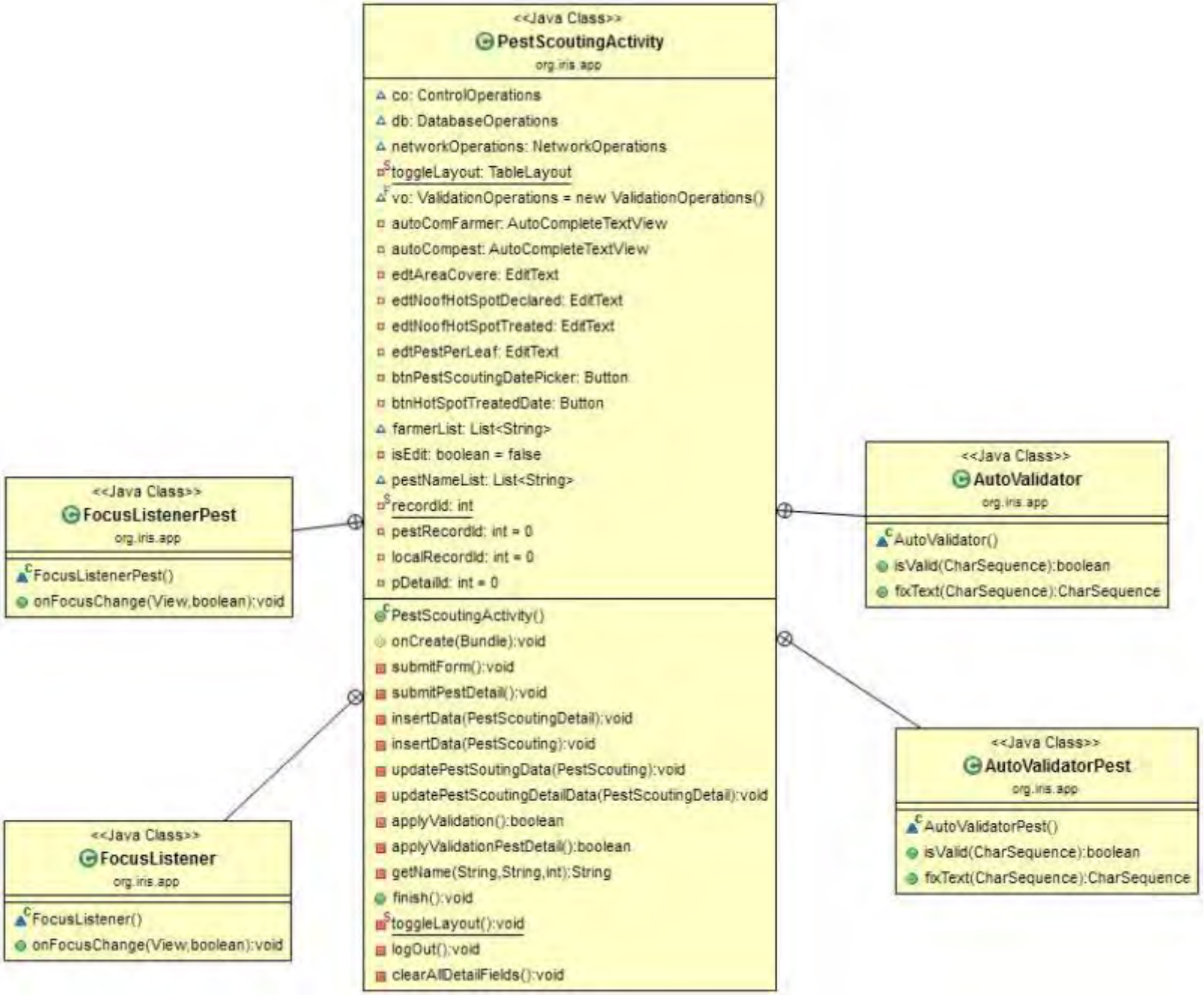

«Java Class»
FormOperations
org.ris.util
gson: Gson
context: Context
_canalMinorList: List<CanalMinor>
_districtList: List<District>
_tehsilList: List<Tehsil>
_markazList: List<Markaz>
_unionCouncilList: List<UnionCouncil>
_villageList: List<Village>
formList: List<Form> = new ArrayList<Form>()
forms: Map<Form,Map<Section,Map<Control,List<ValidationRule>>>> = new LinkedHashMap<Form, Map<Section, Map<Control, List<ValidationRule>>>>()
pestScoutingDetails: Map<PestScouting,List<PestScoutingDetail>> = new LinkedHashMap<PestScouting,List<PestScoutingDetail>>()
FormOperations(Context)
get_canalMinorList():List<CanalMinor>
set_canalMinorList(List<CanalMinor>):void
get_districtList():List<District>
set_districtList(List<District>):void
get_tehsilList():List<Tehsil>
set_tehsilList(List<Tehsil>):void
get_markazList():List<Markaz>
set_markazList(List<Markaz>):void
get_unionCouncilList():List<UnionCouncil>
set_unionCouncilList(List<UnionCouncil>):void
get_villageList():List<Village>
«Java Class»
OffLineData
org.ris.util
context: Context
pestScoutingRecordId: List<Integer> = new ArrayList<Integer>()
OffLineData(Context)
sendOffLineData():void
weatherData():void
biologicalControlData():void
canalStatusData():void
cicoData():void
CottonGinningData():void
kitchenGardeningData():void
micronutrientData():void
pfData():void
pestScoutingData():void
pestScoutingDetailData(int):void
rainfallData():void
seedGraderData():void
sowingPositionData():void
treeDesktopData():void
-db
0..1
«Java Class»
UserOperations
org.ris.util
user: User
device: Device
context: Context
currentSession: Session
sharedPreferences: SharedPreferences
UserOperations(Context)
getUser():User
setUser(User):void
getDevice():Device
setDevice(Device):void
getCurrentSession():Session
setCurrentSession(Session):void
getSharedPreferences():SharedPreferences
setSharedPreferences(SharedPreferences):void
adjustSharedPreferences():void
authenticateUser():boolean
getUserPreferences():boolean
getUserLoginSp():String
getUserPasswordSp():String
setUserPreferences():String():void
clearUserPreferences():void
-deviceOperations
0..1
«Java Class»
DeviceOperations
org.ris.util
device: Device
context: Context
telephonyManager: TelephonyManager
serviceName: String = Context.TELEPHONY_SERVICE
DeviceOperations(Context)
getDevice():Device
setDevice(Device):void
getContext():Context
setContext(Context):void
adjustTelephonyManager():void
getIMEI():String
-deO
0..1
«Java Class»
DatabaseOperations
org.ris.util
DATABASE_VERSION: int = 2
DATABASE_NAME: String = "ris"
db: SQLiteDatabase
DatabaseOperations(Context)
insertControl(int,int,String,String,int):void
insertControlValue(String,int):void
insertSection(int,int,String,int):void
insertCrop(int,String,String,String):void
insertDealer(int,String,String,String,String,String,String,String,int,int,String,String,String,int,int):void
insertDealerLicense(int,String,String):void
insertDealerType(String):void
insertDevice(String):void
insertEducationLevel(String):void
insertFarmer(int,String,String,String,String,String,String,String,String,int):void
insertFarmerCropBridge(int,int,int):void
insertFarmerFamilyMember(String,int,String,int):void
insertFarmerLand(int,int,int):void
insertFertilizer(int,String,String,String,String):void
insertFarm(int,String,int,int,int,int):void
insertFormSectionControlBridge(int,int,int):void
insertPest(int,String,String,int):void
insertPesticide(int,String,String,String,String):void
insertPestTreatment(int,int,int,String):void
insertRecord(int,double,double,String,int,int):void
insertRecordControlBridge(int,int,String):void
-db
0..1
«Java Class»
ConnectivityReceiver
org.ris.util
context: Context
ConnectivityReceiver(Context)
getRecord(Context):Record
buildIds(Context):void
«Java Class»
NetworkOperations
org.ris.util
serverRoot: String = "http://124.109.55.110/"
serverAddress: String = serverRoot
response: String
NetworkOperations()
getNetworkType(Context):NetworkType
pushToServer(StringEntity,String):Object
pushToServer(List<NameValuePair>,String,Context):String
-DBOperator
0..1
«Java Class»
DBHelper
org.ris.util
DBHelper(Context,String,CursorFactory,int)
onCreate(SQLiteDatabase):void
onUpgrade(SQLiteDatabase,int,int):void

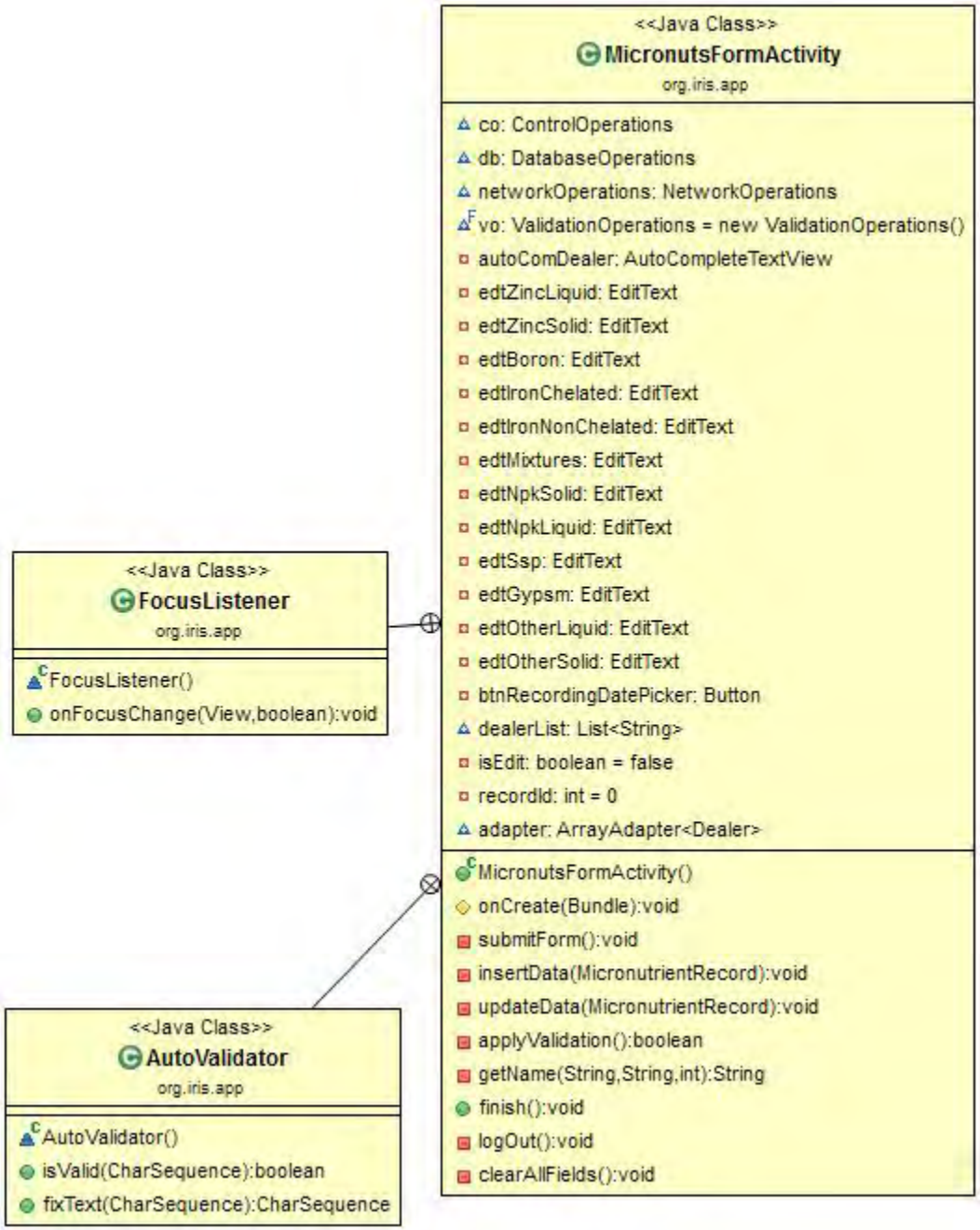
4H. Application Activities (org.iris.app)

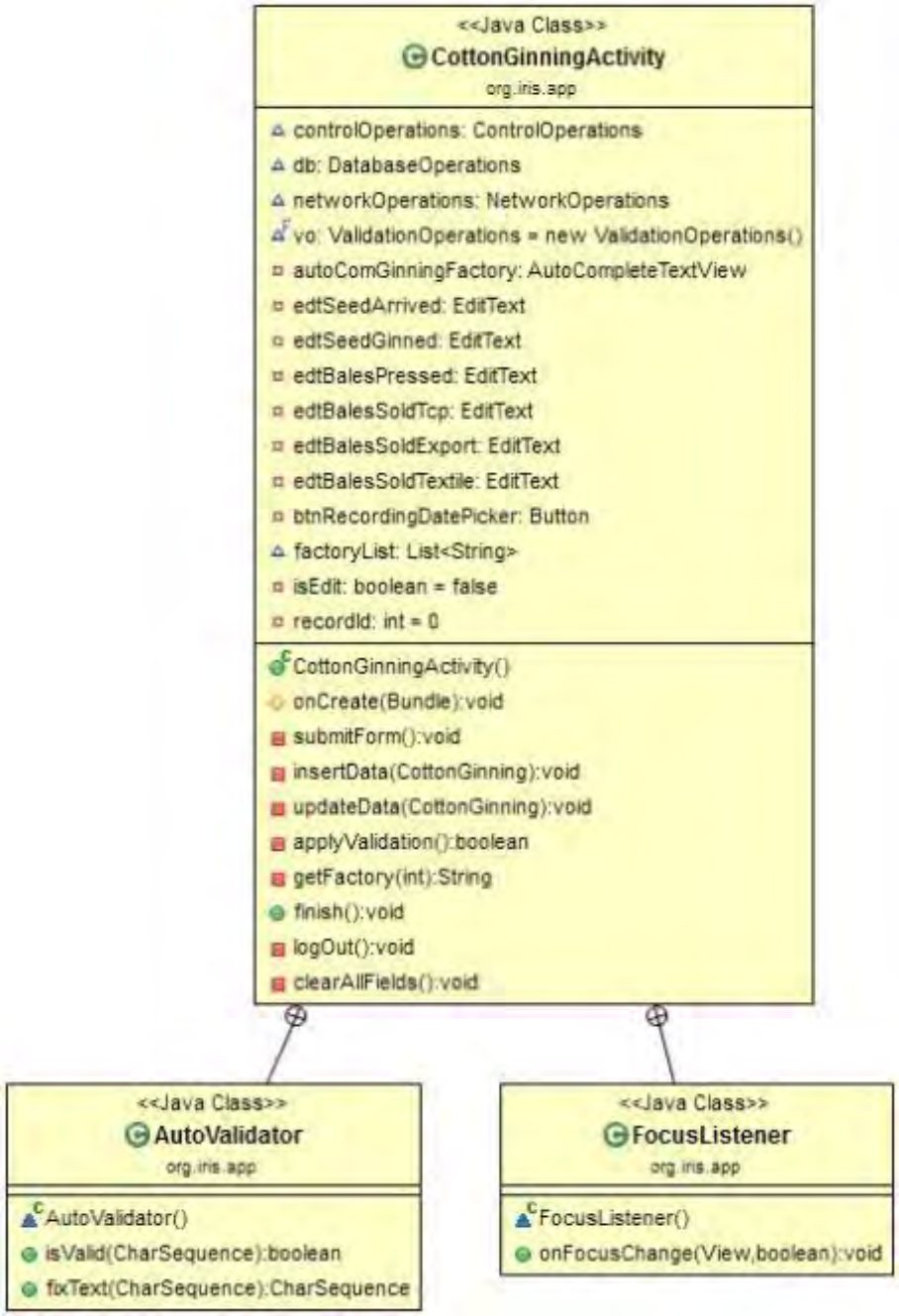

FocusListener2
org.iris.app
FocusListener2()
onFocusChange(View,boolean):void
AutoValidator
org.iris.app
AutoValidator()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
FocusListener
org.iris.app
FocusListener()
onFocusChange(View,boolean):void
BiologicalControlFormActivity
org.iris.app
cp: ControlOperations
db: DatabaseOperations
toggleLayout: LinearLayout
vo: ValidatorOperations = new ValidatorOperations()
networkOperations: NetworkOperations
actvCompleteBenficiary: AutoCompleteTextView
edtPestName: AutoCompleteTextView
edtOtherBenficiary: EditText
edtCrop: AutoCompleteTextView
chkOtherBenficiary: CheckBox
edtCardUsed: EditText
edtCardsPrepared: EditText
edtForCulureUse: EditText
btndatePicker: Button
btnSubmitRecord: Button
farmerList: List<String>
cropList: List<String>
isEdit: boolean = false
pestNameList: List<String>
recordId: int = 0
BiologicalControlFormActivity()
onCreate(Bundle):void
submitForm():void
insertDateBiologicalContro():void
updateDate(BiologicalControl,int):void
applyValidation():boolean
getName(String,String,int):String
finish():void
toggleLayout():void
logOut():void
clearAllFields():void
AutoValidator2
org.iris.app
AutoValidator2()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
AutoValidator1
org.iris.app
AutoValidator1()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
FocusListener1
org.iris.app
FocusListener1()
onFocusChange(View,boolean):void
PesticidePartitionActivity
org.iris.app
AutoValidator
org.iris.app
AutoValidator()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
AutoValidator1
org.iris.app
AutoValidator1()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
AutoValidatorPStation
org.iris.app
AutoValidatorPStation()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
AutoValidatorDistributor
org.iris.app
AutoValidatorDistributor()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
FocusListener1
org.iris.app
FocusListener1()
onFocusChange(View,boolean):void
FocusListenerPStation
org.iris.app
FocusListenerPStation()
onFocusChange(View,boolean):void
AutoValidatorSubstance
org.iris.app
AutoValidatorSubstance()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
FocusListener
org.iris.app
FocusListener()
onFocusChange(View,boolean):void
FocusListenerSubstance
org.iris.app
FocusListenerSubstance()
onFocusChange(View,boolean):void
FocusListenerDistributor
org.iris.app
FocusListenerDistributor()
onFocusChange(View,boolean):void

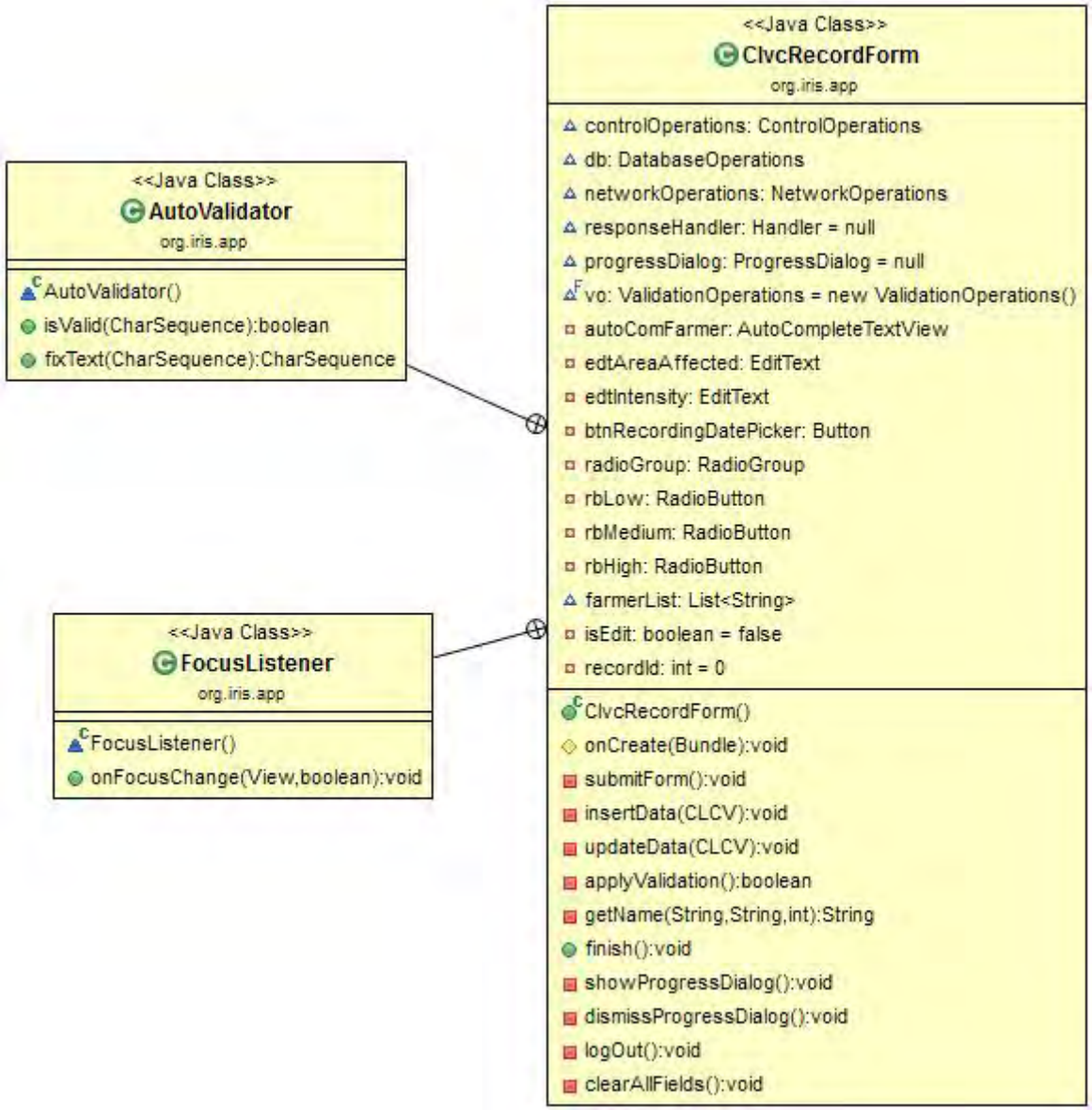

<<Java Class>>
UreaDispatchFormActivity
org.iris.app
co: ControlOperations
db: DatabaseOperations
networkOperations: NetworkOperations
vo: ValidationOperations = new ValidationOperations()
aotuComDealer: AutoCompleteTextView
edtComImporter: AutoCompleteTextView
btnUreaDispatchDatePicker: Button
edtDispatchedTruckNo: EditText
edtQuantityDispatched: EditText
edtQuantityVerified: EditText
btnQuantityVerificationDate: Button
dealerList: List<String>
importerList: List<String>
isEdit: boolean = false
recordId: int = 0
UreaDispatchFormActivity()
onCreate(Bundle):void
submitForm():void
insertData(UreaDispatch):void
updateData(UreaDispatch):void
applyValidation():boolean
getName(String,String,int):String
getDealerName(String,String,int):String
finish():void
logOut():void
clearAllFields():void
<<Java Class>>
FocusListener1
org.iris.app
FocusListener1()
onFocusChange(View,boolean):void
<<Java Class>>
AutoValidator1
org.iris.app
AutoValidator1()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
<<Java Class>>
AutoValidator
org.iris.app
AutoValidator()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
<<Java Class>>
FocusListener
org.iris.app
FocusListener()
onFocusChange(View,boolean):void

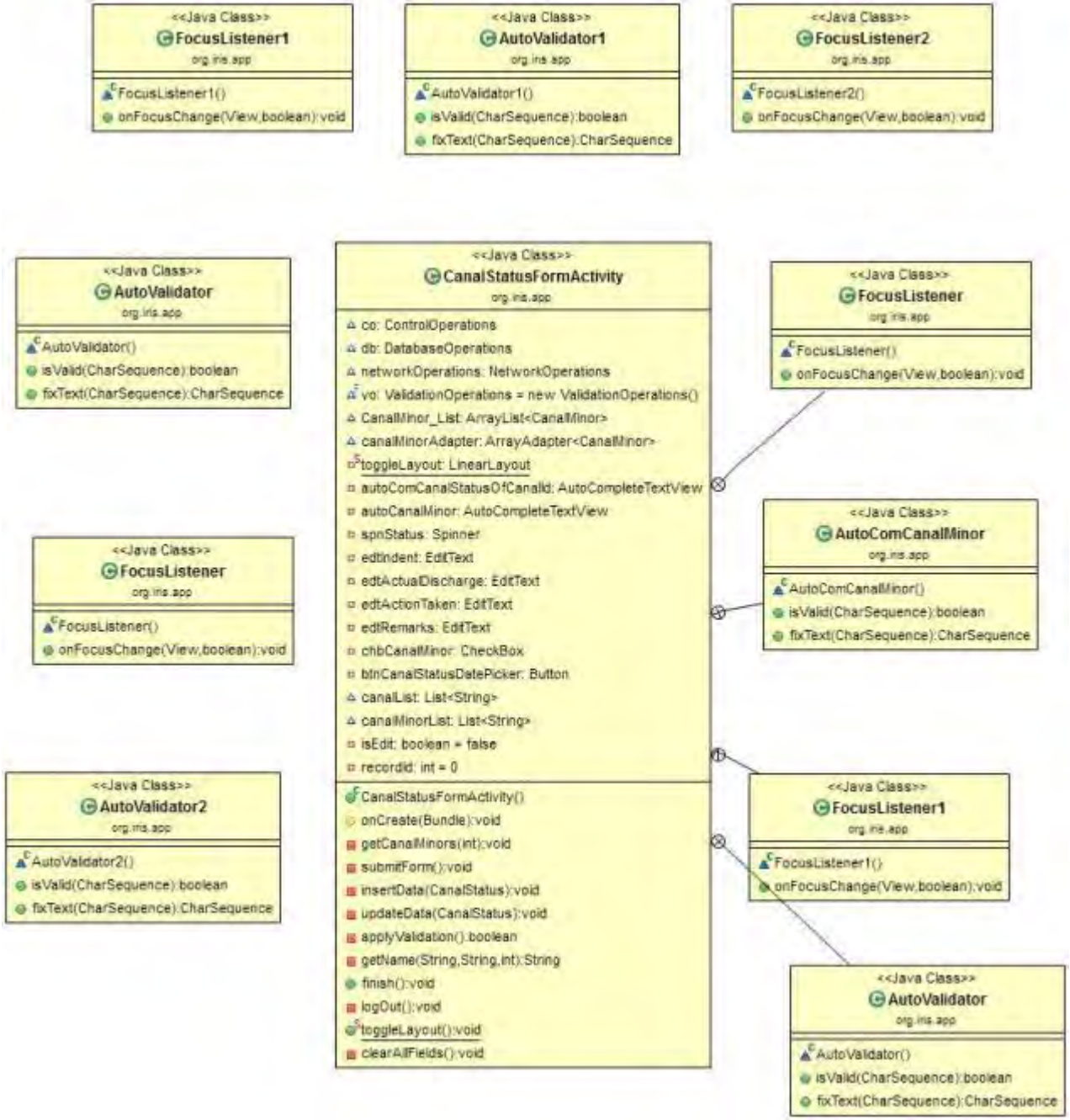

<<Java Class>>
SowingPositionActivity
org.iris.app
co: ControlOperations
db: DatabaseOperations
networkOperations: NetworkOperations
vo: ValidationOperations = new ValidationOperations()
autoComCrop: AutoCompleteTextView
autoComFarmer: AutoCompleteTextView
edtSowingRecorded: EditText
btnDatePicker: Button
cropList: List<String>
farmerList: List<String>
isEdit: boolean = false
recordId: int = 0
SowingPositionActivity()
onCreate(Bundle):void
submitForm():void
insertData(SowingPosition):void
updateData(SowingPosition):void
applyValidation():boolean
getName(String,String,int):String
finish():void
logOut():void
clearAllFields():void
<<Java Class>>
FocusListener
org.iris.app
FocusListener()
onFocusChange(View,boolean):void
<<Java Class>>
AutoValidator
org.iris.app
AutoValidator()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
<<Java Class>>
AutoValidator1
org.iris.app
AutoValidator1()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
<<Java Class>>
FocusListener1
org.iris.app
FocusListener1()
onFocusChange(View,boolean):void


<<Java Class>>
PestScoutingActivity
org.iris.app
co: ControlOperations
db: DatabaseOperations
networkOperations: NetworkOperations
toggleLayout: TableLayout
vo: ValidationOperations = new ValidationOperations()
autoComFarmer: AutoCompleteTextView
autoCompest: AutoCompleteTextView
edtAreaCovere: EditText
edtNoofHotSpotDeclared: EditText
edtNoofHotSpotTreated: EditText
edtPestPerLeaf: EditText
btnPestScoutingDatePicker: Button
btnHotSpotTreatedDate: Button
farmerList: List<String>
isEdit: boolean = false
pestNameList: List<String>
recordId: int
pestRecordId: int = 0
localRecordId: int = 0
pDetailId: int = 0
PestScoutingActivity()
onCreate(Bundle):void
submitForm():void
submitPestDetail():void
insertData(PestScoutingDetail):void
insertData(PestScouting):void
updatePestSoutingData(PestScouting):void
updatePestScoutingDetailData(PestScoutingDetail):void
applyValidation():boolean
applyValidationPestDetail():boolean
getName(String,String,int):String
finish():void
toggleLayout():void
logOut():void
clearAllDetailFields():void
<<Java Class>>
FocusListenerPest
org.iris.app
FocusListenerPest()
onFocusChange(View,boolean):void
<<Java Class>>
FocusListener
org.iris.app
FocusListener()
onFocusChange(View,boolean):void
<<Java Class>>
AutoValidator
org.iris.app
AutoValidator()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
<<Java Class>>
AutoValidatorPest
org.iris.app
AutoValidatorPest()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence


<<Java Class>>
MicronutsFormActivity
org.iris.app
co: ControlOperations
db: DatabaseOperations
networkOperations: NetworkOperations
vo: ValidationOperations = new ValidationOperations()
autoComDealer: AutoCompleteTextView
edtZincLiquid: EditText
edtZincSolid: EditText
edtBoron: EditText
edtIronChelated: EditText
edtIronNonChelated: EditText
edtMixtures: EditText
edtNpkSolid: EditText
edtNpkLiquid: EditText
edtSsp: EditText
edtGypsm: EditText
edtOtherLiquid: EditText
edtOtherSolid: EditText
btnRecordingDatePicker: Button
dealerList: List<String>
isEdit: boolean = false
recordId: int = 0
adapter: ArrayAdapter<Dealer>
MicronutsFormActivity()
onCreate(Bundle):void
submitForm():void
insertData(MicronutrientRecord):void
updateData(MicronutrientRecord):void
applyValidation():boolean
getName(String,String,int):String
finish():void
logOut():void
clearAllFields():void
<<Java Class>>
FocusListener
org.iris.app
FocusListener()
onFocusChange(View,boolean):void
<<Java Class>>
AutoValidator
org.iris.app
AutoValidator()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence


<<Java Class>>
CottonGinningActivity
org.iris.app
controlOperations: ControlOperations
db: DatabaseOperations
networkOperations: NetworkOperations
vo: ValidationOperations = new ValidationOperations()
autoComGinningFactory: AutoCompleteTextView
edtSeedArrived: EditText
edtSeedGinned: EditText
edtBalesPressed: EditText
edtBalesSoldTcp: EditText
edtBalesSoldExport: EditText
edtBalesSoldTextile: EditText
btnRecordingDatePicker: Button
factoryList: List<String>
isEdit: boolean = false
recordId: int = 0
CottonGinningActivity()
onCreate(Bundle):void
submitForm():void
insertData(CottonGinning):void
updateData(CottonGinning):void
applyValidation():boolean
getFactory(int):String
finish():void
logOut():void
clearAllFields():void
<<Java Class>>
AutoValidator
org.iris.app
AutoValidator()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
<<Java Class>>
FocusListener
org.iris.app
FocusListener()
onFocusChange(View,boolean):void

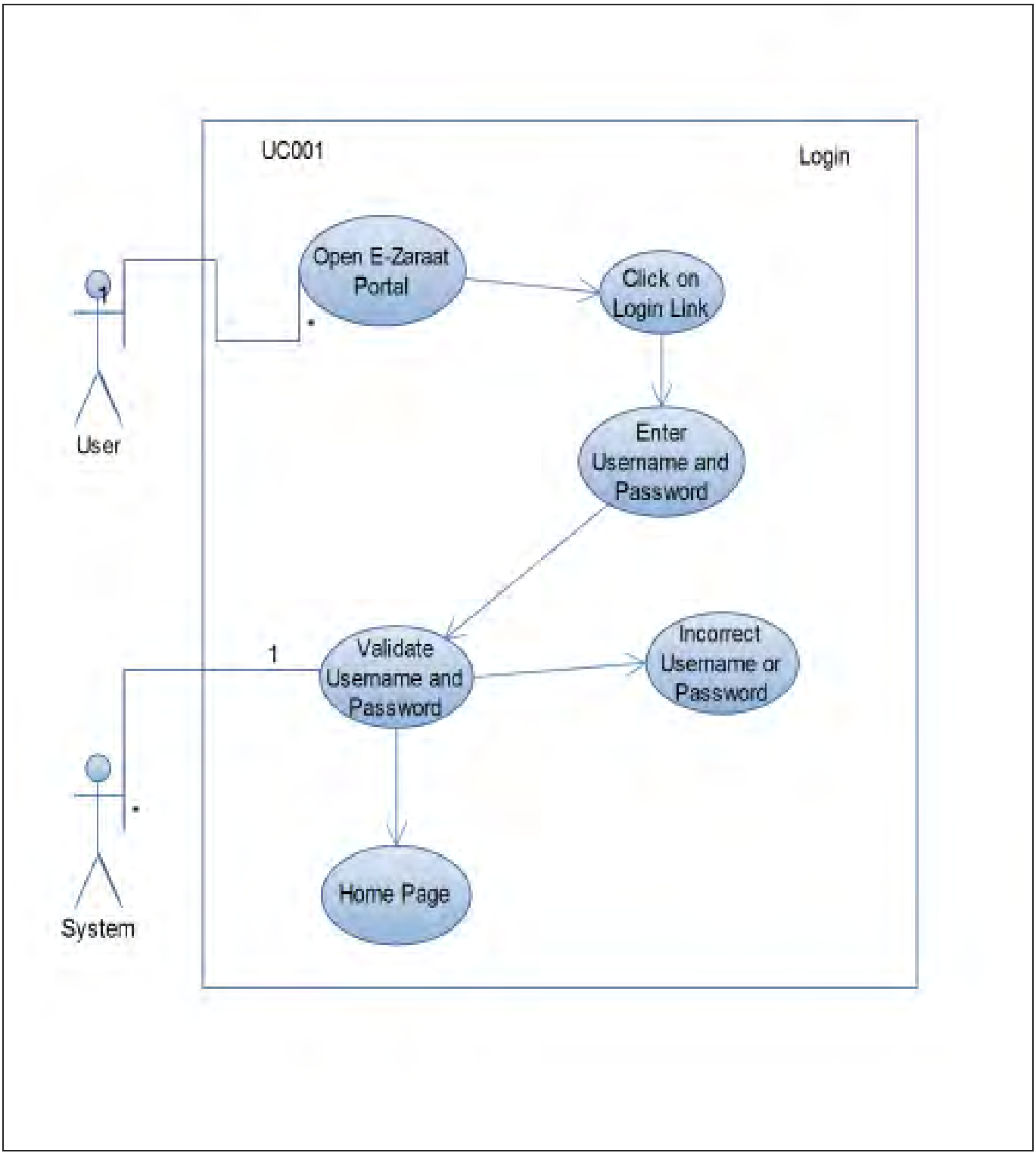

<<Java Class>>
ClvcRecordForm
org.iris.app
controlOperations: ControlOperations
db: DatabaseOperations
networkOperations: NetworkOperations
responseHandler: Handler = null
progressDialog: ProgressDialog = null
vo: ValidationOperations = new ValidationOperations()
autoComFarmer: AutoCompleteTextView
edtAreaAffected: EditText
edtIntensity: EditText
btnRecordingDatePicker: Button
radioGroup: RadioGroup
rbLow: RadioButton
rbMedium: RadioButton
rbHigh: RadioButton
farmerList: List<String>
isEdit: boolean = false
recordId: int = 0
ClvcRecordForm()
onCreate(Bundle):void
submitForm():void
insertData(CLCV):void
updateData(CLCV):void
applyValidation():boolean
getName(String,String,int):String
finish():void
showProgressDialog():void
dismissProgressDialog():void
logOut():void
clearAllFields():void
<<Java Class>>
AutoValidator
org.iris.app
AutoValidator()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
<<Java Class>>
FocusListener
org.iris.app
FocusListener()
onFocusChange(View,boolean):void


<<Java Class>>
FocusListener1
org.iris.app
FocusListener1()
onFocusChange(View,boolean):void
<<Java Class>>
AutoValidator1
org.iris.app
AutoValidator1()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
<<Java Class>>
FocusListener2
org.iris.app
FocusListener2()
onFocusChange(View,boolean):void
<<Java Class>>
AutoValidator
org.iris.app
AutoValidator()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
<<Java Class>>
CanalStatusFormActivity
org.iris.app
co: ControlOperations
db: DatabaseOperations
networkOperations: NetworkOperations
vo: ValidationOperations = new ValidationOperations()
CanalMinor_List: ArrayList<CanalMinor>
canalMinorAdapter: ArrayAdapter<CanalMinor>
toggleLayout: LinearLayout
autoComCanalStatusOfCanalId: AutoCompleteTextView
autoCanalMinor: AutoCompleteTextView
spnStatus: Spinner
edtIndent: EditText
edtActualDischarge: EditText
edtActionTaken: EditText
edtRemarks: EditText
chbCanalMinor: CheckBox
btnCanalStatusDatePicker: Button
canalList: List<String>
canalMinorList: List<String>
isEdit: boolean = false
recordId: int = 0
CanalStatusFormActivity()
onCreate(Bundle):void
getCanalMinors(int):void
submitForm():void
insertData(CanalStatus):void
updateData(CanalStatus):void
applyValidation():boolean
getName(String,String,int):String
finish():void
logOut():void
toggleLayout():void
clearAllFields():void
<<Java Class>>
FocusListener
org.iris.app
FocusListener()
onFocusChange(View,boolean):void
<<Java Class>>
AutoComCanalMinor
org.iris.app
AutoComCanalMinor()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
<<Java Class>>
FocusListener
org.iris.app
FocusListener()
onFocusChange(View,boolean):void
<<Java Class>>
AutoValidator2
org.iris.app
AutoValidator2()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence
<<Java Class>>
FocusListener1
org.iris.app
FocusListener1()
onFocusChange(View,boolean):void
<<Java Class>>
AutoValidator
org.iris.app
AutoValidator()
isValid(CharSequence):boolean
fixText(CharSequence):CharSequence

1. Login

User Case Ref	UC001
User Case Name	Login
Description	
This user case is to login user into system	
Actors	User, system
Business Rules	
Basic Flow	**Alternate Flow**
1. User Open E-Zaraat Portal 2. Click on Login link 3. Enter User Name and Password 4. System will re-direct user to his/her home page according to role assigned	1. System shows error if user name or password field are empty 2. System shows error if user doesn't exist in system
Non-Functional Requirements	N/A
Pre-Conditions	User account must be created
Post Conditions	User is logged in into system

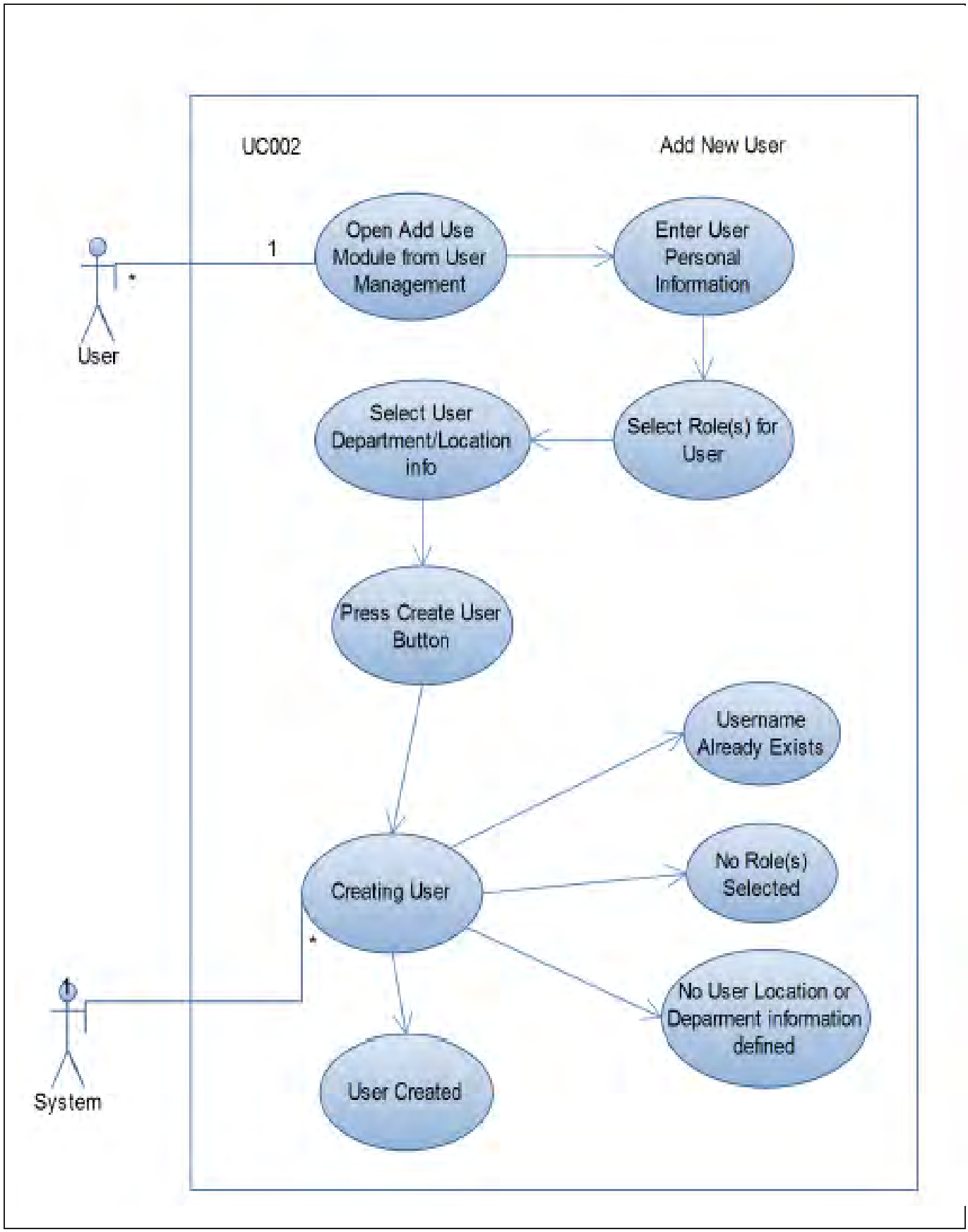
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC001
Login
Open E-Zaraat Portal
Click on Login Link
Enter Username and Password
Validate Username and Password
Incorrect Username or Password
Home Page
User
System
1
*
1
*

2. Add New User

User Case Ref	UC002
User Case Name	Add New User
Description	
This user case is to add new user in system	
Actors	User, system
Business Rules	
Basic Flow	**Alternate Flow**
1. Open User Management add user module 2. Enter user personal information 3. Select role(s) for user 4. Select User department /location info 5. Press create user button 6. System will create new user in system and will show appropriate message	1. User name already exists 2. System will prompt message if admin haven't selected role(s) 3. System will prompt message if admin haven't selected new user location and department information
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to create new users
Post Conditions	1. New user must be created in system and he must be assigned a role

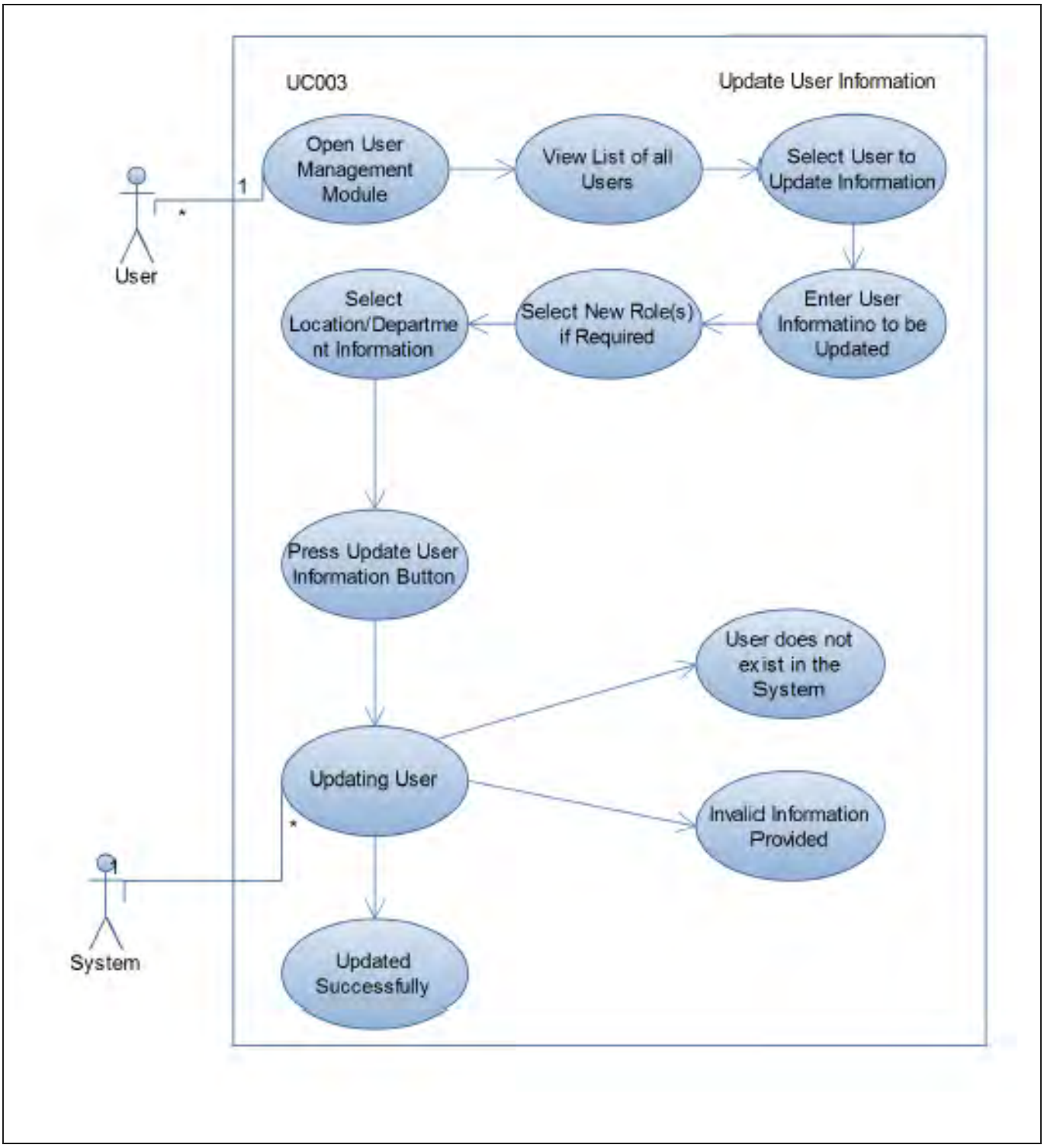
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC002
Add New User
User
1
*
Open Add Use Module from User Management
Enter User Personal Information
Select User Department/Location info
Select Role(s) for User
Press Create User Button
Username Already Exists
Creating User
No Role(s) Selected
No User Location or Deparment information defined
User Created
System
*

3. Update User Information

User Case Ref	UC003
User Case Name	Update user information
Description	
This user case is to update already exist user information	
Actors	User, system
Business Rules	
Basic Flow	**Alternate Flow**
1. Open User Management module 2. View list of all users 3. Select user to update information 4. Enter user information to be updates 5. Select new roles if required 6. Select location/department info 7. Press Update user info button 8. System will update user information and show appropriate message	1. User doesn't exists in system 2. System will prompt message if admin has entered invalid information
Non-Functional Requirements	N/A
Pre-Conditions	1. User must be logged in as admin 2. User must exist in system
Post Conditions	1. User information has been updated

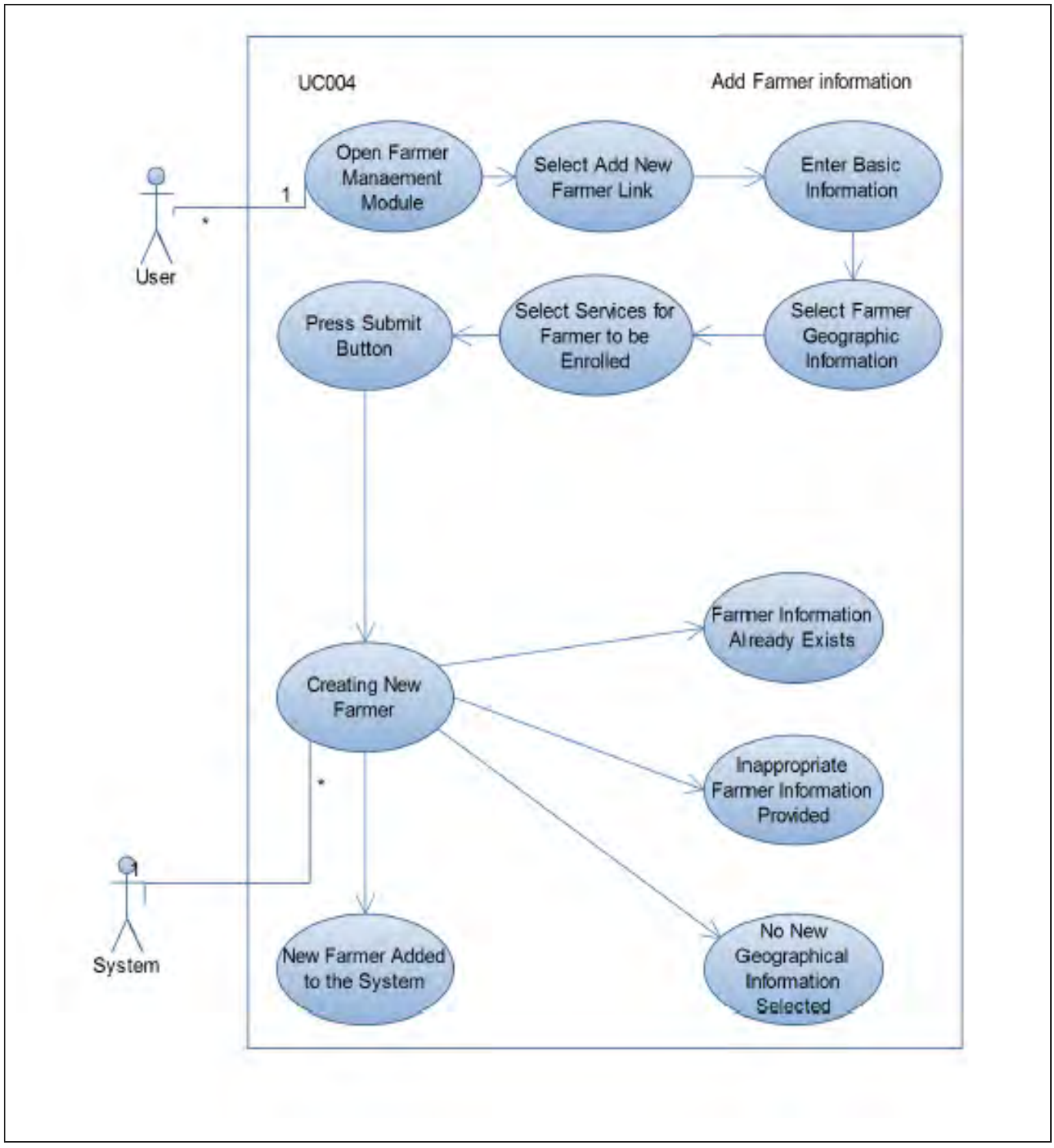
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC003
Update User Information
Open User Management Module
View List of all Users
Select User to Update Information
Enter User Informatino to be Updated
Select New Role(s) if Required
Select Location/Department Information
Press Update User Information Button
User does not exist in the System
Updating User
Invalid Information Provided
Updated Successfully
User
System
1
*
1
*

4. Add farmer Information

User Case Ref	UC004
User Case Name	Add former information
Description	
This user case is to add new farmer information in system	
Actors	User, system
Business Rules	
Basic Flow	**Alternate Flow**
1. Open farmer management module 2. Select add new former link 3. Enter farmer basic information 4. Select farmer geographic information 5. Select services for farmer to be enrolled 6. Press submit button 7. System will create new farmer in system and will show appropriate message	1. farmer information already exists 2. System will prompt message if admin haven't entered appropriate farmer info 3. System will prompt message if admin haven't selected new farmer geographical information
Non-Functional Requirements	N/A
Pre-Conditions	1. User must be logged in as admin 2. User must have role to create new farmer
Post Conditions	1. Farmer information have been added to system

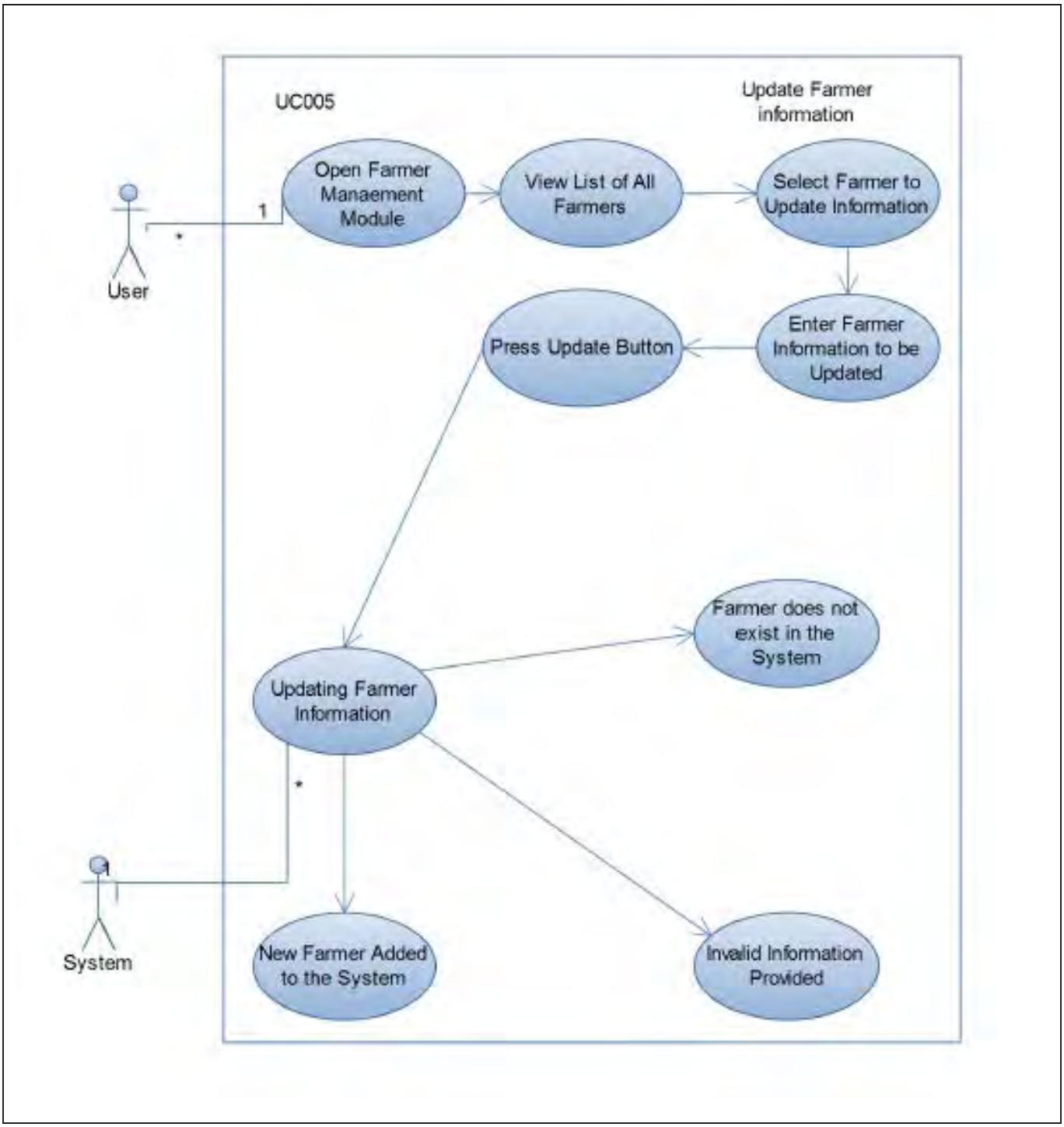
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC004
Add Farmer information
Open Farmer Manaement Module
Select Add New Farmer Link
Enter Basic Information
Select Farmer Geographic Information
Select Services for Farmer to be Enrolled
Press Submit Button
Creating New Farmer
Farmer Information Already Exists
Inappropriate Farmer Information Provided
No New Geographical Information Selected
New Farmer Added to the System
User
System
1
*
1
*

5. Update Farmer Information

User Case Ref	UC005
User Case Name	Update farmer information
Description	
This user case is to update already exist farmer information	
Actors	User, system
Business Rules	
Basic Flow	**Alternate Flow**
1. Open farmer Management module 2. View list of all farmer 3. Select farmer to update information 4. Enter farmer information to be updates 5. Press Update button 6. System will update farmer information and show appropriate message	1. System will prompt appropriate message if farmer doesn't exists in system 2. System will prompt message if admin has entered invalid information
Non-Functional Requirements	N/A
Pre-Conditions	1. User must be logged in as admin 2. Farmer information should exist in system
Post Conditions	1. Farmer information should be updated into system

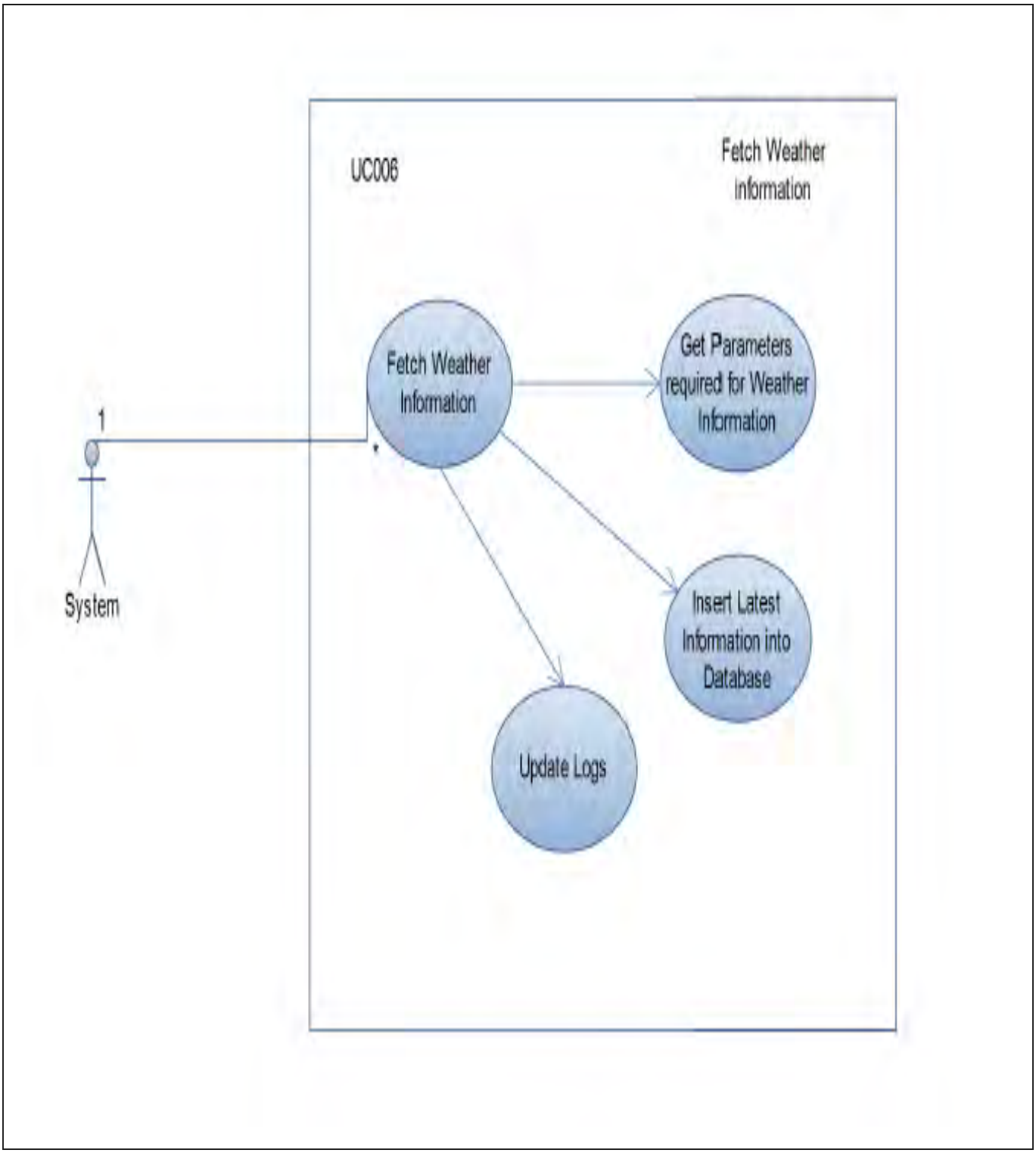
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC005
Update Farmer information
Open Farmer Manaement Module
View List of All Farmers
Select Farmer to Update Information
Enter Farmer Information to be Updated
Press Update Button
Farmer does not exist in the System
Updating Farmer Information
New Farmer Added to the System
Invalid Information Provided
User
System
1
*
*
1

6. Fetch Weather information

User Case Ref	UC006
User Case Name	Fetch Weather information
Description	
This Use case is to fetch weather information on particular day from weather websites through weather information web service using a schedules process	
Actors	System
Business Rules	
Basic Flow	**Alternate Flow**
1. System will invoke this functionality at certain time of day to fetch weather information 2. Process will provide parameters required for weather information 3. Process insert latest weather information into database 4. Process will update logs	1. Process will insert log if connection with weather information service or RSS feed failed
Non-Functional Requirements	N/A
Pre-Conditions	1. Weather information web service configuration information must exist in system 2. Process must be schedule to fetch weather information 3. Process should be rights to access weather information services
Post Conditions	Weather information must be updated in database

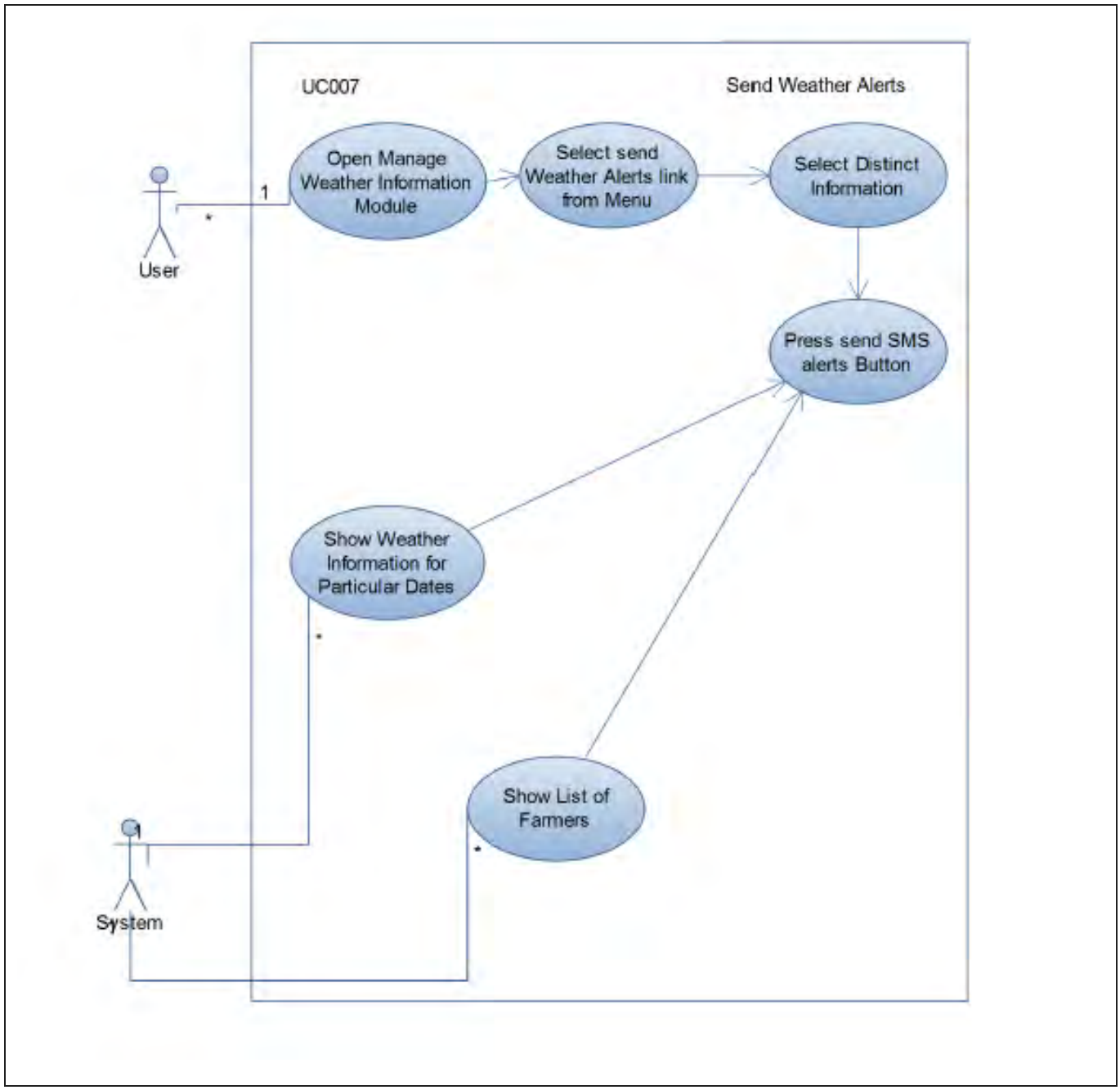
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC006
Fetch Weather information
Fetch Weather Information
Get Parameters required for Weather Information
Insert Latest Information into Database
Update Logs
1
*
System

7. Send weather Alerts

User Case Ref	UC007
User Case Name	Send weather alerts
Description	
This Use case is to send weather alerts to farmers who have subscribed for weather information alerts	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User will open Manage Weather Information module 2. User will select Send weather alerts link from menu 3. User will select start and end date to fetch weather information 4. User will select district information 5. System will show weather information for particular dates from database 6. System will show list of farmers 7. Press send SMS alerts button 8. System will send weather information along with dates to farmers includes in list and prompt appropriate message to user	1. System will prompt appropriate message if user has not select district information 2. System will prompt appropriate message weather information does not exist for certain dates 3. System will prompt appropriate message if none of the farmers have subscribed to SMS alert service
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to send SMS alerts 2. The weather information for certain district must exist in database 3. List of farmers must exist with valid cell phone numbers
Post Conditions	SMS alerts must be send to farmer and other management peoples

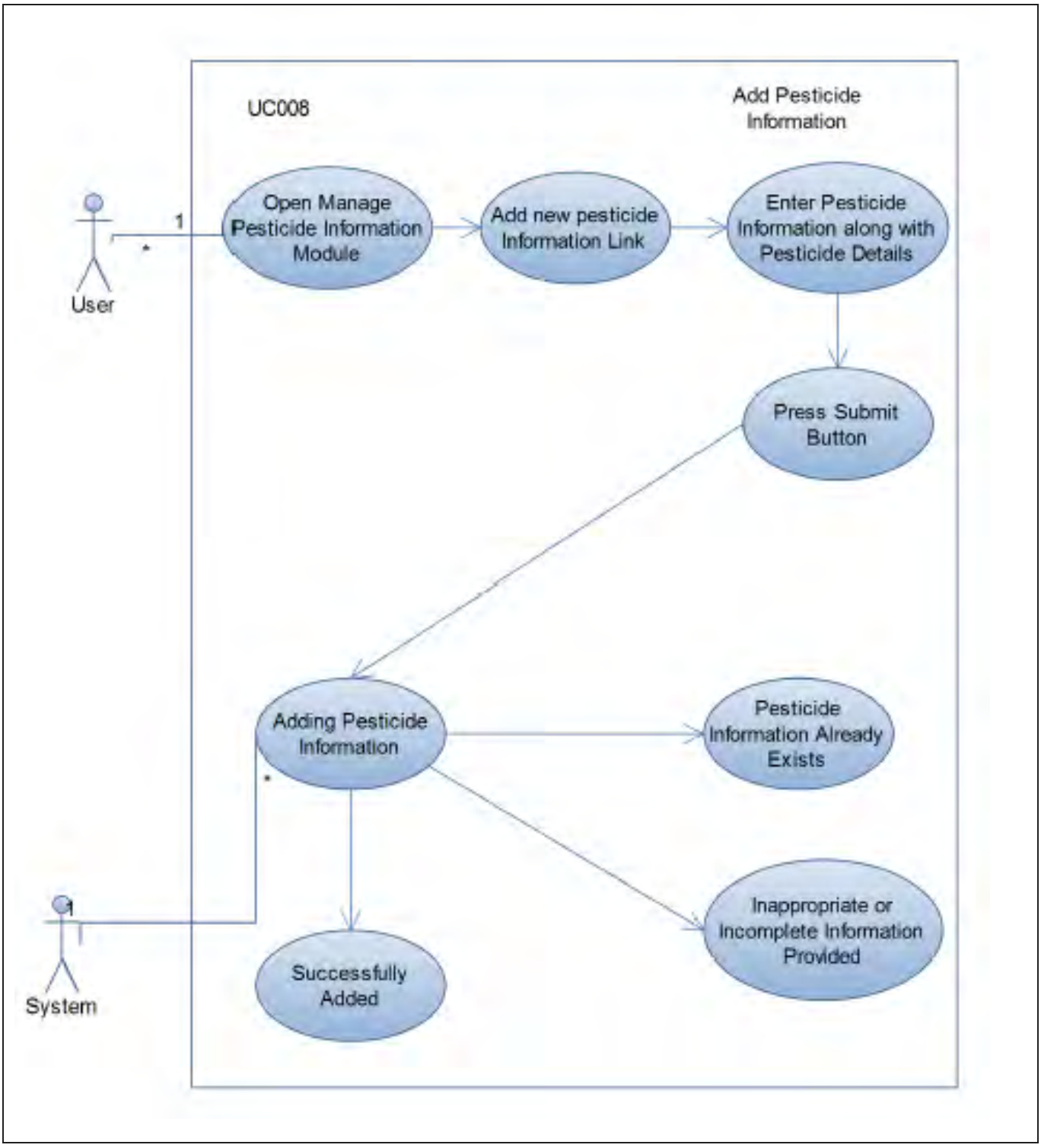
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC007
Send Weather Alerts
Open Manage Weather Information Module
Select send Weather Alerts link from Menu
Select Distinct Information
Press send SMS alerts Button
Show Weather Information for Particular Dates
Show List of Farmers
User
System
1
*
1
*
*

8. Add Pesticide Information

User Case Ref	UC008
User Case Name	Add pesticide information
Description	
This Use case is to add pesticide information into database	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User will open Manager pesticide information module 2. User will select add new pesticide information link from menu 3. User enter pesticide information along with details of pesticide. 4. User press submit button 5. System will add pesticide information and will prompt with appropriate message	1. System will prompt appropriate message if pesticide information already exists in system 2. System will prompt appropriate message if user have not provided necessary information of pesticide
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to manage pesticide information
Post Conditions	1. Pesticide information must added in database

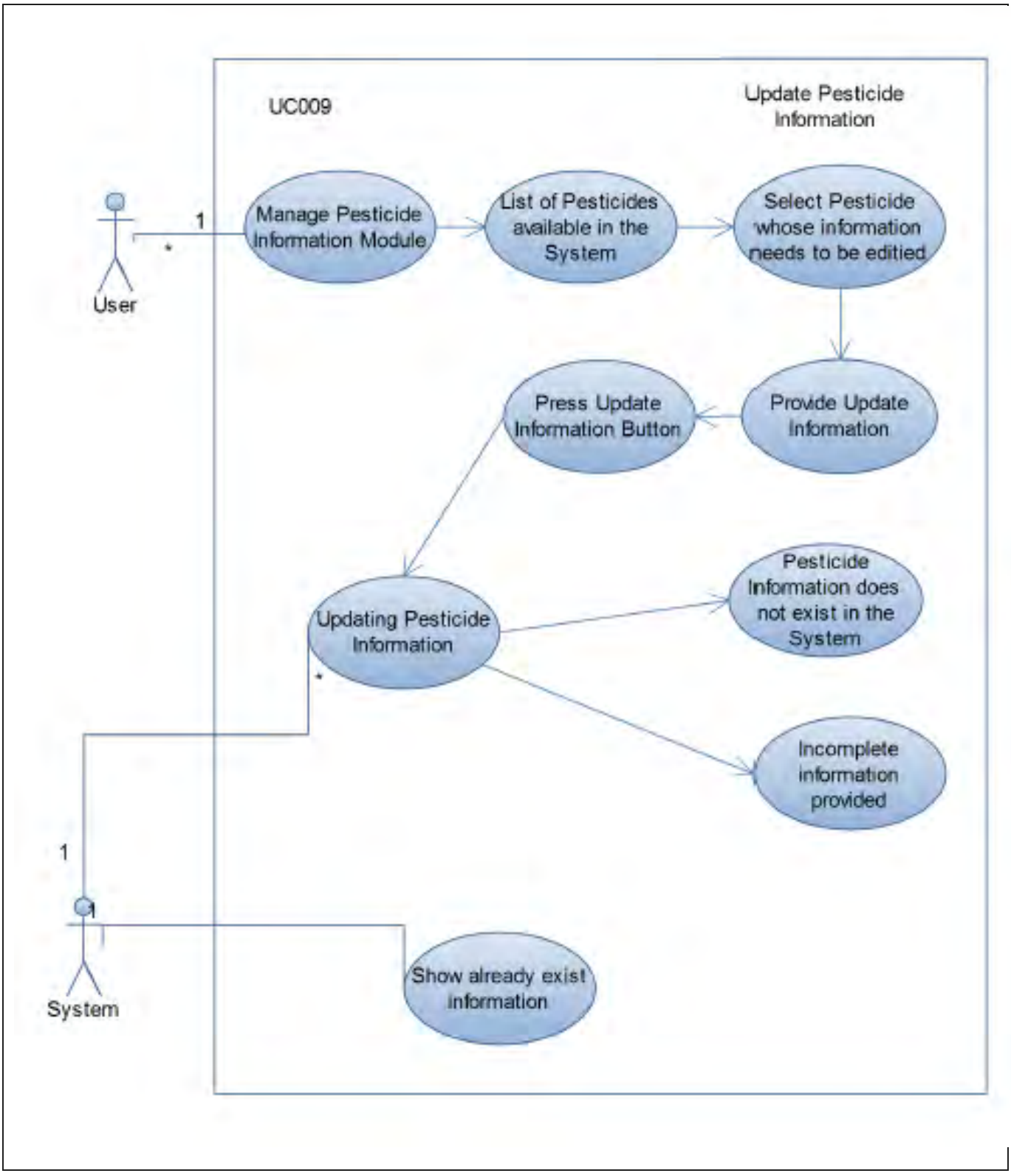
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC008
Add Pesticide Information
User
1
*
Open Manage Pesticide Information Module
Add new pesticide Information Link
Enter Pesticide Information along with Pesticide Details
Press Submit Button
Adding Pesticide Information
*
Pesticide Information Already Exists
Inappropriate or Incomplete Information Provided
Successfully Added
System
1

9. Update Pesticide Information

User Case Ref	UC009
User Case Name	Update pesticide information
Description	
This Use case is to update pesticide information into database	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User open Manage pesticide information module 2. System shows list of pesticides available in system 3. User select pesticide whose information need to edit 4. System show already exist information 5. User provide update information and press update information button 6. System will add pesticide information and will prompt with appropriate message	1. System will prompt appropriate message if pesticide information doesn't exists in system 2. System will prompt appropriate message if user have not provided necessary information of pesticide
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to manage pesticide information
Post Conditions	2. Pesticide information must updated in database

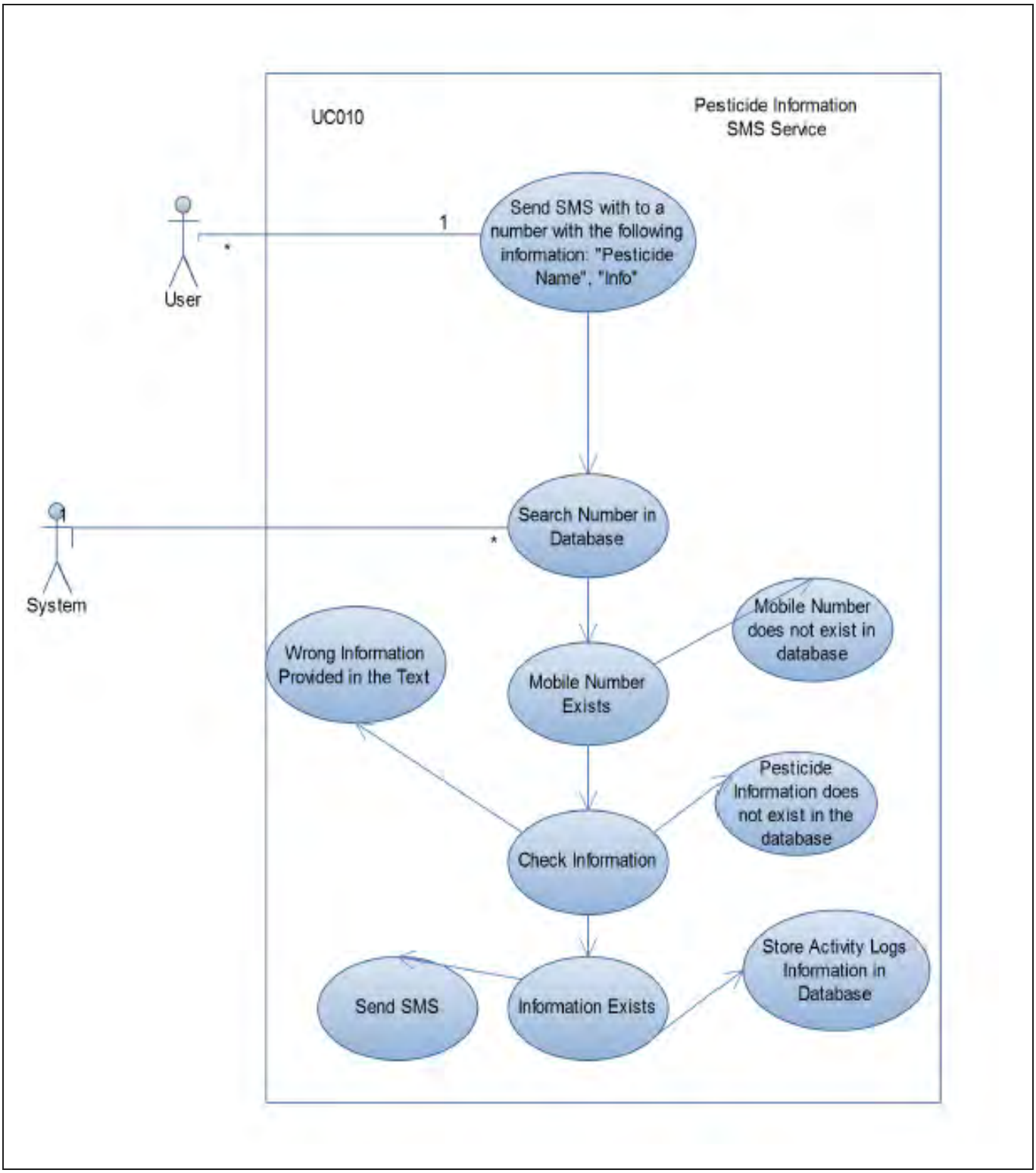
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC009
Update Pesticide Information
User
1
*
Manage Pesticide Information Module
List of Pesticides available in the System
Select Pesticide whose information needs to be editied
Provide Update Information
Press Update Information Button
Updating Pesticide Information
*
Pesticide Information does not exist in the System
Incomplete information provided
1
1
System
Show already exist information

10. Pesticide Info SMS Service

User Case Ref	UC010
User Case Name	Pesticide Info SMS Service
Description	
This Use case is get pesticide information from system using SMS	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User send SMS to certain number with following info in SMS “pesticide name”, “info” 2. System search database against cell number. If cell number exist in database system will move further 3. System will search database to get pesticide information 4. If information exist system will send SMS alert to mobile number 5. System will store activity logs information in database	1. System will prompt appropriate message if mobile number is not registered in database 2. System will prompt appropriate message if user has sent wrong text information 3. System will prompt appropriate message if pesticide information does not exist in database.
Non-Functional Requirements	N/A
Pre-Conditions	1. User mobile number must exist in database 2. Pesticide information must exists in database
Post Conditions	1. User receive SMS alert which contain information about pesticide

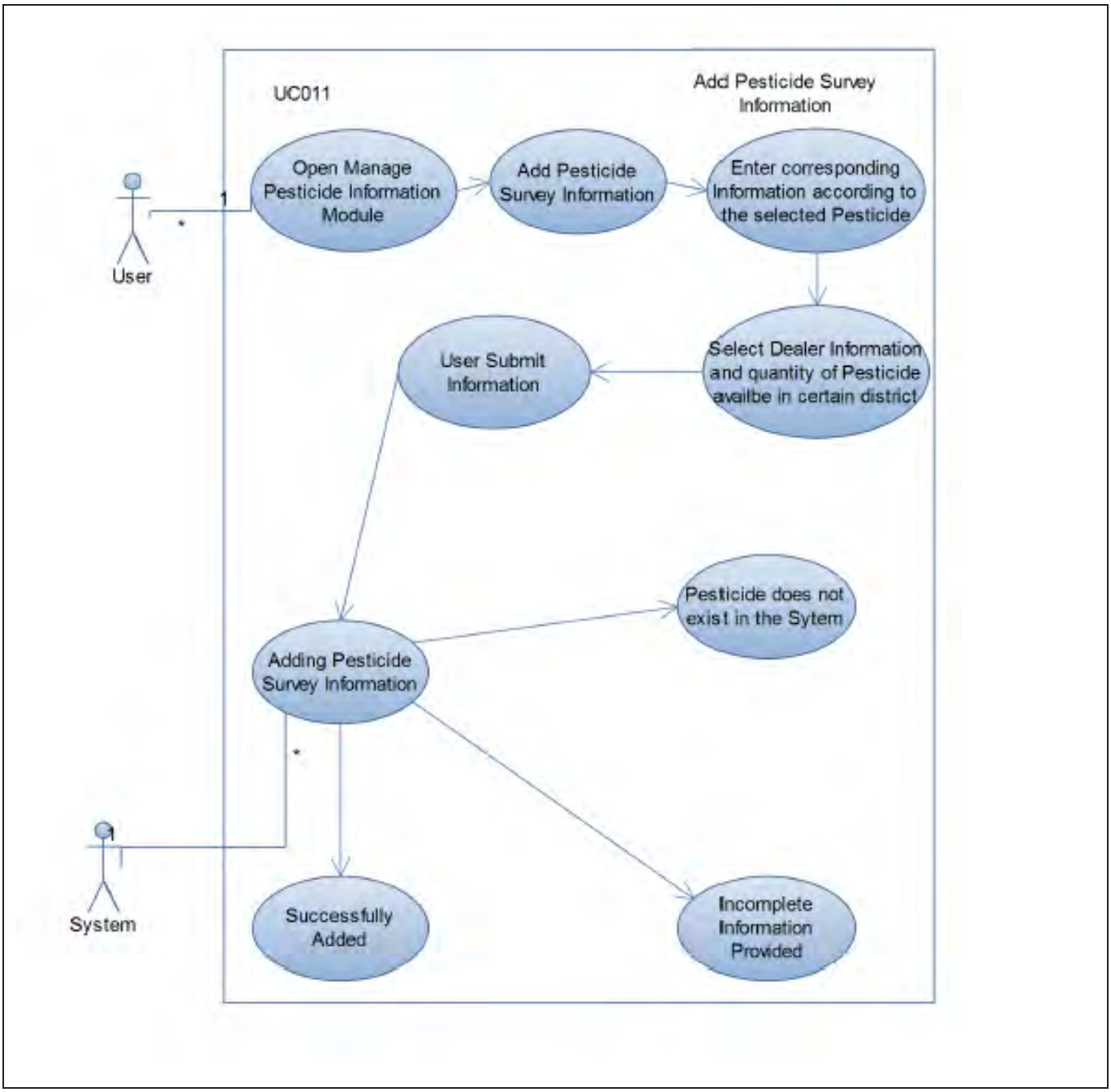
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of “inherited from parent” use cases**
N/A	N/A	N/A


UC010
Pesticide Information
SMS Service
User
1
*
Send SMS with to a number with the following information: "Pesticide Name", "Info"
System
1
*
Search Number in Database
Wrong Information Provided in the Text
Mobile Number Exists
Mobile Number does not exist in database
Check Information
Pesticide Information does not exist in the database
Send SMS
Information Exists
Store Activity Logs Information in Database

11. Add Pesticide Survey Information

User Case Ref	UC011
User Case Name	Add pesticide Survey information
Description	
This Use case is to add pesticide survey information. This information include latest prices quantity available at different dealers	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User open Manage pesticide information module 2. User select Add Pesticide Survey information 3. User enters survey information for certain pesticide select from dropdown 4. User select dealer information and quantity of pesticide available in certain district 5. User submit information 6. System will add pesticide information and will prompt with appropriate message	1. System will prompt appropriate message if pesticide information doesn't exists in system 2. System will prompt appropriate message if user have not provided necessary information of pesticide survey.
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to manage pesticide information 2. Pesticide information must exists 3. Dealer information must exist for select district
Post Conditions	1. Pesticide survey information must exist in database

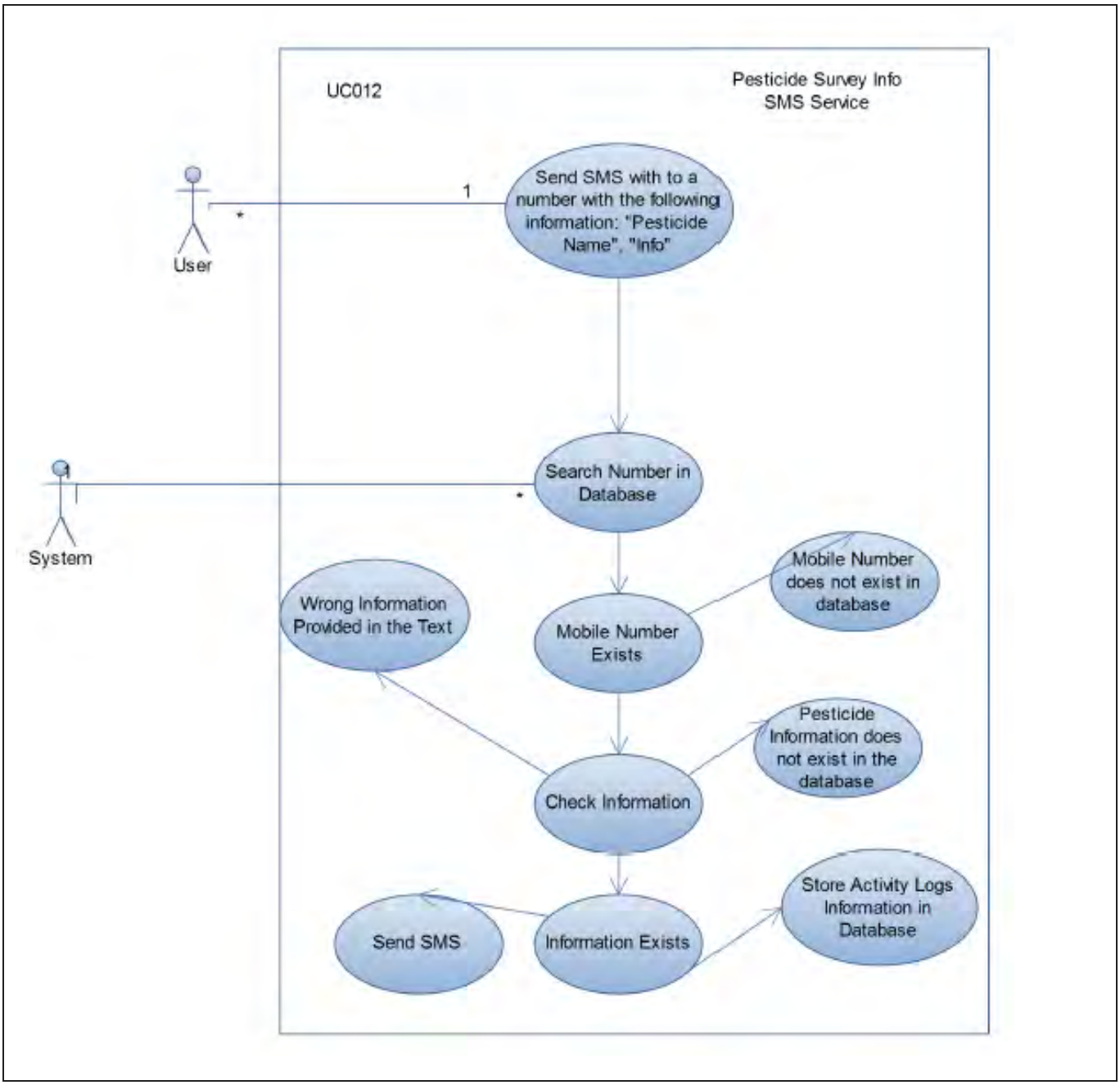
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC011
Add Pesticide Survey Information
Open Manage Pesticide Information Module
Add Pesticide Survey Information
Enter corresponding Information according to the selected Pesticide
User
1
*
User Submit Information
Select Dealer Information and quantity of Pesticide availbe in certain district
Pesticide does not exist in the Sytem
Adding Pesticide Survey Information
*
1
System
Successfully Added
Incomplete Information Provided

12. Pesticide Survey Info SMS Service

User Case Ref	UC012
User Case Name	Pesticide Survey Info SMS Service
Description	
This Use case is get pesticide quantity and its availability information in certain city	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
6. User send SMS to certain number with following info in SMS “pesticide name”, “city name” 7. System search database against cell number. If cell number exist in database system will move further 8. System will search database to get pesticide survey information like its availability from certain dealer in given city, its current price. 9. If information exist system will send SMS alert to mobile number 10. System will store activity logs information in database	4. System will prompt appropriate message if mobile number is not registered in database 5. System will prompt appropriate message if user has sent wrong text information 6. System will prompt appropriate message if pesticide survey information does not exist in database.
Non-Functional Requirements	N/A
Pre-Conditions	3. User mobile number must exist in database 4. Pesticide survey information must exists in database
Post Conditions	2. User receive SMS alert which contain information about pesticide quantity , price and availability with certain dealer

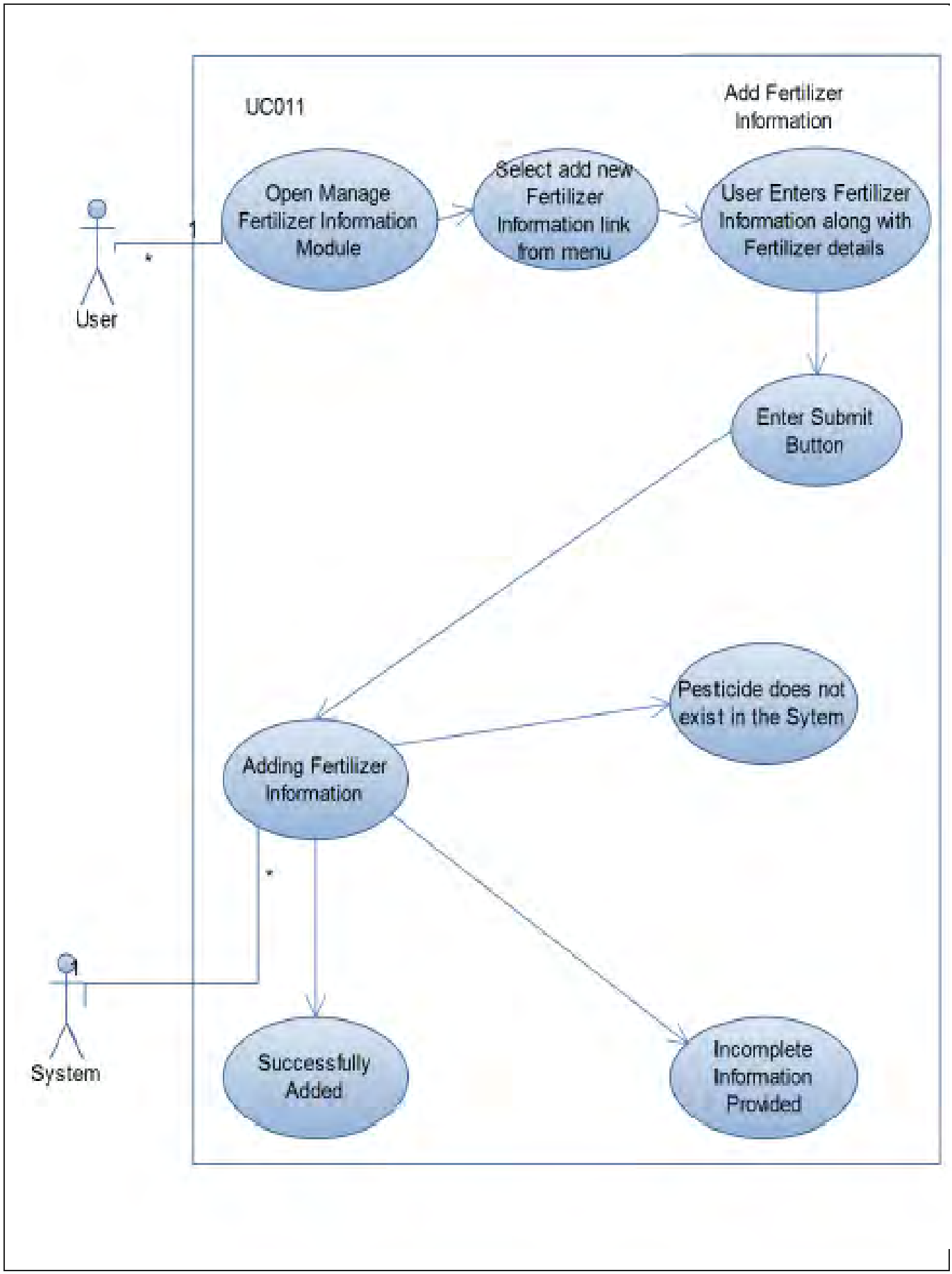
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of “inherited from parent” use cases**
N/A	N/A	N/A


UC012
Pesticide Survey Info
SMS Service
User
1
*
Send SMS with to a number with the following information: "Pesticide Name", "Info"
System
1
*
Search Number in Database
Mobile Number does not exist in database
Wrong Information Provided in the Text
Mobile Number Exists
Pesticide Information does not exist in the database
Check Information
Store Activity Logs Information in Database
Send SMS
Information Exists

13. Add Fertilizer Information

User Case Ref	UC013
User Case Name	Add fertilizer information
Description	
This Use case is to add fertilizer information into database	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
6. User will open Manager fertilizer information module 7. User will select add new fertilizer information link from menu 8. User enter fertilizer information along with details of fertilizer. 9. User press submit button 10. System will add fertilizer information and will prompt with appropriate message	3. System will prompt appropriate message if fertilizer information already exists in system 4. System will prompt appropriate message if user have not provided necessary information of fertilizer. fertilizer
Non-Functional Requirements	N/A
Pre-Conditions	2. User must have role to manage fertilizer information
Post Conditions	3. fertilizer information must added in database

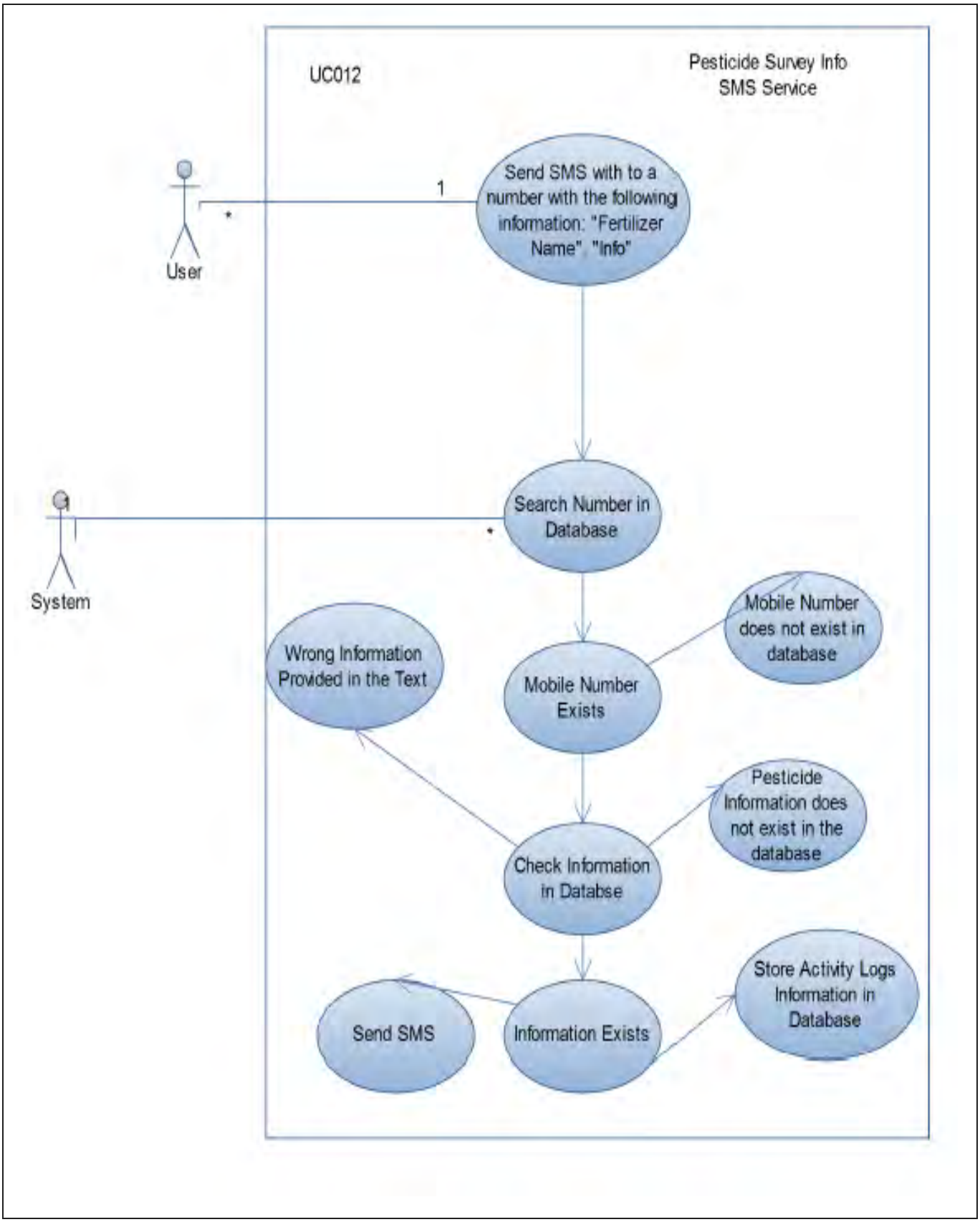
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC011
Add Fertilizer Information
Open Manage Fertilizer Information Module
Select add new Fertilizer Information link from menu
User Enters Fertilizer Information along with Fertilizer details
Enter Submit Button
User
1
*
Adding Fertilizer Information
Pesticide does not exist in the Sytem
Successfully Added
Incomplete Information Provided
System
1
*

14. Fertilizer Info SMS Service

User Case Ref	UC014
User Case Name	Fertilizer Info SMS Service
Description	
This Use case is get Fertilizer information from system using SMS	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
11. User send SMS to certain number with following info in SMS “Fertilizer name”, “info” 12. System search database against cell number. If cell number exist in database system will move further 13. System will search database to get fertilizer information 14. If information exist system will send SMS alert to mobile number 15. System will store activity logs information in database	7. System will prompt appropriate message if mobile number is not registered in database 8. System will prompt appropriate message if user has sent wrong text information 9. System will prompt appropriate message if fertilizer information does not exist in database.
Non-Functional Requirements	N/A
Pre-Conditions	5. User mobile number must exist in database 6. fertilizer information must exists in database
Post Conditions	3. User receive SMS alert which contain information about fertilizer

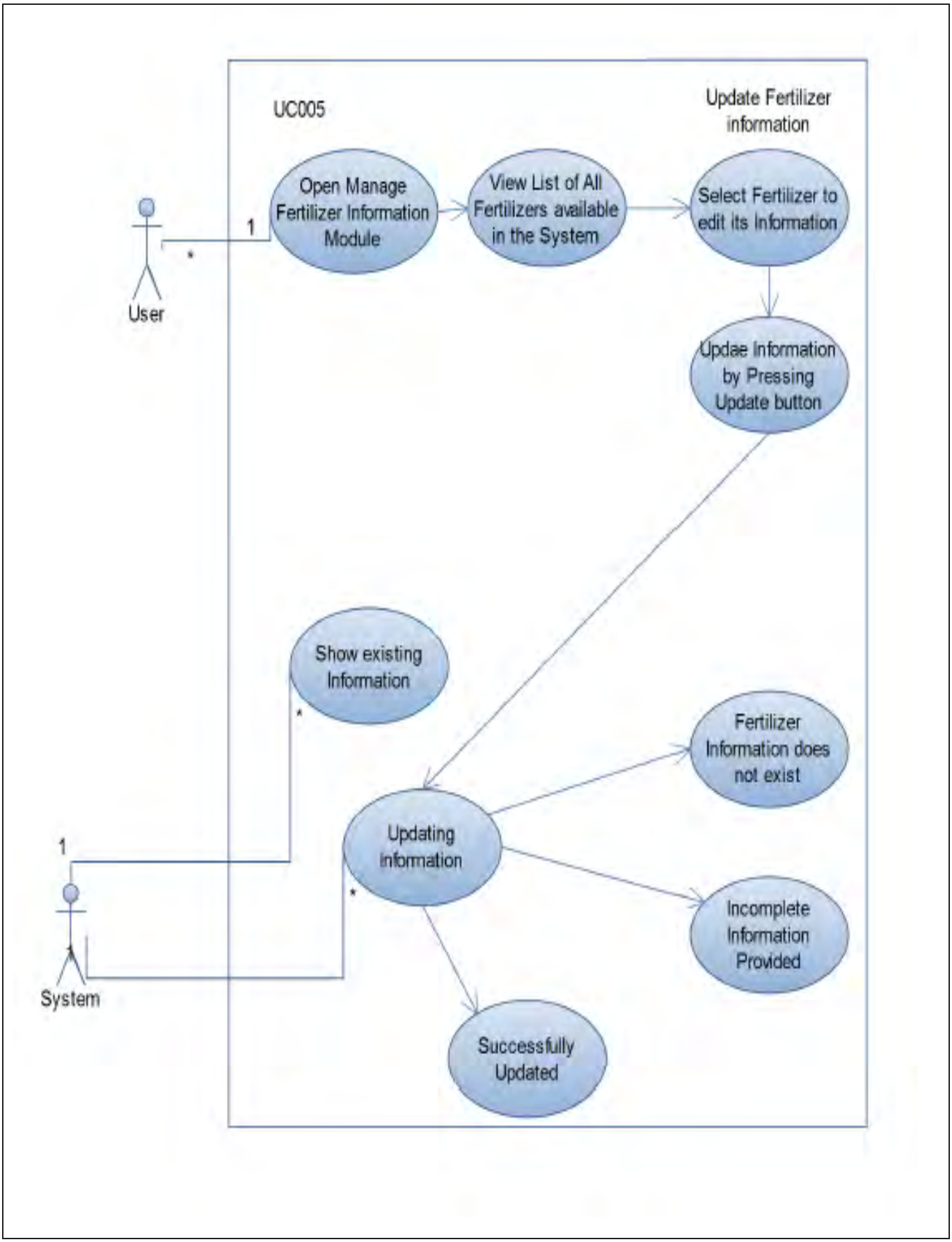
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of “inherited from parent” use cases**
N/A	N/A	N/A


UC012
Pesticide Survey Info
SMS Service
User
1
*
Send SMS with to a number with the following information: "Fertilizer Name", "Info"
System
*
Search Number in Database
Wrong Information Provided in the Text
Mobile Number Exists
Mobile Number does not exist in database
Pesticide Information does not exist in the database
Check Information in Databse
Send SMS
Information Exists
Store Activity Logs Information in Database

15. Update Fertilizer Information

User Case Ref	UC015
User Case Name	Update fertilizer information
Description	
This Use case is to update fertilizer information into database	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User open Manage fertilizer information module 2. System shows list of fertilizer available in system 3. User select fertilizer whose information need to edit 4. System show already exist information 5. User provide update information and press update information button 6. System will add fertilizer information and will prompt with appropriate message	1. System will prompt appropriate message if fertilizer information doesn't exists in system 2. System will prompt appropriate message if user have not provided necessary information of fertilizer
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to manage fertilizer information 2. fertilizer information must exist in database
Post Conditions	1. fertilizer information must updated in database

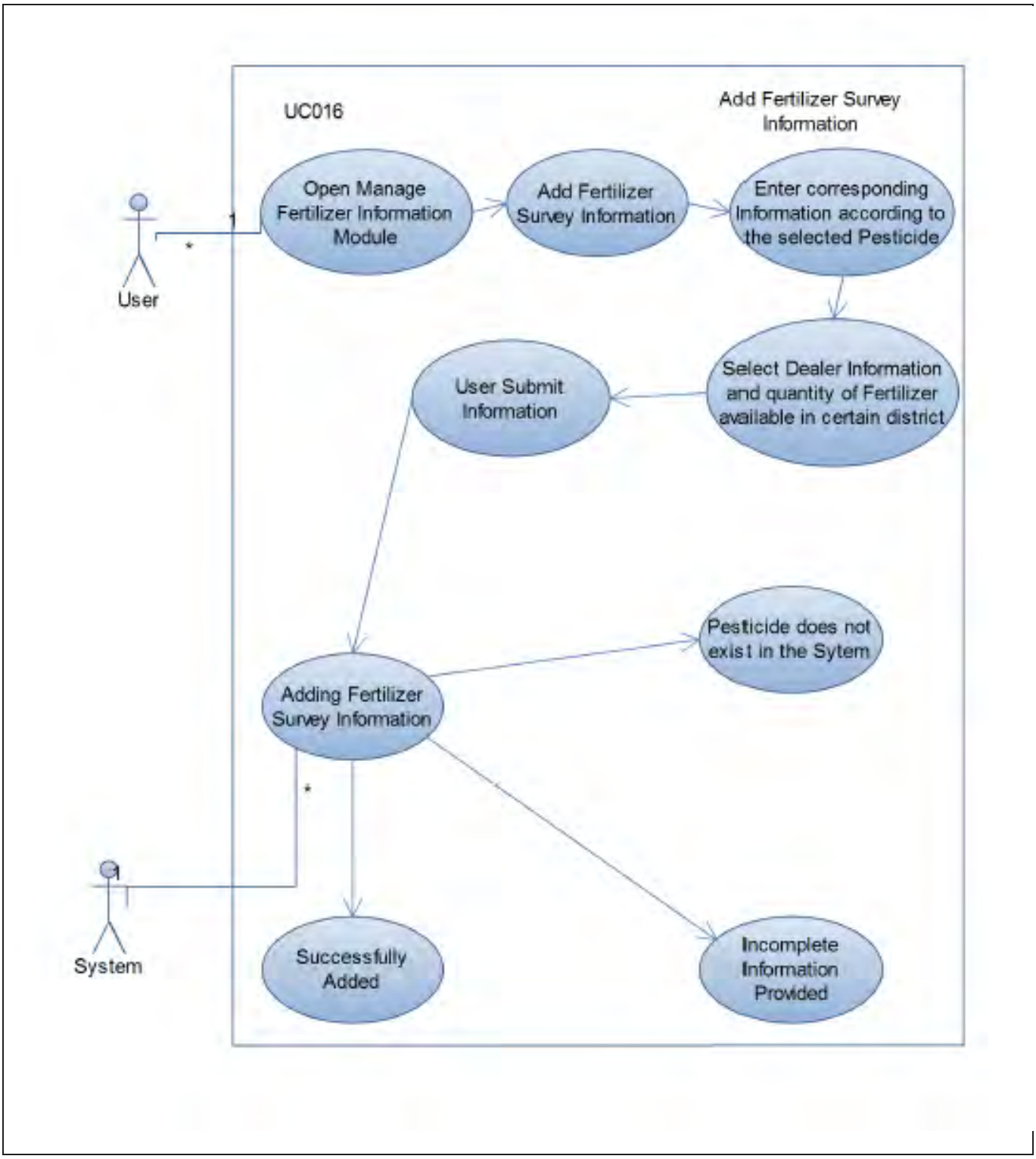
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC005
Update Fertilizer information
Open Manage Fertilizer Information Module
View List of All Fertilizers available in the System
Select Fertilizer to edit its Information
Updae Information by Pressing Update button
User
1
*
Show existing Information
Fertilizer Information does not exist
Updating Information
Incomplete Information Provided
Successfully Updated
System
1
*

16. Add fertilizer Survey Information

User Case Ref	UC016
User Case Name	Add fertilizer Survey information
Description	
This Use case is to add fertilizer survey information. This information include latest prices quantity available at different dealers	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User open Manage fertilizer information module 2. User select Add fertilizer Survey information 3. User enters survey information for certain pesticide select from dropdown 4. User select dealer information and quantity of fertilizer available in certain district 5. User submit information 6. System will add fertilizer information and will prompt with appropriate message	1. System will prompt appropriate message if fertilizer information doesn't exists in system 2. System will prompt appropriate message if user have not provided necessary information of fertilizer survey.
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to manage pesticide information 2. fertilizer information must exists 3. Dealer information must exist for select district
Post Conditions	4. fertilizer survey information must exist in database

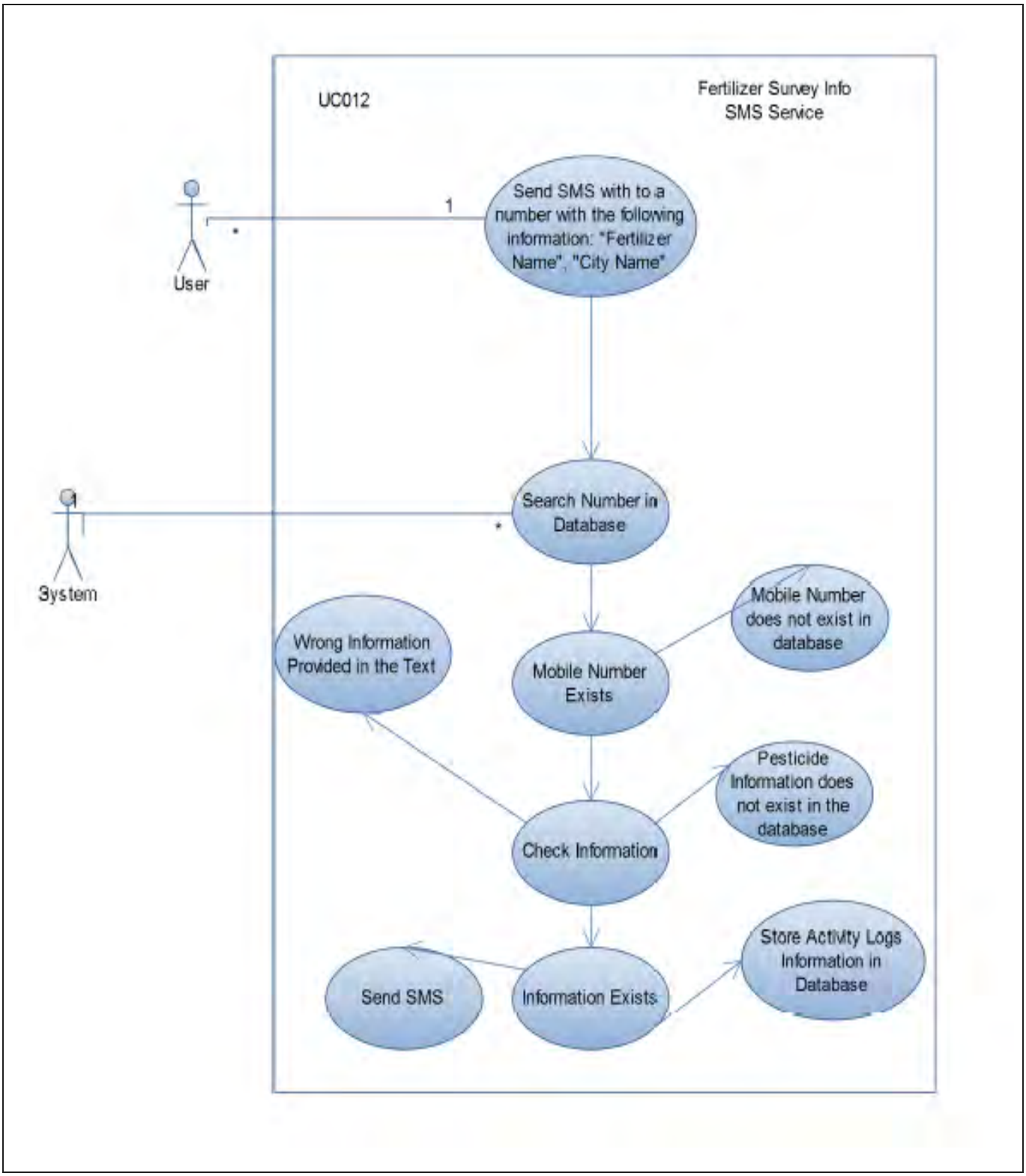
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC016
Add Fertilizer Survey Information
Open Manage Fertilizer Information Module
Add Fertilizer Survey Information
Enter corresponding Information according to the selected Pesticide
User
1
*
Select Dealer Information and quantity of Fertilizer available in certain district
User Submit Information
Pesticide does not exist in the Sytem
Adding Fertilizer Survey Information
*
1
System
Successfully Added
Incomplete Information Provided

17. Fertilizer Survey Info SMS Service

User Case Ref	UC017
User Case Name	Fertilizer Survey Info SMS Service
Description	
This Use case is get Fertilizer quantity and its availability information in certain city	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User send SMS to certain number with following info in SMS “Fertilizer name”, “city name” 2. System search database against cell number. If cell number exist in database system will move further 3. System will search database to get pesticide survey information like its availability from certain dealer in given city, its current price. 4. If information exist system will send SMS alert to mobile number 5. System will store activity logs information in database	1. System will prompt appropriate message if mobile number is not registered in database 2. System will prompt appropriate message if user has sent wrong text information 3. System will prompt appropriate message if Fertilizer survey information does not exist in database.
Non-Functional Requirements	N/A
Pre-Conditions	1. User mobile number must exist in database 2. Fertilizer survey information must exists in database
Post Conditions	1. User receive SMS alert which contain information about Fertilizer quantity , price and availability with certain dealer

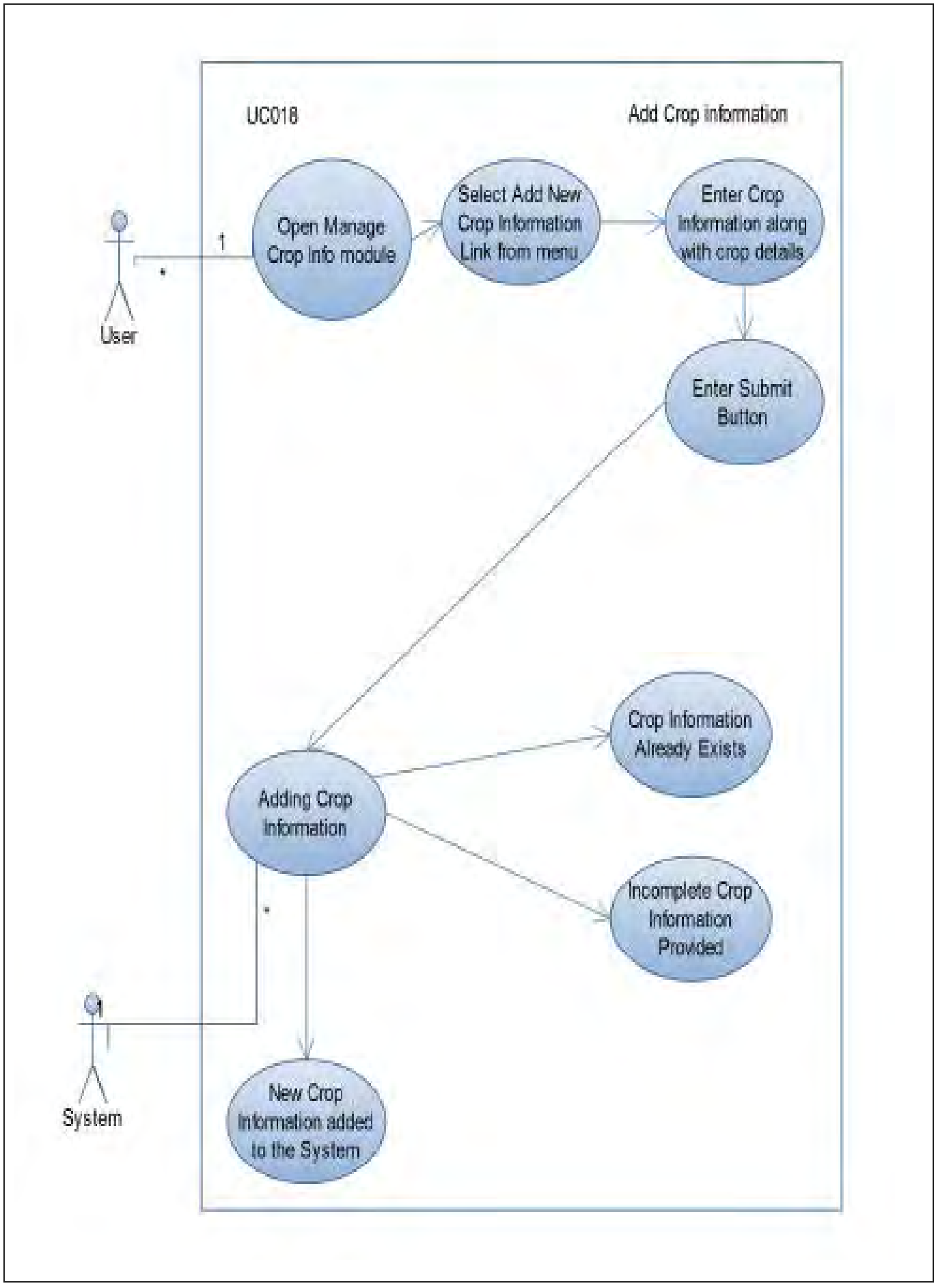
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of “inherited from parent” use cases**
N/A	N/A	N/A


UC012
Fertilizer Survey Info
SMS Service
User
1
*
Send SMS with to a number with the following information: "Fertilizer Name", "City Name"
System
1
*
Search Number in Database
Mobile Number does not exist in database
Wrong Information Provided in the Text
Mobile Number Exists
Pesticide Information does not exist in the database
Check Information
Store Activity Logs Information in Database
Send SMS
Information Exists

18. Add Crop Information

User Case Ref	UC018
User Case Name	Add Crop information
Description	
This Use case is to add crop information into database	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User will open Manage crop information module 2. User will select add new crop information link from menu 3. User enters crop information along with details of crop. 4. User press submit button 5. System will add crop information and will prompt with appropriate message	1. System will prompt appropriate message if crop information already exists in system 2. System will prompt appropriate message if user have not provided necessary information of crop.
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to manage crop information
Post Conditions	1. crop information must added in database

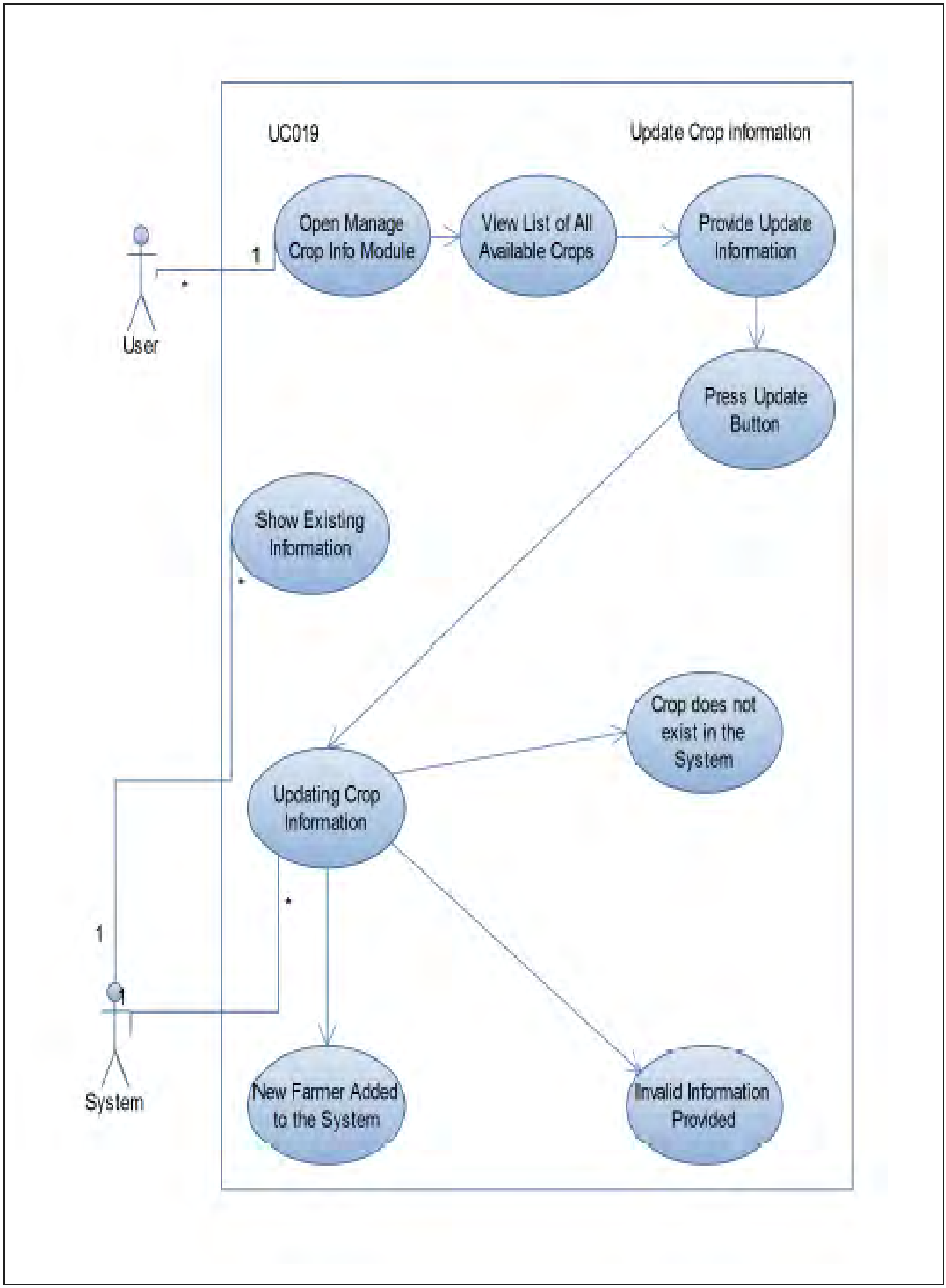
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC018
Add Crop information
Open Manage Crop Info module
Select Add New Crop Information Link from menu
Enter Crop information along with crop details
Enter Submit Button
User
1
*
Crop Information Already Exists
Adding Crop Information
Incomplete Crop Information Provided
*
1
System
New Crop Information added to the System

19. Update Crop Information

User Case Ref	UC019
User Case Name	Update crop information
Description	
This Use case is to update crop information into database	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User open Manage crop information module 2. System shows list of crop available in system 3. User select crop whose information need to edit 4. System show already exist information 5. User provide update information and press update information button 6. System will add crop information and will prompt with appropriate message	1. System will prompt appropriate message if crop information doesn't exists in system 2. System will prompt appropriate message if user have not provided necessary information of crop
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to manage crop information 2. crop information must exist in database
Post Conditions	1. crop information must updated in database

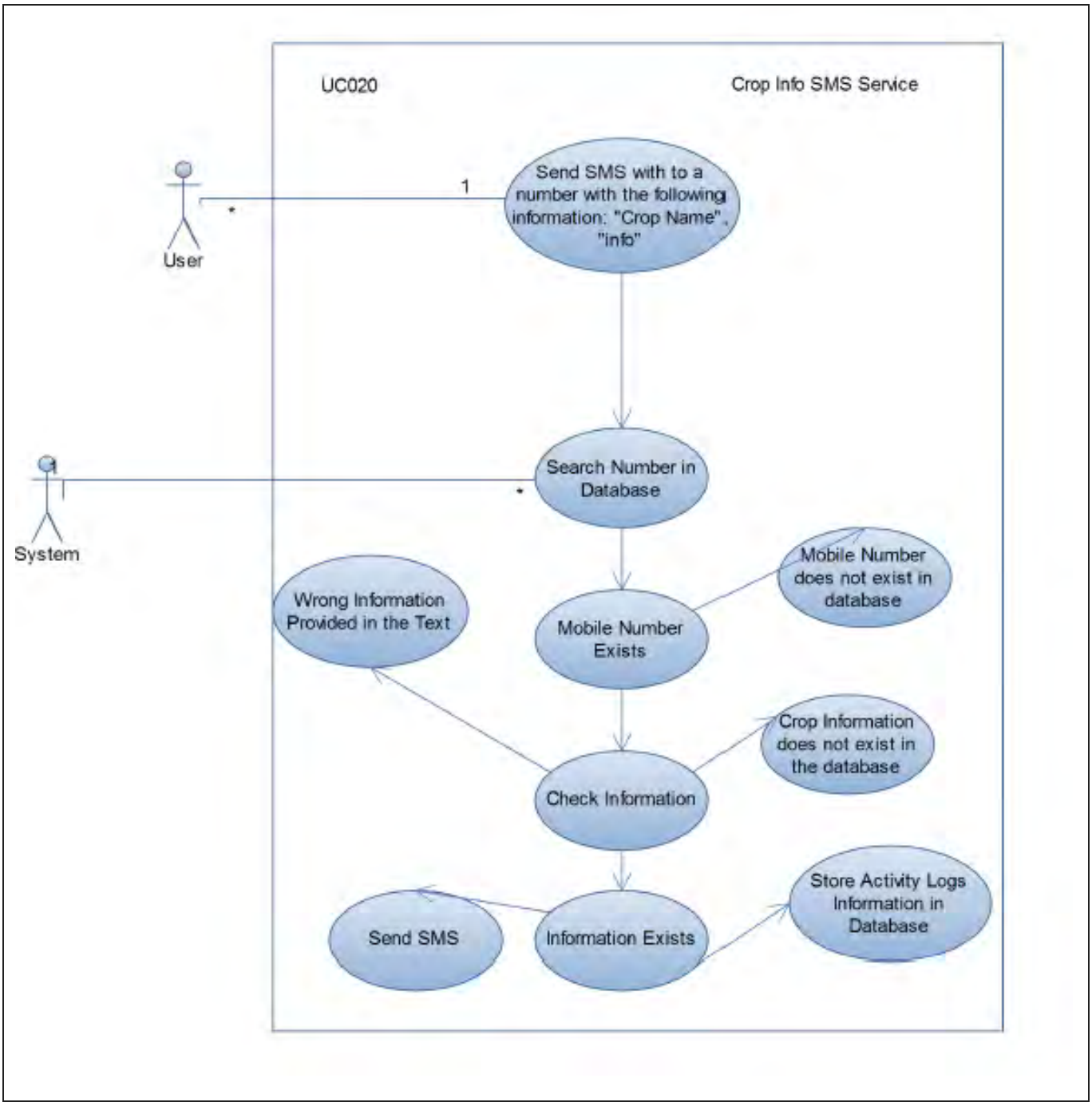
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC019
Update Crop information
Open Manage Crop Info Module
View List of All Available Crops
Provide Update Information
Press Update Button
Show Existing Information
Crop does not exist in the System
Updating Crop Information
New Farmer Added to the System
Invalid Information Provided
User
System
1
*
1
*
1
*

20. Crop Info SMS Service

User Case Ref	UC020
User Case Name	Crop Info SMS Service
Description	
This Use case is get System will provide service to provide complete information about sowing, fertilizer, harvesting , pesticides for certain crop.	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User send SMS to certain number with following info in SMS “crop name”, “info” 2. System search database against cell number. If cell number exist in database system will move further 3. System will search database to get crop information 4. If information exist system will send SMS alert to mobile number 5. System will store activity logs information in database	1. System will prompt appropriate message if mobile number is not registered in database 2. System will prompt appropriate message if user has sent wrong text information 3. System will prompt appropriate message if crop information does not exist in database.
Non-Functional Requirements	N/A
Pre-Conditions	1. User mobile number must exist in database 2. crop information must exists in database
Post Conditions	1. User receive SMS alert which contain information about crop

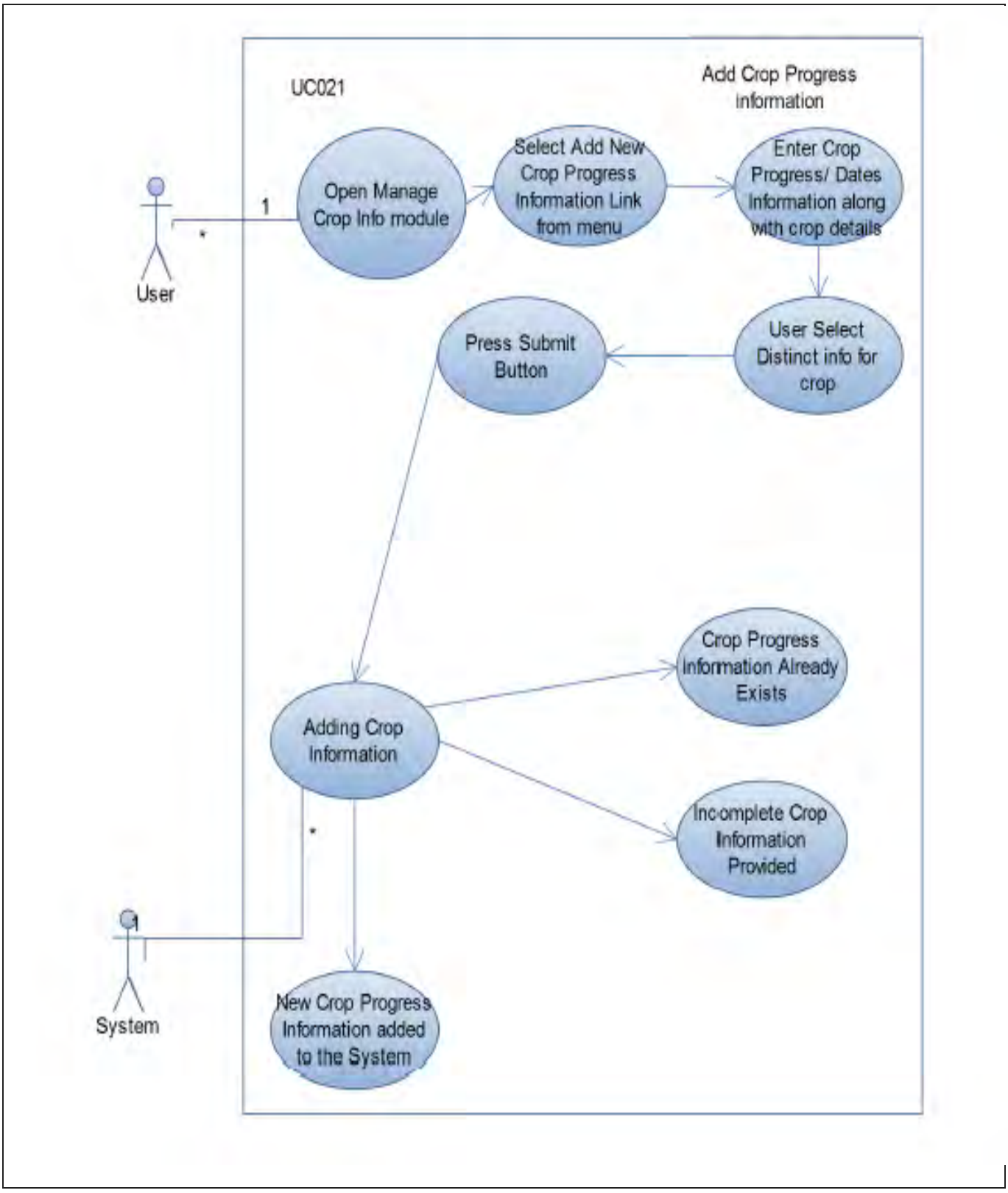
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of “inherited from parent” use cases**
N/A	N/A	N/A


UC020
Crop Info SMS Service
User
1
*
Send SMS with to a number with the following information: "Crop Name", "info"
System
1
*
Search Number in Database
Wrong Information Provided in the Text
Mobile Number Exists
Mobile Number does not exist in database
Check Information
Crop Information does not exist in the database
Send SMS
Information Exists
Store Activity Logs Information in Database

21. Add Crop Progress Information

User Case Ref	UC021
User Case Name	Add Progress information
Description	
This Use case is to add information about crop sowing season in different areas and different dates for first timings watering and fertilizer timings according to districts	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User will open Manage crop information module 2. User will select add new crop progress information link from menu 3. User enters crop progress/dates information along with other details. 4. User select district information for certain crop 5. User press submit button 6. System will add information and will prompt with appropriate message	1. System will prompt appropriate message if crop progress information already exists in system 2. System will prompt appropriate message if user have not provided necessary information of crop.
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to manage crop progress information
Post Conditions	1. Crop progress information must added in database

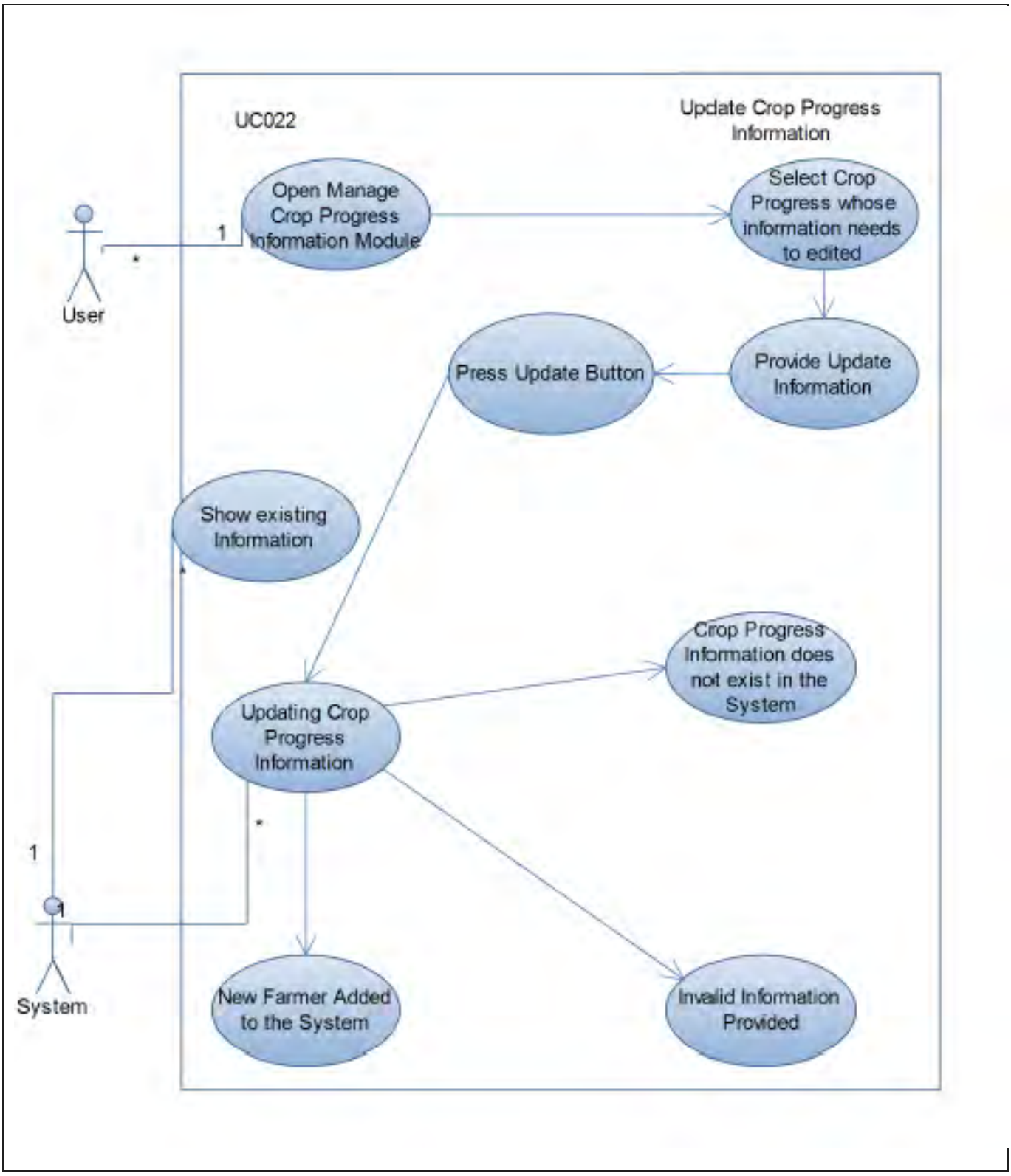
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC021
Add Crop Progress information
User
1
*
Open Manage Crop Info module
Select Add New Crop Progress Information Link from menu
Enter Crop Progress/ Dates Information along with crop details
User Select Distinct info for crop
Press Submit Button
Crop Progress Information Already Exists
Adding Crop Information
Incomplete Crop Information Provided
*
1
System
New Crop Progress Information added to the System

22. Update Crop Progress Information

User Case Ref	UC022
User Case Name	Update crop progress information
Description	
This Use case is to update crop progress information	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User open Manage crop progress information module 2. System shows list of crop progress info system 3. User select crop progress whose information need to edit 4. System show already exist information 5. User provide update information and press update information button 6. System will add crop progress information and will prompt with appropriate message	1. System will prompt appropriate message if crop progress information doesn't exists in system 2. System will prompt appropriate message if user have not provided necessary information of crop progress details
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to manage crop information 2. Crop progress information must exist in database
Post Conditions	1. Crop progress information must updated in database

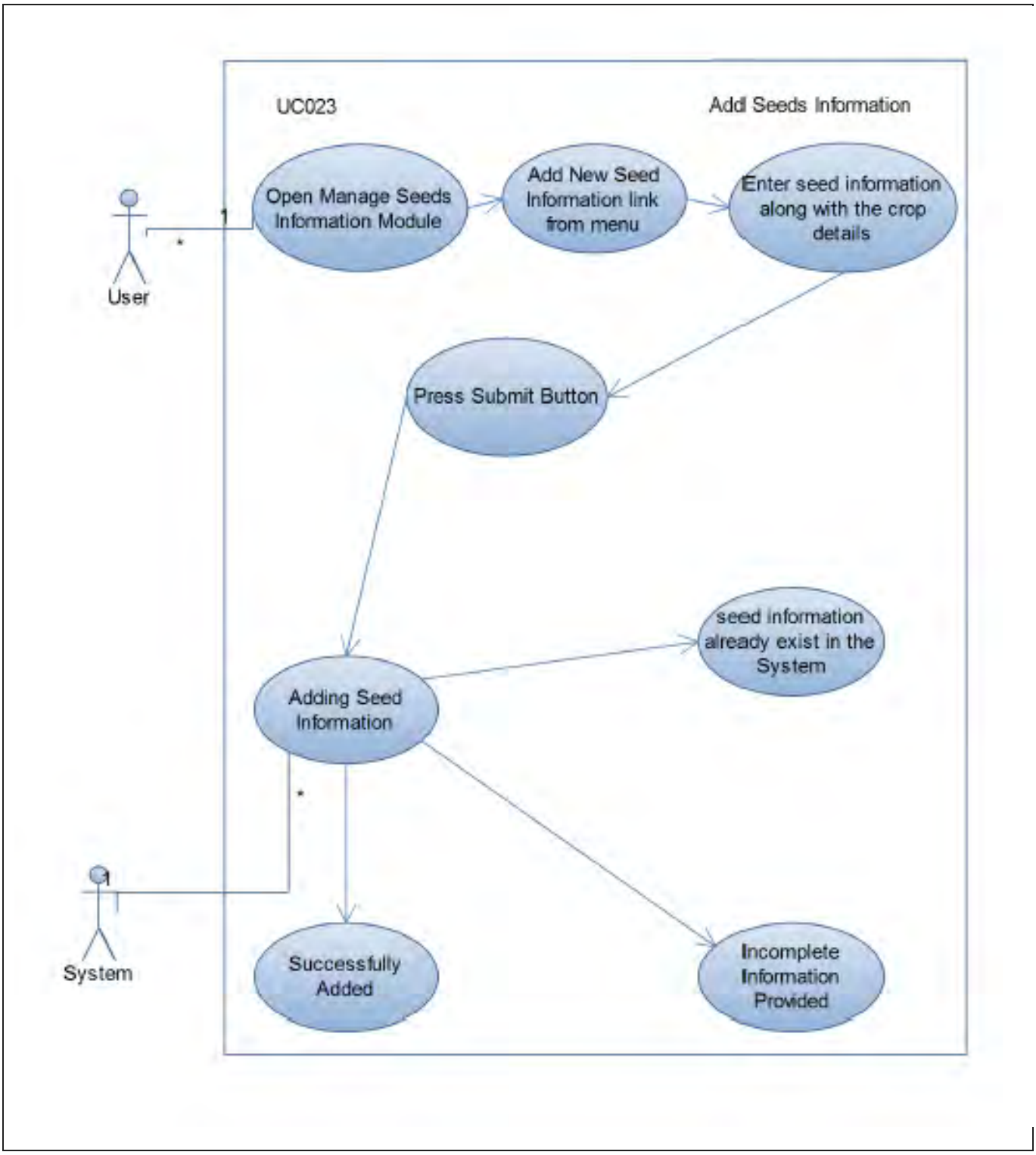
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC022
Update Crop Progress Information
Open Manage Crop Progress Information Module
Select Crop Progress whose information needs to edited
Provide Update Information
Press Update Button
Show existing Information
Crop Progress Information does not exist in the System
Updating Crop Progress Information
New Farmer Added to the System
Invalid Information Provided
User
System
1
*
1
*
1
*

23. Add Seeds Information

User Case Ref	UC023
User Case Name	Add Seeds information
Description	
This Use case is to add seed information into database	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User will open Manage Seeds information module 2. User will select Add New Seed information link from menu 3. User enters seed information along with details of crop. 4. User press submit button 5. System will add seed information and will prompt with appropriate message	1. System will prompt appropriate message if seed information already exists in system 2. System will prompt appropriate message if user have not provided necessary information of seed.
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to manage seed information
Post Conditions	1. seed information must added in database

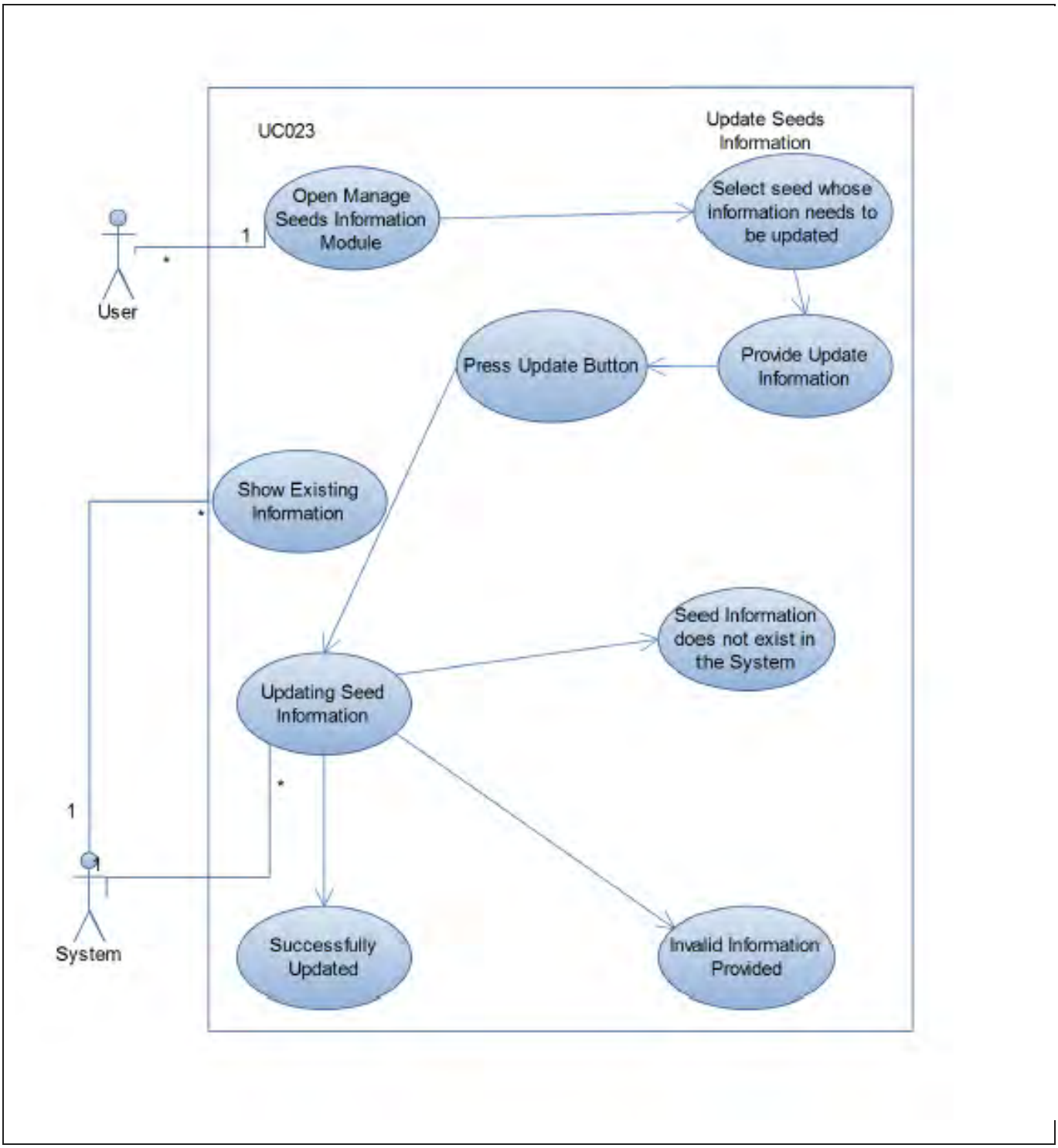
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC023
Add Seeds Information
User
Open Manage Seeds Information Module
Add New Seed Information link from menu
Enter seed information along with the crop details
Press Submit Button
seed information already exist in the System
Adding Seed Information
System
Successfully Added
Incomplete Information Provided

24. Update Seeds Information

User Case Ref	UC024
User Case Name	Update seed information
Description	
This Use case is to update seed information into database	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User open Manage seed information module 2. System shows list of seed available in system 3. User select seed whose information need to edit 4. System show already exist information 5. User provide update information and press update information button 6. System will add seed information and will prompt with appropriate message	1. System will prompt appropriate message if seed information doesn't exists in system 2. System will prompt appropriate message if user have not provided necessary information of seed
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to manage seed information 2. seed information must exist in database
Post Conditions	1. seed information must updated in database

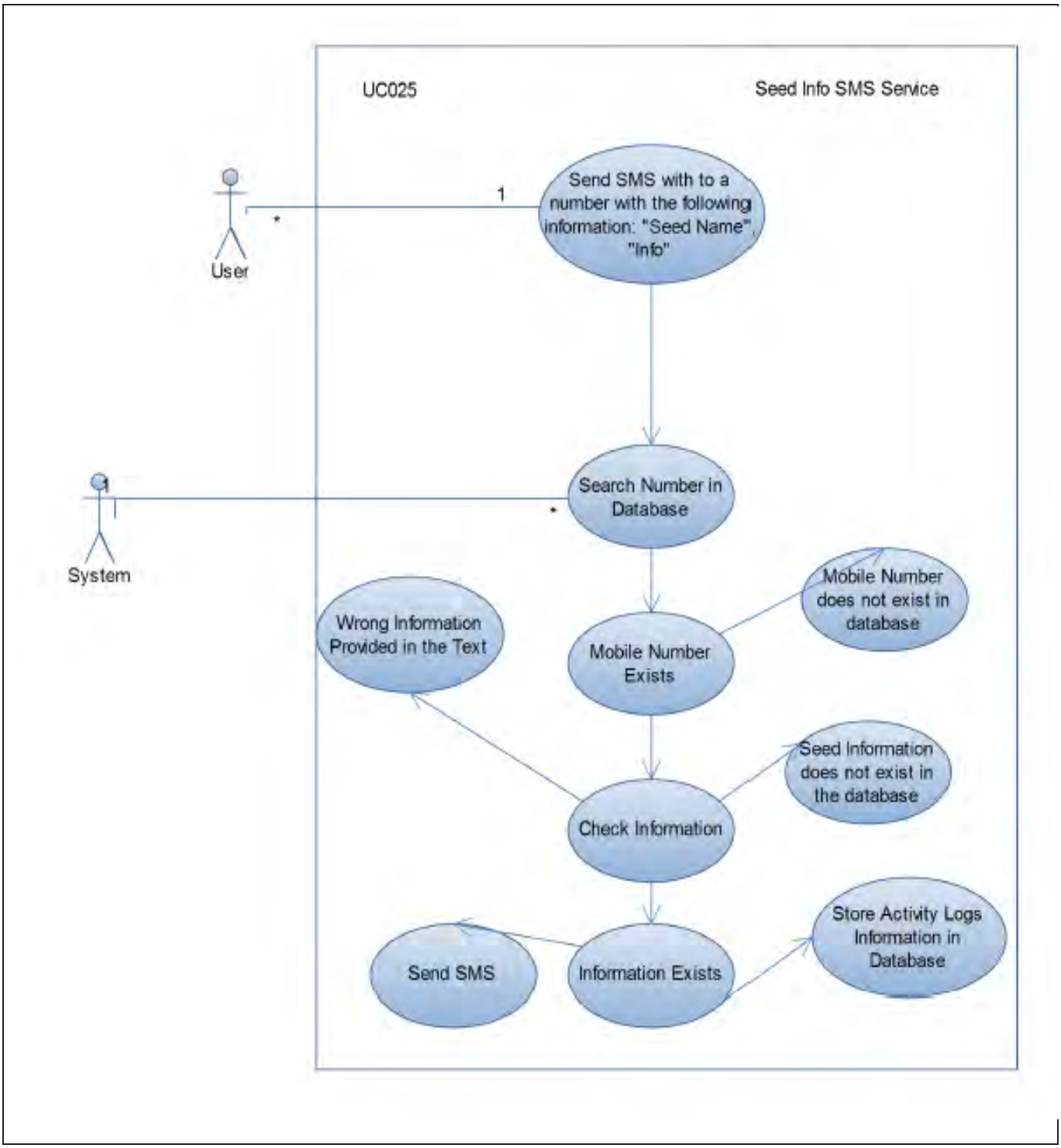
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC023
Update Seeds Information
Open Manage Seeds Information Module
Select seed whose information needs to be updated
Provide Update Information
Press Update Button
Show Existing Information
Seed Information does not exist in the System
Updating Seed Information
Successfully Updated
Invalid Information Provided
User
System
1
*
1
*
1
*

25. Seed Info SMS Service

User Case Ref	UC025
User Case Name	Seed Info SMS Service
Description	
This Use case is get System will provide service to provide complete information about sowing, fertilizer for certain type of seeds pesticides for certain seed.	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User send SMS to certain number with following info in SMS “seed name”, “info” 2. System search database against cell number. If cell number exist in database system will move further 3. System will search database to get seed information 4. If information exist system will send SMS alert to mobile number 5. System will store activity logs information in database	4. System will prompt appropriate message if mobile number is not registered in database 5. System will prompt appropriate message if user has sent wrong text information 6. System will prompt appropriate message if seed information does not exist in database.
Non-Functional Requirements	N/A
Pre-Conditions	3. User mobile number must exist in database 4. seed information must exists in database
Post Conditions	2. User receive SMS alert which contain information about seed

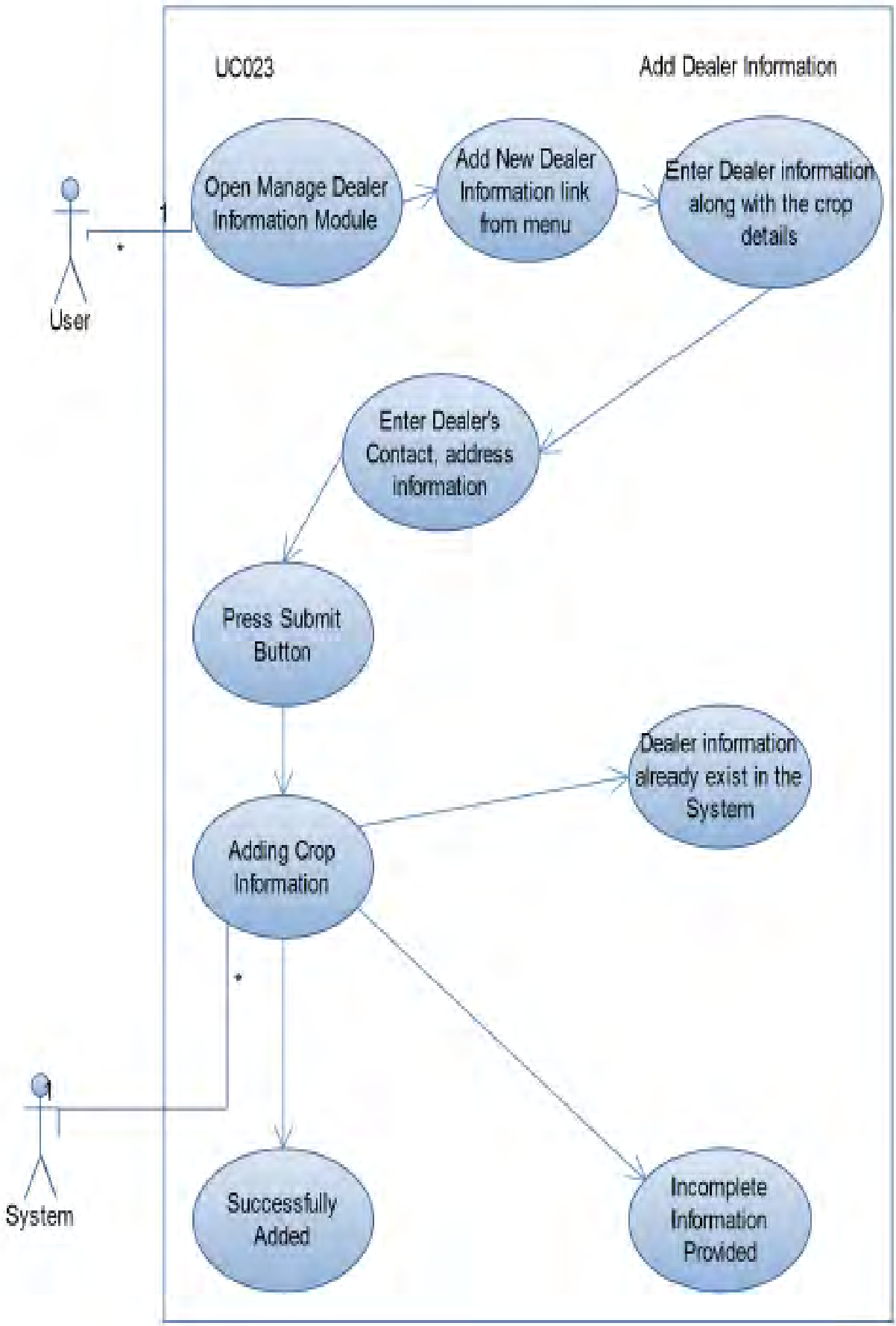
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of “inherited from parent” use cases**
N/A	N/A	N/A


UC025
Seed Info SMS Service
User
1
*
Send SMS with to a number with the following information: "Seed Name", "Info"
System
1
*
Search Number in Database
Wrong Information Provided in the Text
Mobile Number Exists
Mobile Number does not exist in database
Check Information
Seed Information does not exist in the database
Send SMS
Information Exists
Store Activity Logs Information in Database

26. Add Dealer Information

User Case Ref	UC026
User Case Name	Add Dealer information
Description	
This Use case is to add information of Dealer into system	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User will open Manage Dealer information module 2. User will select add new dealer information link from menu 3. User enters dealer information along with details of crop. 4. User enter dealer's contact ,address information 5. User press submit button 6. System will add crop information and will prompt with appropriate message	3. System will prompt appropriate message if dealer information already exists in system 4. System will prompt appropriate message if user have not provided necessary information of dealer.
Non-Functional Requirements	N/A
Pre-Conditions	2. User must have role to manage dealer information
Post Conditions	2. Dealer information must added in database

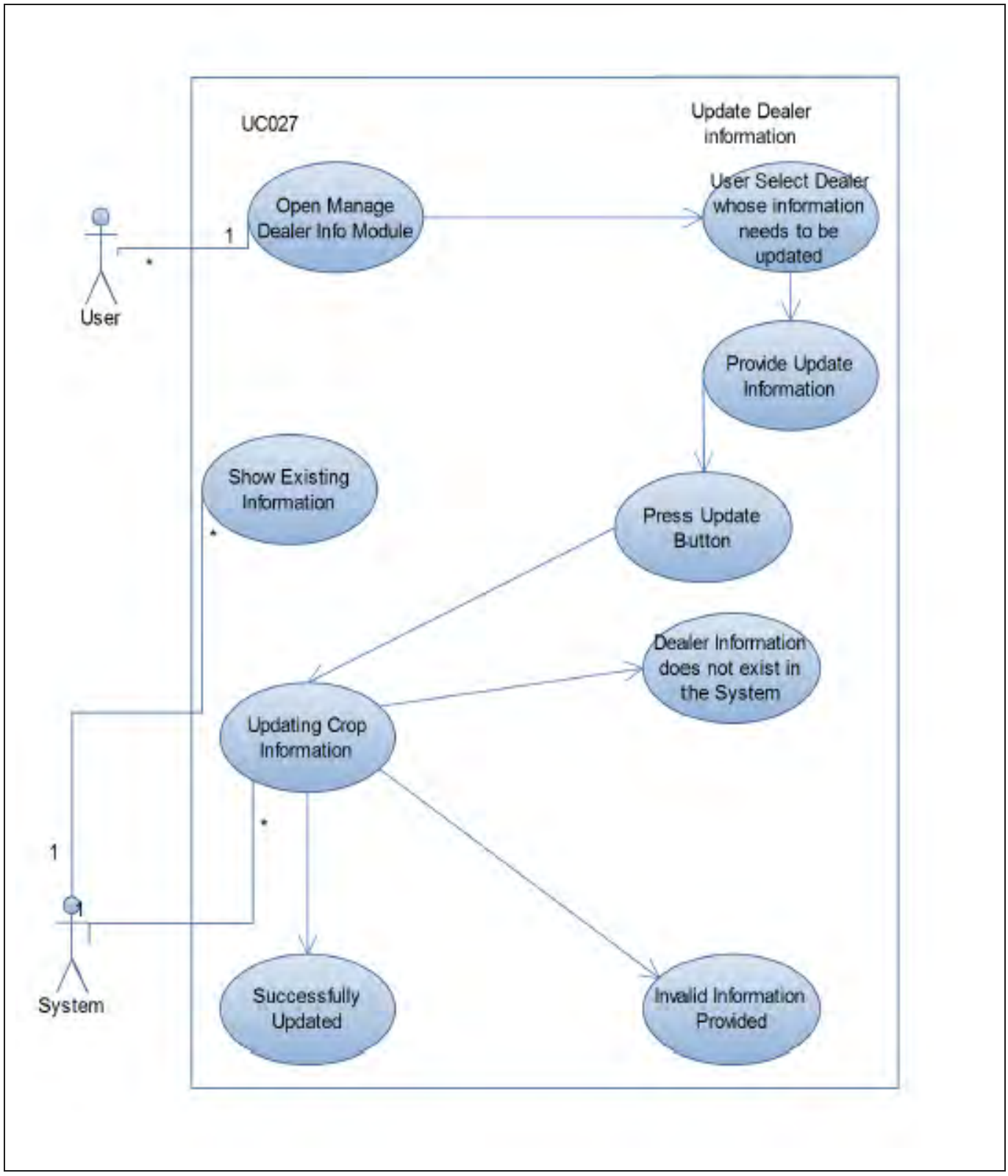
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC023
Add Dealer Information
User
1
*
Open Manage Dealer Information Module
Add New Dealer Information link from menu
Enter Dealer information along with the crop details
Enter Dealer's Contact, address information
Press Submit Button
Dealer information already exist in the System
Adding Crop Information
*
1
System
Successfully Added
Incomplete Information Provided

27. Update Dealer Information

User Case Ref	UC027
User Case Name	Update Dealer information
Description	
This Use case is to update dealer information into system.	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User open Manage Dealer information module 2. System shows list of Dealer available in system 3. User select Dealer whose information need to edit 4. System show already exist information 5. User provide update information and press update information button 6. System will add Dealer information and will prompt with appropriate message	1. System will prompt appropriate message if Dealer information doesn't exists in system 2. System will prompt appropriate message if user have not provided necessary information of Dealer.
Non-Functional Requirements	N/A
Pre-Conditions	3. User must have role to manage Dealer information 4. Dealer information must exist in database
Post Conditions	2. Dealer information must updated in database

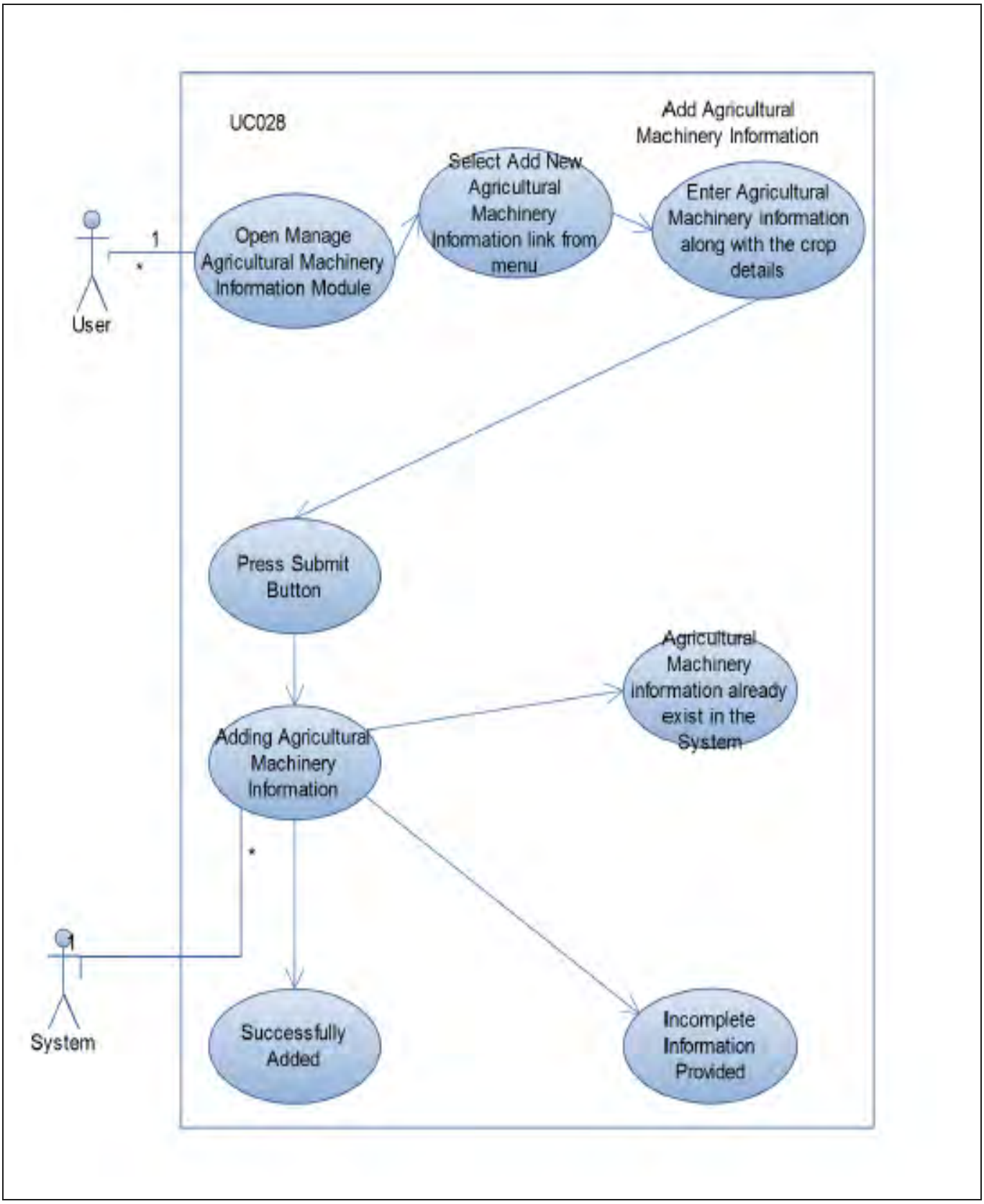
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC027
Update Dealer information
Open Manage Dealer Info Module
User Select Dealer whose information needs to be updated
Provide Update Information
Press Update Button
Show Existing Information
Dealer Information does not exist in the System
Updating Crop Information
Successfully Updated
Invalid Information Provided
User
System
1
*
1
*
1
*

28. Add Agricultural Machinery Information

User Case Ref	UC028
User Case Name	Add Agricultural machinery information
Description	
This Use case is to add information about agricultural machinery so that farmers can get latest information about pricing , usefulness of certain machinery in their area	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User will open Manage Agricultural machinery information module 2. User will select add new Agricultural machinery information link from menu 3. User enters Agricultural machinery information along with details of crop. 4. User press submit button 5. System will add Agricultural machinery information and will prompt with appropriate message	5. System will prompt appropriate message if machinery information already exists in system 6. System will prompt appropriate message if user have not provided necessary information of machinery.
Non-Functional Requirements	N/A
Pre-Conditions	2. User must have role to manage Agricultural machinery information
Post Conditions	2. Agricultural machinery information must added in database

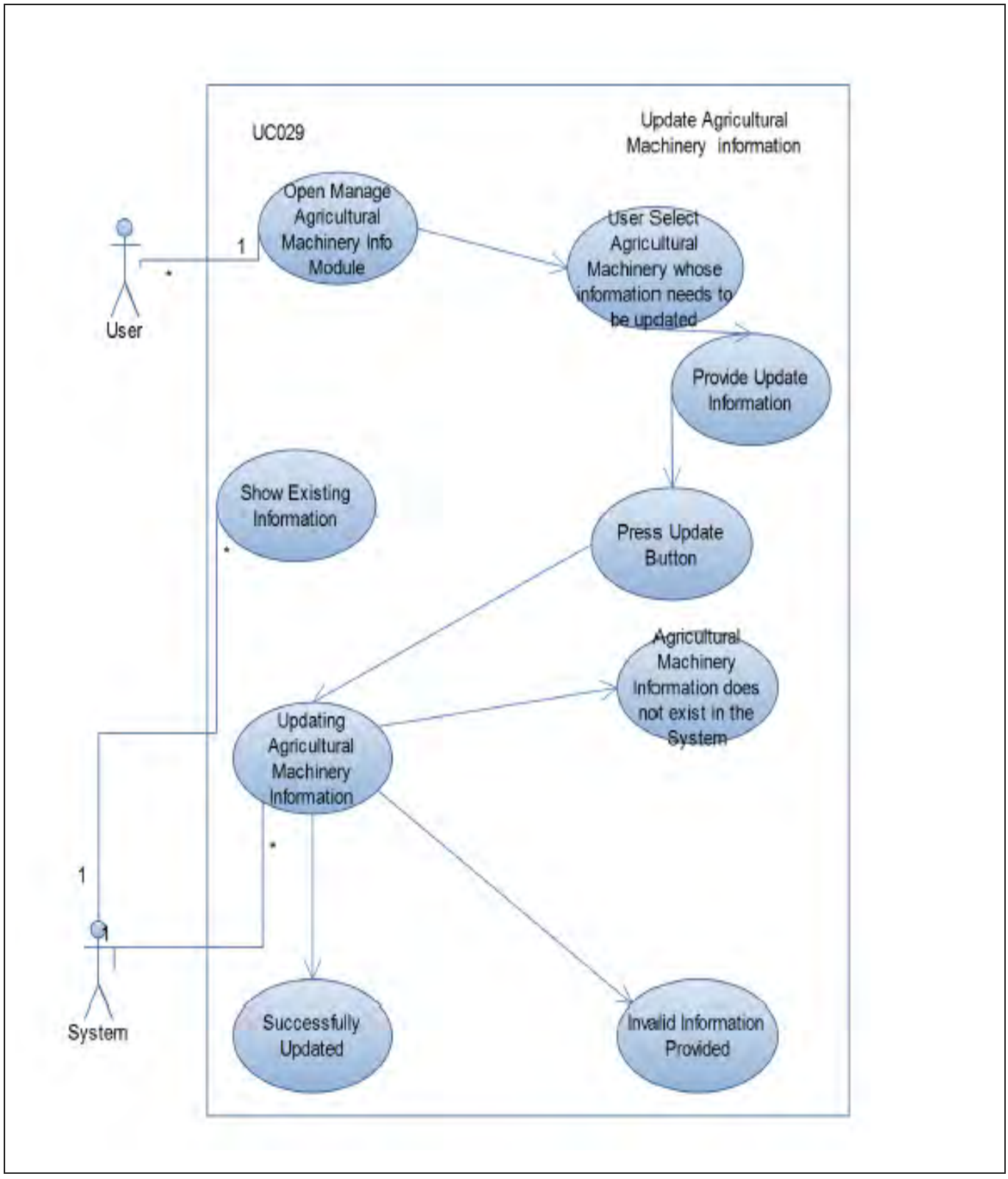
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC028
Add Agricultural Machinery Information
User
1
*
Open Manage Agricultural Machinery Information Module
Select Add New Agricultural Machinery Information link from menu
Enter Agricultural Machinery information along with the crop details
Press Submit Button
Agricultural Machinery information already exist in the System
Adding Agricultural Machinery Information
*
1
System
Successfully Added
Incomplete Information Provided

29. Update Agricultural Machinery Information

User Case Ref	UC029
User Case Name	Update Agricultural machinery information
Description	
This Use case is to update information of Agricultural machinery already added into system	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
7. User open Manage Agricultural machinery information module 8. System shows list of Agricultural machinery available in system 9. User select machinery whose information need to edit 10. System show already exist information 11. User provide update information and press update information button 12. System will add machinery information and will prompt with appropriate message	3. System will prompt appropriate message if Agricultural machinery information doesn't exists in system 4. System will prompt appropriate message if user have not provided necessary information of Agricultural machinery.
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to manage Agricultural machinery information 2. Agricultural machinery information must exist in database
Post Conditions	2. Agricultural machinery information must updated in database

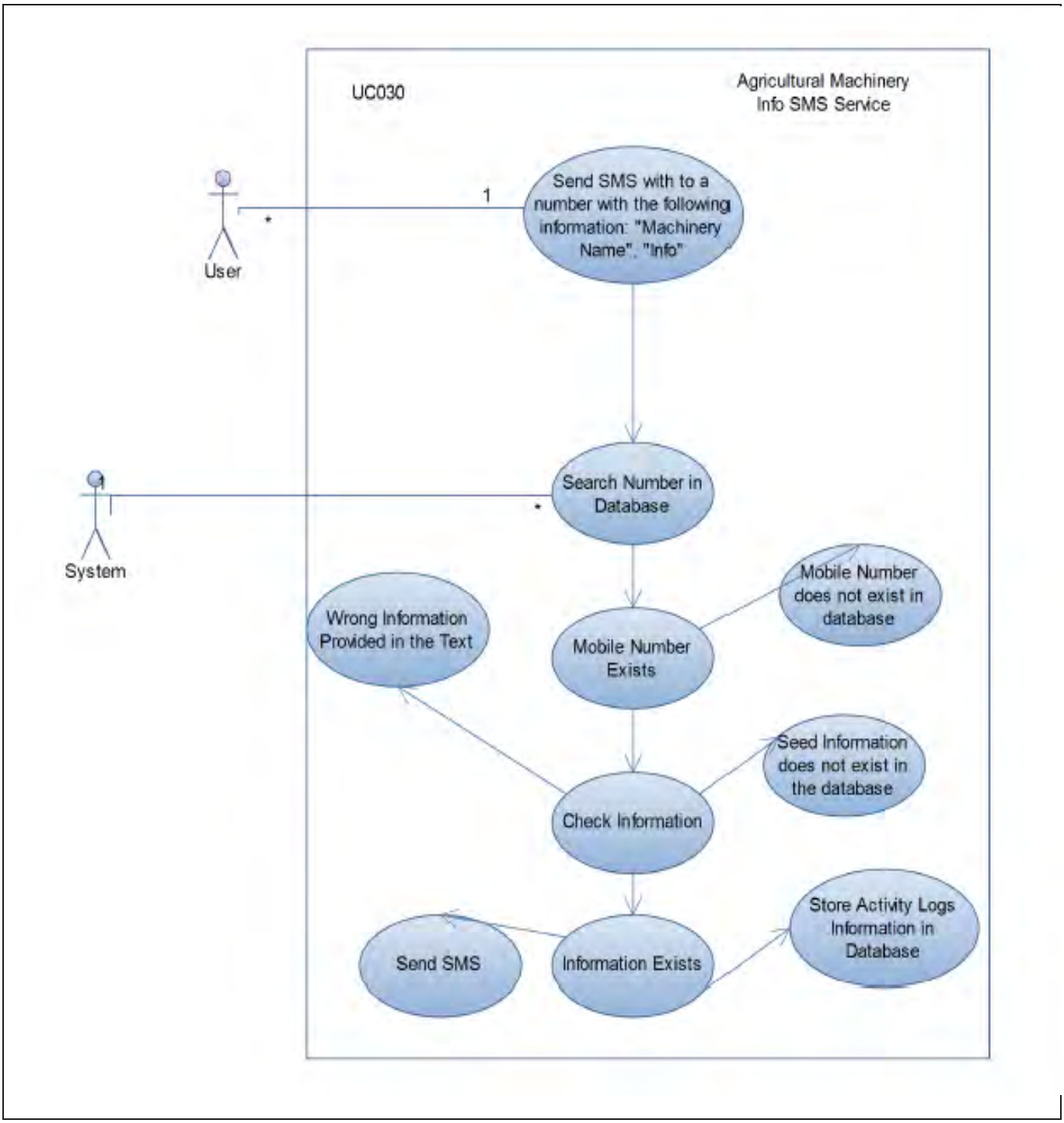
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC029
Update Agricultural Machinery information
Open Manage Agricultural Machinery Info Module
User Select Agricultural Machinery whose information needs to be updated
Provide Update Information
Show Existing Information
Press Update Button
Agricultural Machinery Information does not exist in the System
Updating Agricultural Machinery Information
Successfully Updated
Invalid Information Provided
User
System
1
*
1
*
1
1

30. Agricultural machinery Info SMS Service

User Case Ref	UC030
User Case Name	Agricultural machinery Info SMS Service
Description	
This Use case is get System will provide service to provide complete information about Agricultural machinery , its price and usefulness in certain area	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User send SMS to certain number with following info in SMS “machinery name”, “info” 2. System search database against cell number. If cell number exist in database system will move further 3. System will search database to get machinery information 4. If information exist system will send SMS alert to mobile number 5. System will store activity logs information in database	1. System will prompt appropriate message if mobile number is not registered in database 2. System will prompt appropriate message if user has sent wrong text information 3. System will prompt appropriate message if machinery information does not exist in database.
Non-Functional Requirements	N/A
Pre-Conditions	1. User mobile number must exist in database 2. crop information must exists in database
Post Conditions	1. User receive SMS alert which contain information about crop

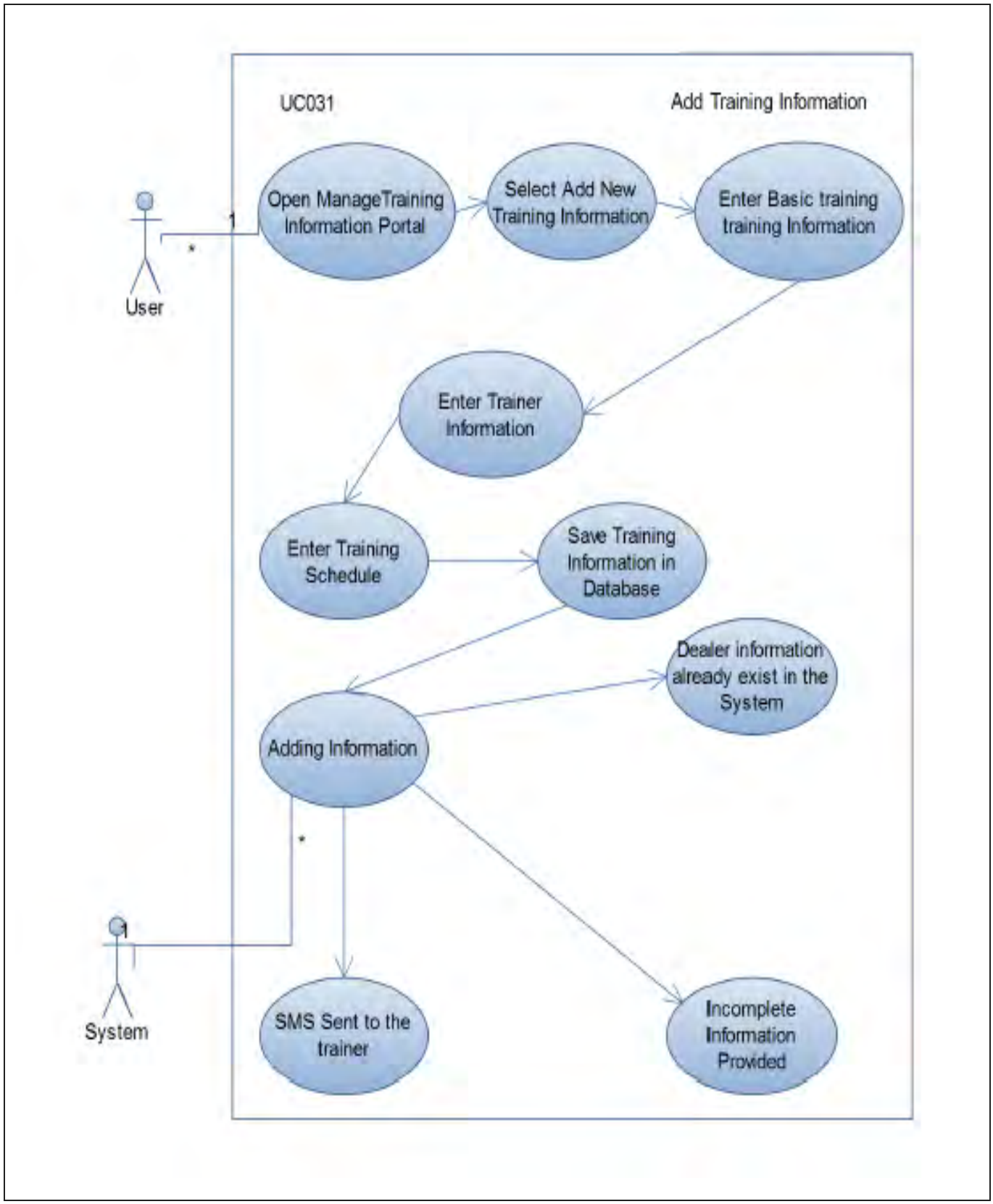
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of “inherited from parent” use cases**
N/A	N/A	N/A


UC030
Agricultural Machinery
Info SMS Service
User
1
*
Send SMS with to a number with the following information: "Machinery Name", "Info"
System
1
*
Search Number in Database
Wrong Information Provided in the Text
Mobile Number Exists
Mobile Number does not exist in database
Check Information
Seed Information does not exist in the database
Send SMS
Information Exists
Store Activity Logs Information in Database

31. Add Training Information

User Case Ref	UC031
User Case Name	Add Training Information
Description	
This user case to add and schedule training information in system	
Actors	User, system
Business Rules	
Basic Flow	**Alternate Flow**
1. User will open Manage Training Information portal 2. User select add new training information 3. User enter training basic information 4. User enter trainer information 5. User enter training schedule 6. User save training information in database 7. System prompt appropriate message about training and send email/SMS alerts to trainer	1. System prompt appropriate message if necessary information of training is not provided 2. System prompt appropriate message when user does not define schedule and trainer information
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to Manage Training information
Post Conditions	1. Training information should be added into system

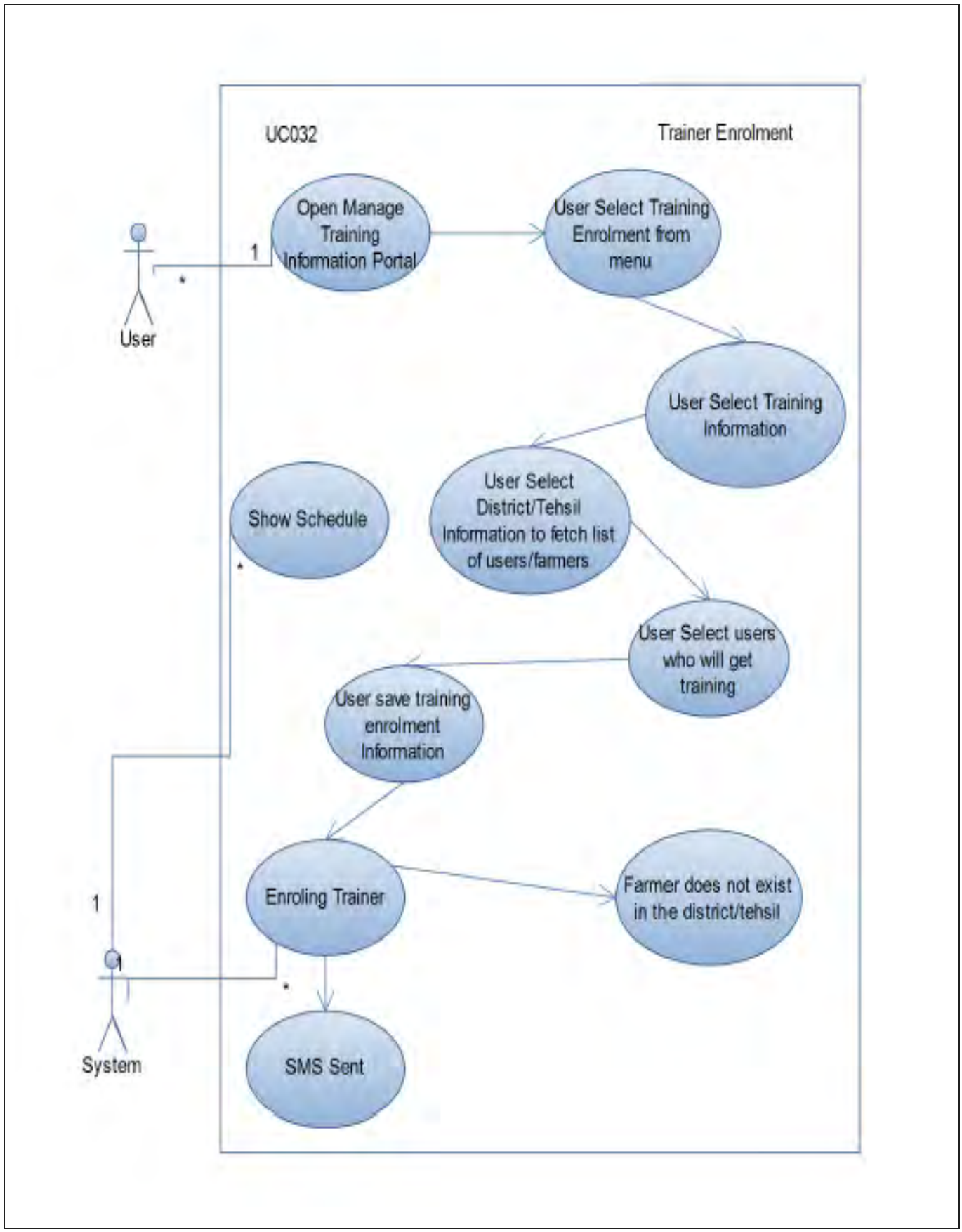
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC031
Add Training Information
Open ManageTraining Information Portal
Select Add New Training Information
Enter Basic training training Information
Enter Trainer Information
Enter Training Schedule
Save Training Information in Database
Dealer information already exist in the System
Adding Information
SMS Sent to the trainer
Incomplete Information Provided
User
System
1
*
1
*

32. Training Enrolment

User Case Ref	UC032
User Case Name	Training Enrolment
Description	
This user case to add peoples (farmers, staff) to training	
Actors	User, system
Business Rules	
Basic Flow	**Alternate Flow**
1. User will open Manage Training Information portal 2. User select Training Enrolment from menu 3. User select training information 4. System shows its schedule 5. User select district/tehsil information to fetch list of users/farmers 6. User select users who will get training 7. User Save training enrolment information 8. System send SMS alerts/email to management, trainees, trainer about schedule	1. System prompt appropriate message if farmers doesn't exist in certain district/tehsil
Non-Functional Requirements	N/A
Pre-Conditions	2. User must have role to Manage Training information
Post Conditions	2. Users should be enrolled for certain training

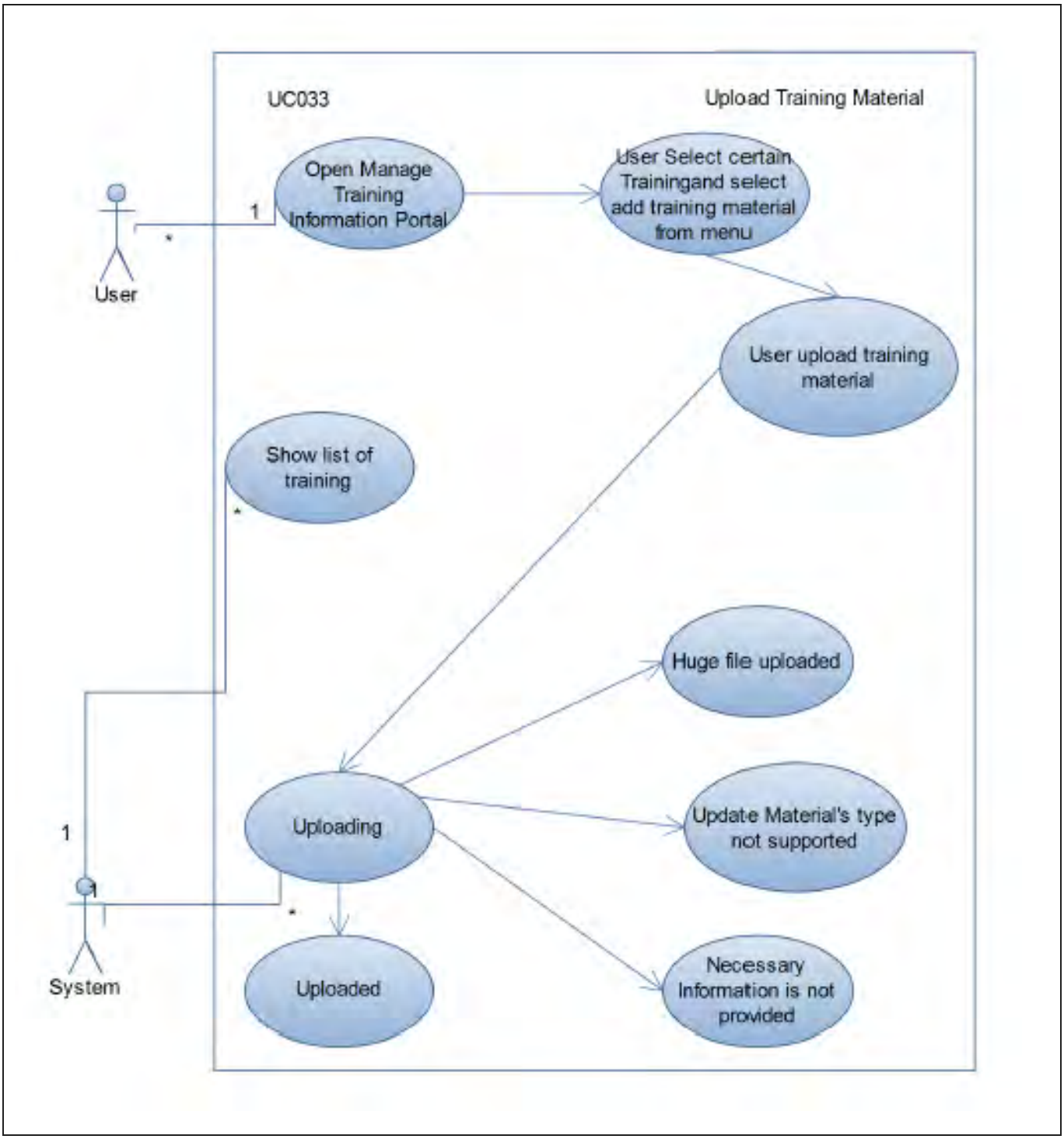
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC032
Trainer Enrolment
Open Manage Training Information Portal
User Select Training Enrolment from menu
User Select Training Information
User Select District/Tehsil Information to fetch list of users/farmers
Show Schedule
User Select users who will get training
User save training enrolment Information
Enroling Trainer
Farmer does not exist in the district/tehsil
SMS Sent
User
System
1
*
1
*
1
*

33. Upload Training Material

User Case Ref	UC033
User Case Name	Upload Training Material
Description	
This user case to add training material such as document, videos to enable users to view training information later on	
Actors	User, system
Business Rules	
Basic Flow	**Alternate Flow**
1. User will open Manage Training Information portal 2. System show list of training 3. User select certain training and select add training material from menu 4. User upload training material 5. System shows appropriate message and send alerts to trainees	1. System prompt appropriate message if necessary information of training is not provided 2. System prompt appropriate message when user upload invalid or not supported type of material. 3. System shows message when user upload large files.
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to Manage Training information
Post Conditions	1. Training material should be uploaded and viewable to other users or public portal under training information

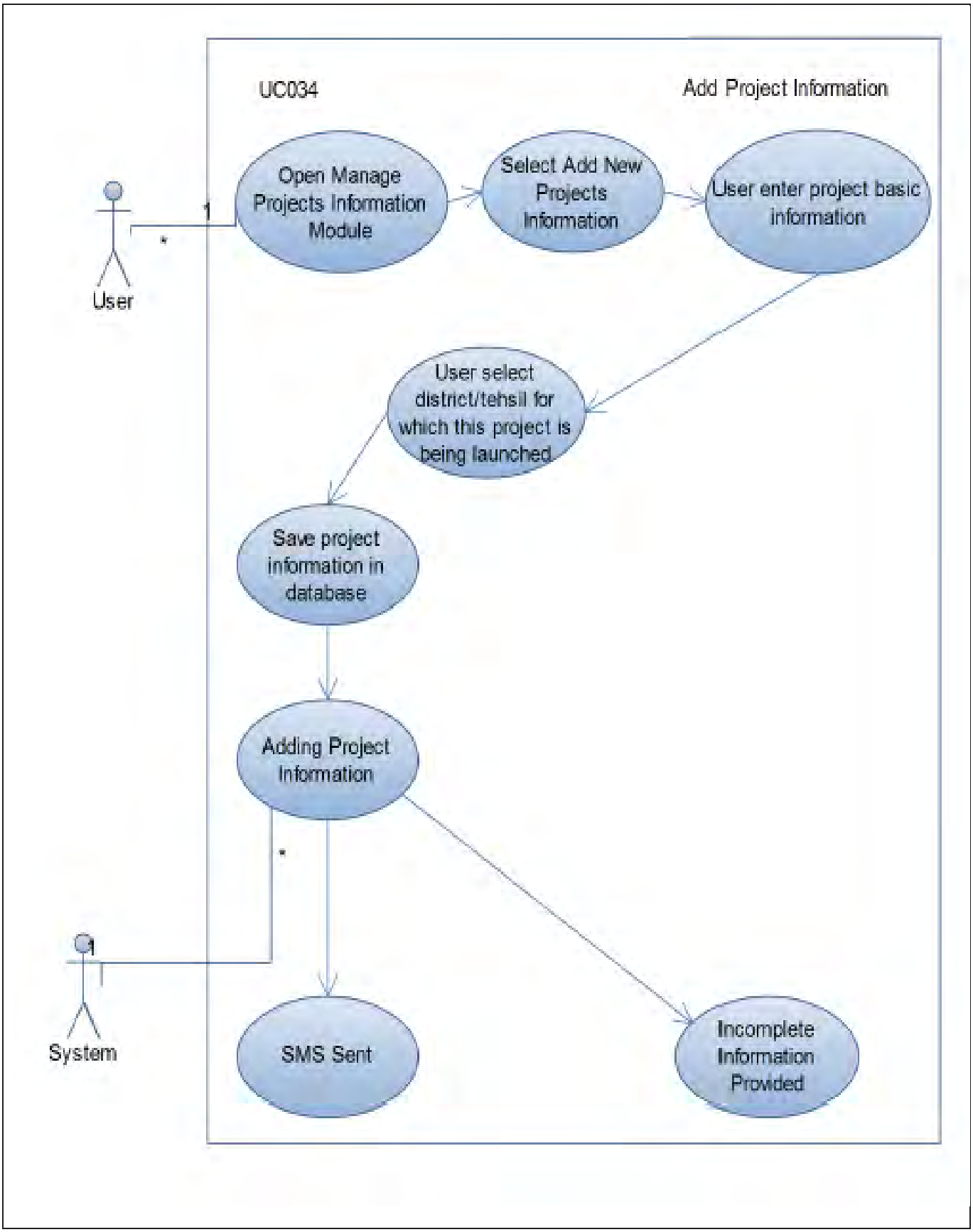
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC033
Upload Training Material
Open Manage Training Information Portal
User Select certain Trainingand select add training material from menu
User
1
*
User upload training material
Show list of training
*
Huge file uploaded
Uploading
Update Material's type not supported
1
1
*
System
Uploaded
Necessary Information is not provided

34. Add Project Information

User Case Ref	UC034
User Case Name	Add Project Information
Description	
As government introduce new projects to farmers like kitchen gardening. Our system will maintain information of project and enrolment. This use case is to add new project information in database	
Actors	User, system
Business Rules	
Basic Flow	**Alternate Flow**
1. User will open Manage Projects Information portal 2. User select add new project information 3. User enter project basic information 4. User select district/tehsil for which this project is being launched 5. User save project information in database 6. System prompt appropriate message about training and send email/SMS alerts to trainer	1. System prompt appropriate message if necessary information of project is not entered
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to Manage Project information
Post Conditions	1. Project information should be added into system

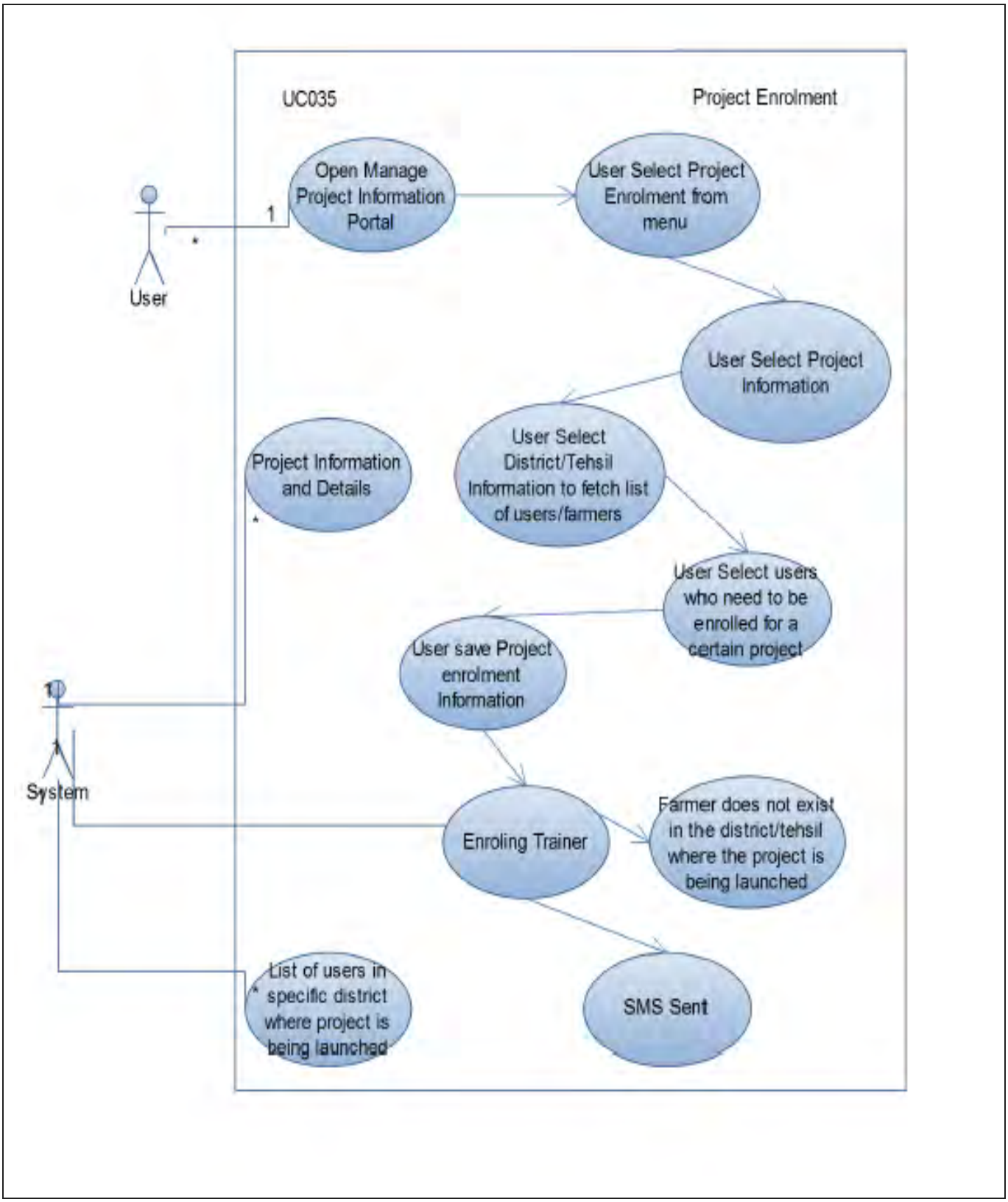
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC034
Add Project Information
Open Manage Projects Information Module
Select Add New Projects Information
User enter project basic information
User
1
*
User select district/tehsil for which this project is being launched
Save project information in database
Adding Project Information
*
1
System
SMS Sent
Incomplete Information Provided

35. Project Enrolment

User Case Ref	UC035
User Case Name	Project Enrolment
Description	
This user case to enroll farmers for certain project offered by government	
Actors	User, system
Business Rules	
Basic Flow	**Alternate Flow**
9. User will open Manage Project Information portal 10. User select Project Enrolment from menu 11. User select Project information 12. System shows project information and details 13. System shows list of users in specific district where project is being launched. 14. User select users who need to be enrolled for certain project 15. User saves project enrolment information 16. System send SMS alerts/email to management, farmers about project enrolment	2. System prompt appropriate message if farmers doesn't exist in certain district/tehsil where project is being launched
Non-Functional Requirements	N/A
Pre-Conditions	3. User must have role to Manage Project information
Post Conditions	3. Users must be enrolled in project and sms alerts must be sent

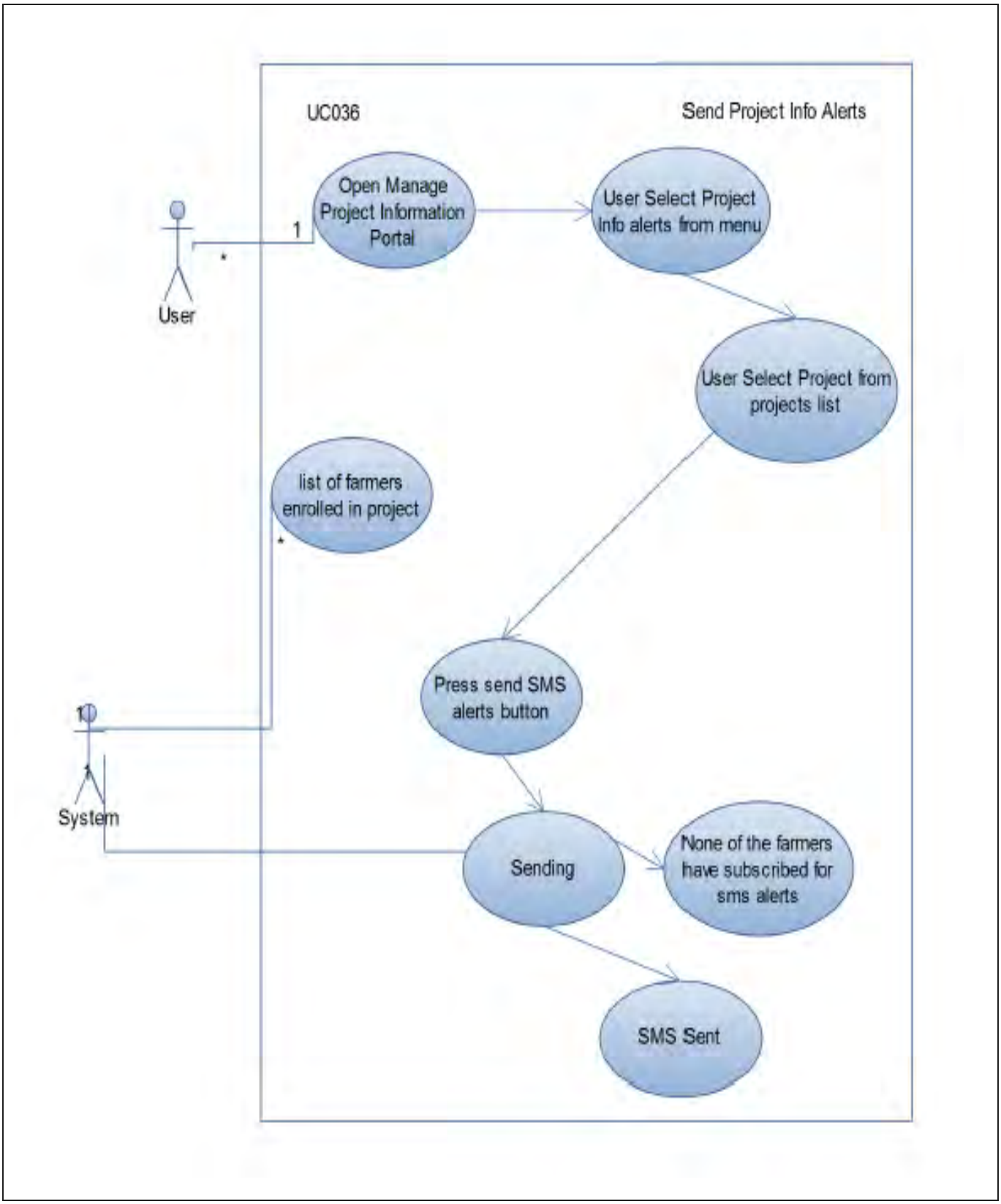
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC035
Project Enrolment
Open Manage Project Information Portal
User Select Project Enrolment from menu
User
1
*
User Select Project Information
User Select District/Tehsil Information to fetch list of users/farmers
Project Information and Details
*
User Select users who need to be enrolled for a certain project
User save Project enrolment Information
1
1
System
Enroling Trainer
Farmer does not exist in the district/tehsil where the project is being launched
List of users in specific district where project is being launched
*
SMS Sent

36. Send Project info Alerts

User Case Ref	UC036
User Case Name	Send Project Info alerts
Description	
This Use case is to send alerts about project to create awareness and to send certain instructions about project	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User will open Manage Project Information module 2. User will select Send Project alerts link from menu 3. User will select project information from projects list 4. System will show list of farmers which are enrolled in project 5. Press send SMS alerts button 6. System will send project information to users	1. System will prompt appropriate message if none of the farmers have subscribed to SMS alert service
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role Manage Project Information 2. List of farmers enrolled in project must exist with valid cell phone numbers
Post Conditions	1. SMS alerts must be send to farmer and other management peoples

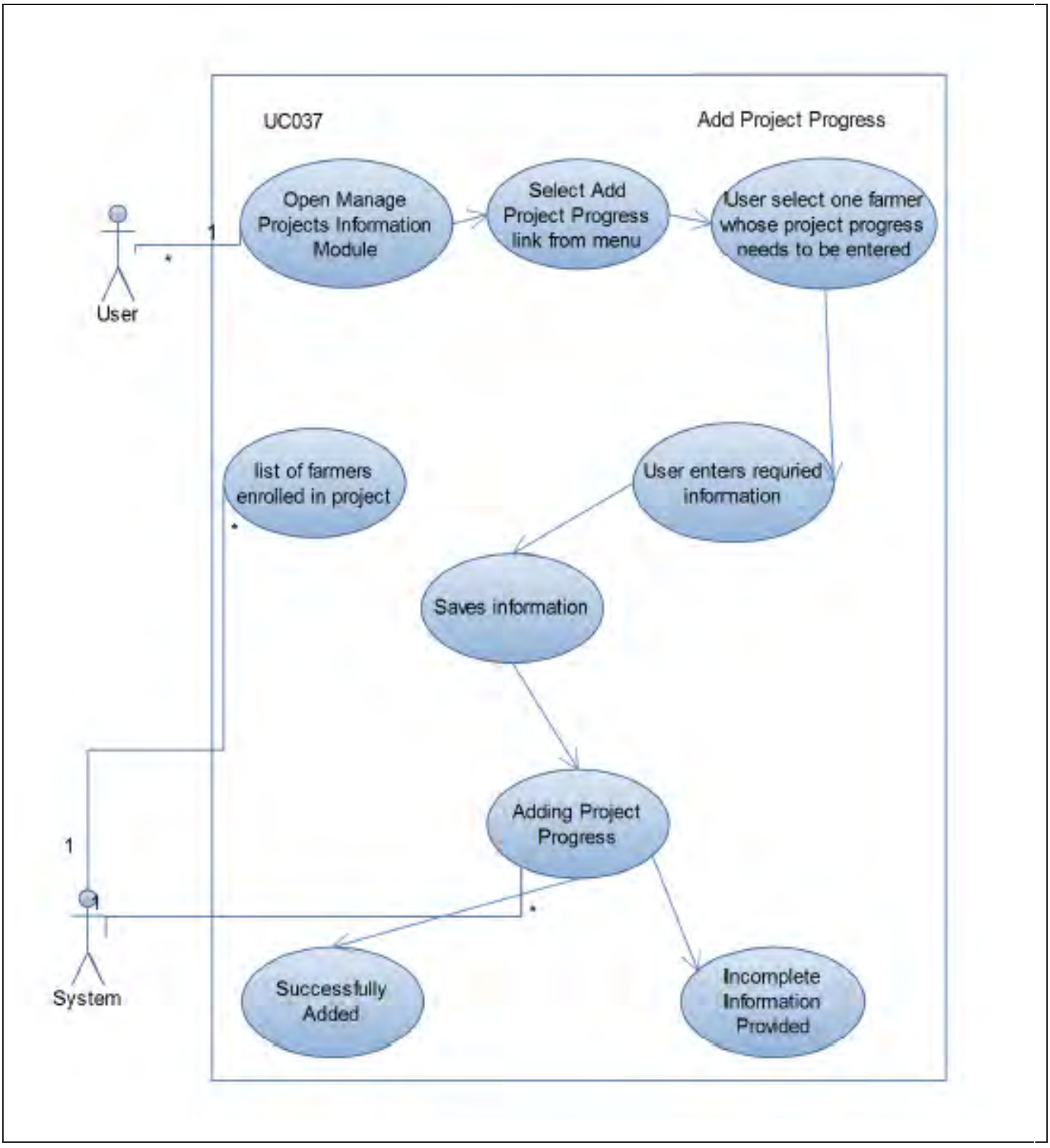
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC036
Send Project Info Alerts
Open Manage Project Information Portal
User Select Project Info alerts from menu
User
1
*
User Select Project from projects list
list of farmers enrolled in project
*
Press send SMS alerts button
1
System
Sending
None of the farmers have subscribed for sms alerts
SMS Sent

37. Add Project Progress

User Case Ref	UC037
User Case Name	Add Project progress
Description	
This Use case is to add progress of farmer on certain project periodically which will be collected through different sources	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User will open Manage Project Information module 2. User will select Add Project progress link from menu 3. System will show list of farmers enrolled in project 4. User select one farmer whose project progress need to be entered 5. User enters required information and saves information 6. System prompt appropriate message	1. System will prompt appropriate message if user have not provided necessary data of project progress
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role Manage Project Information
Post Conditions	1. Project progress should be added against a farmer

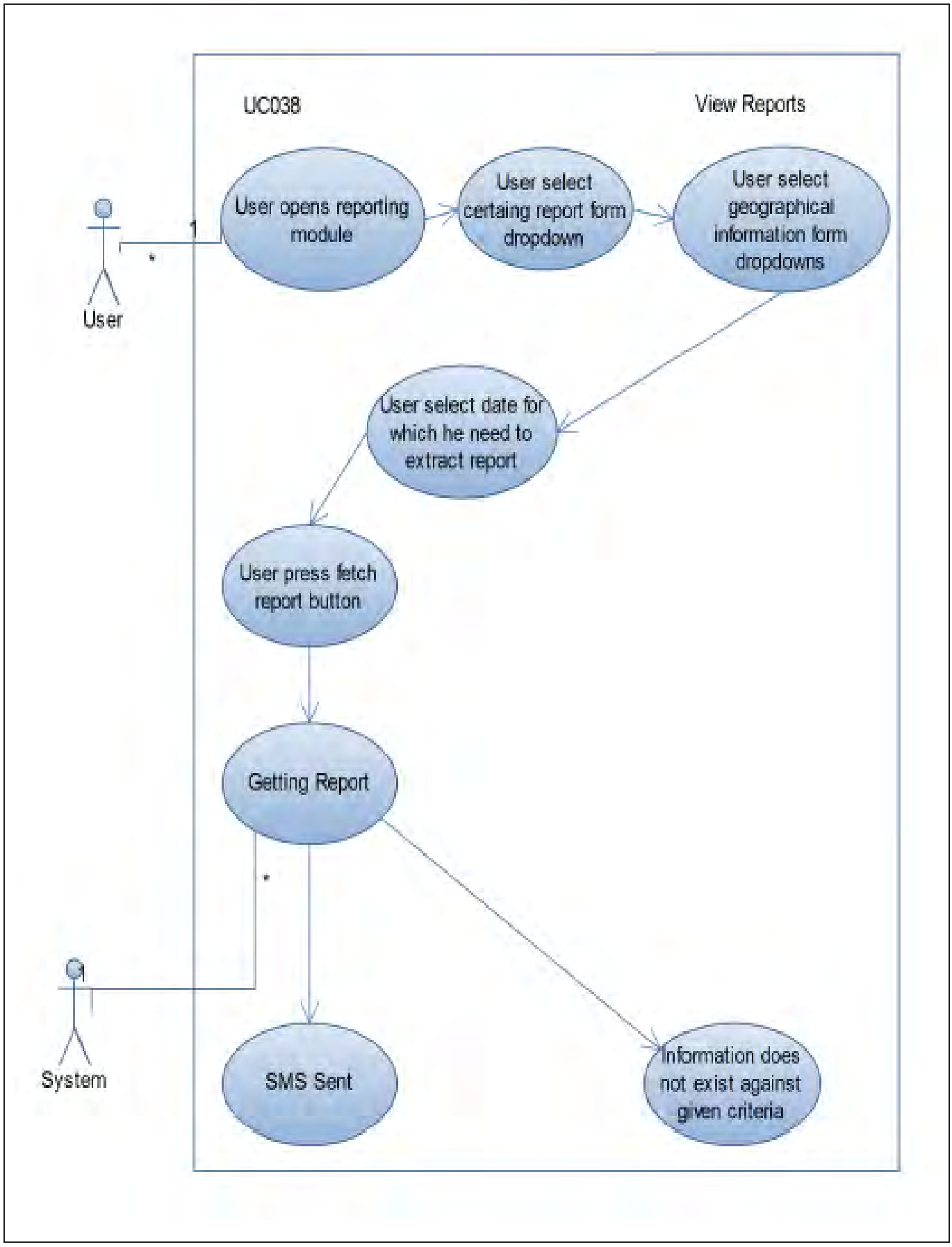
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC037
Add Project Progress
Open Manage Projects Information Module
Select Add Project Progress link from menu
User select one farmer whose project progress needs to be entered
User
1
*
list of farmers enrolled in project
User enters requried information
Saves information
Adding Project Progress
1
1
System
*
Successfully Added
Incomplete Information Provided

38. View Reports

User Case Ref	UC038
User Case Name	View Report
Description	
This Use case is to view report by management user	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. User will open Reporting module 2. User select certain report from dropdown 3. User select geographical information (province, district, tehsil) from dropdowns 4. User select dates for which he need to extract report 5. User press fetch report button 6. System shows complete report according to certain criteria	1. System will prompt appropriate message if information does not exists against selected criteria
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to view reports
Post Conditions	2. System show should correct report

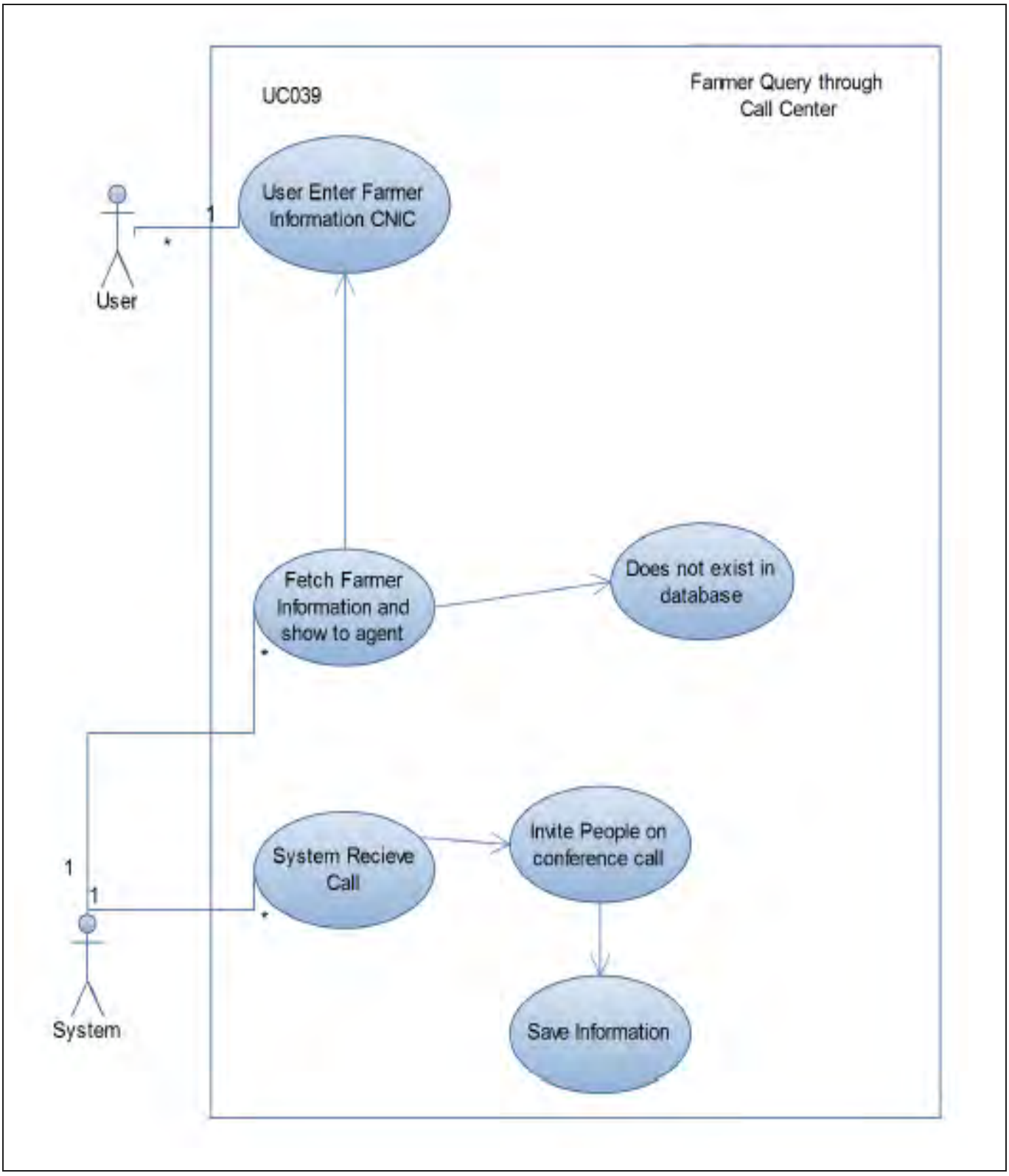
Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC038
View Reports
User
1
*
User opens reporting module
User select certaing report form dropdown
User select geographical information form dropdowns
User select date for which he need to extract report
User press fetch report button
Getting Report
*
1
System
SMS Sent
Information does not exist against given criteria

39. Farmer Query through Call Center

User Case Ref	UC039
User Case Name	Farmer Query though call center
Description	
This Use case is to handle farmer queries through call center	
Actors	User, System
Business Rules	
Basic Flow	**Alternate Flow**
1. System receive call 2. User enter farmer information CNIC 3. System fetch farmer information and shows it before agent 4. Call center agent resolve issue or forward the call or invite people for conference call 5. Call center agent saves information provided to farmer in system to be used later for reference/FAQs	1. System will prompt appropriate message if farmer information does not exists in database
Non-Functional Requirements	N/A
Pre-Conditions	1. User must have role to enter call information
Post Conditions	1. System must have farmer query and resolution logs saved in database

Extension Points	**Extension Condition**	**Extending Use Case**
N/A	N/A	N/A
List of <<include>> use cases	**List of <<extended>> use cases**	**List of "inherited from parent" use cases**
N/A	N/A	N/A


UC039
Farmer Query through Call Center
User Enter Farmer Information CNIC
User
1
*
Fetch Farmer Information and show to agent
Does not exist in database
*
1
1
System Recieve Call
Invite People on conference call
*
System
Save Information

Annex-B User Guide E-Zaraat Ver 2

UKaid from the British people
Department for International Development

www.cabi.org

E-Zaraat User Guide

Ver.2

Abdul Wahab Chauhdry, Mahrukh Siraj

www.cabi.org
KNOWLEDGE FOR LIFE

Contents

1. e-Zaraat Web Application

Welcome to the e-Zaraat Web Application! This User Manual provides a detailed description of this application.

1.1. Computer Requirements

Before logging on to the system, please make sure your computer meets the following requirements:

- Windows 98 or higher
- 32MB RAM
- Internet connection
- One of the following internet browsers: Microsoft Internet Explorer 4.0 or later, Google Chrome, Opera or Mozilla Firefox.
- A valid e-Zaraat user account to access the e-Zaraat Web Application.

2. Logging Into the e-Zaraat Web Application

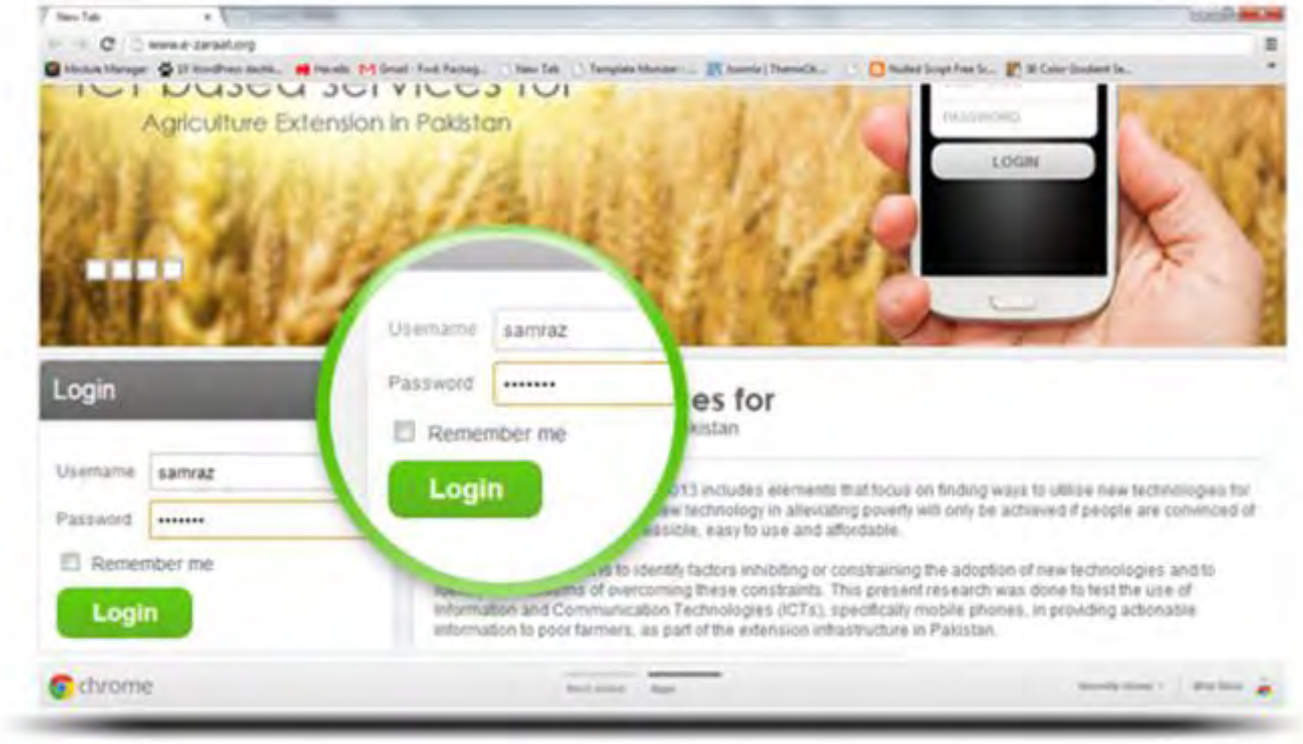
Power on your computer. The power on key should be at the top or centre of your desktop PC.

Once the operating system (Windows etc.) has loaded, open your browser (Internet Explorer/Mozilla Firefox/Google Chrome etc.).

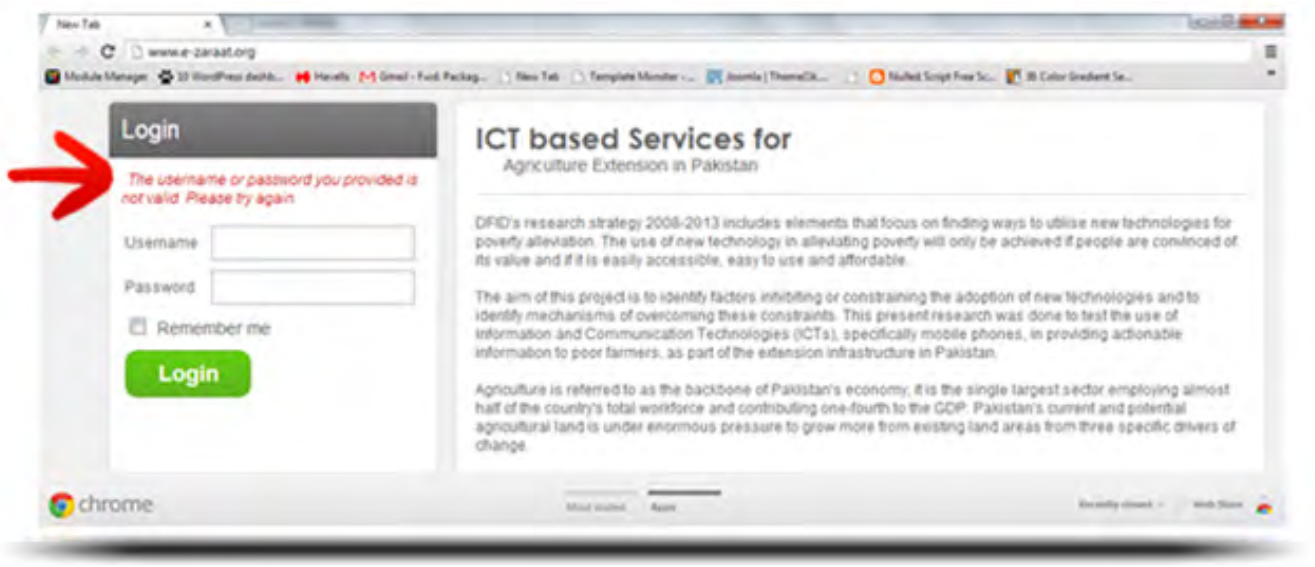
Note: For this guide, we are using Google Chrome. Google Chrome and Mozilla Firefox are the preferred browsers.

As shown in the above image, enter the URL "www.e-zaraat.org" into the browser and press enter. The following screen will appear:

On the sign-in screen of the e-Zaraat Web Application, enter your User ID and password:



Once you have added this information click the ‘Login’ button to enter the e-Zaraat Web Application. If you enter a valid account ID and password, you will be taken to the Main Menu. If the Login ID and/or password are incorrect, the following message will be displayed:



If you receive the message above, use the ‘Login’ button to return to the Login page and attempt to enter your information again. If you continue to have problems logging in, please contact us (info@e-zaraat.org).

You may also receive this page if your session has timed out. If this occurs, click the “Login” button to log in again and restart your session.

The Dashboard screen will display after successful login.

2.1. Dashboard Page

The Dashboard page is the initial page shown immediately after logging into the e-Zaraat Web Application.

The Dashboard is divided into the following sections:

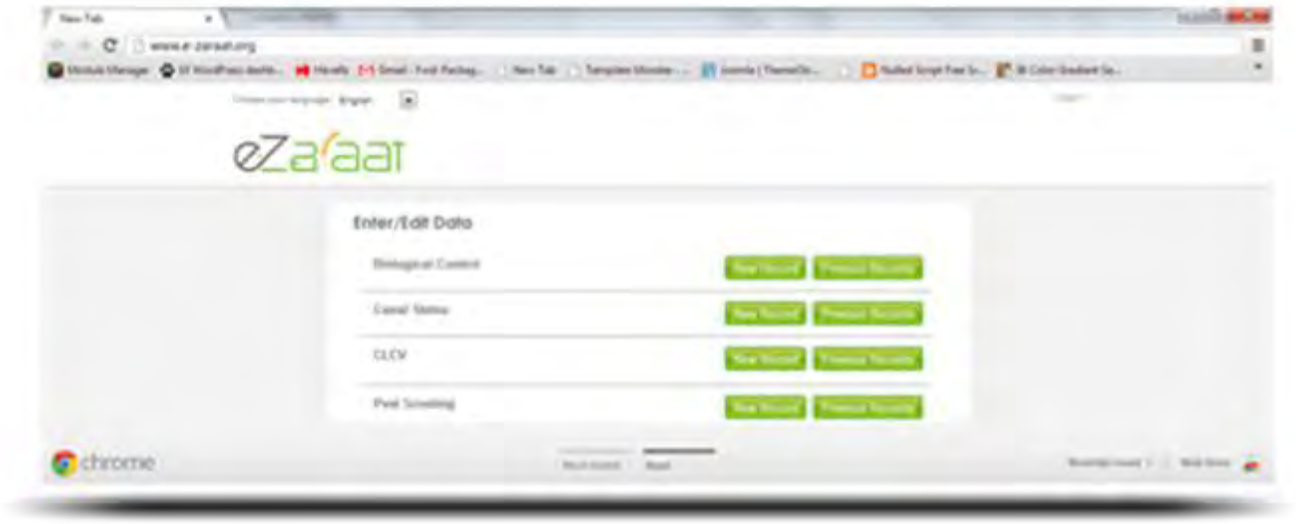
1) Data
2) Configurations
3) Settings

2.1.1. Data

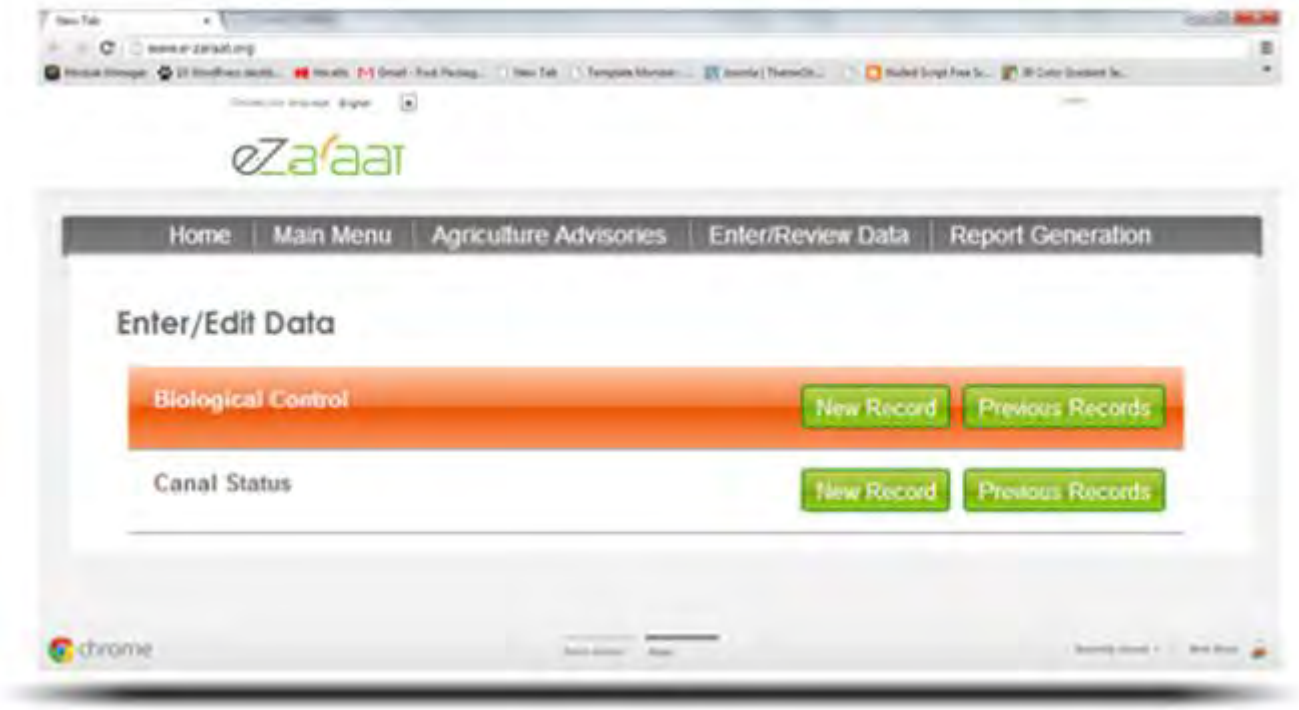
The Data section is further divided into the following categories:

2.1.1.1. Enter Review Data

By clicking on “Enter Review Data”, the following screen will appear:

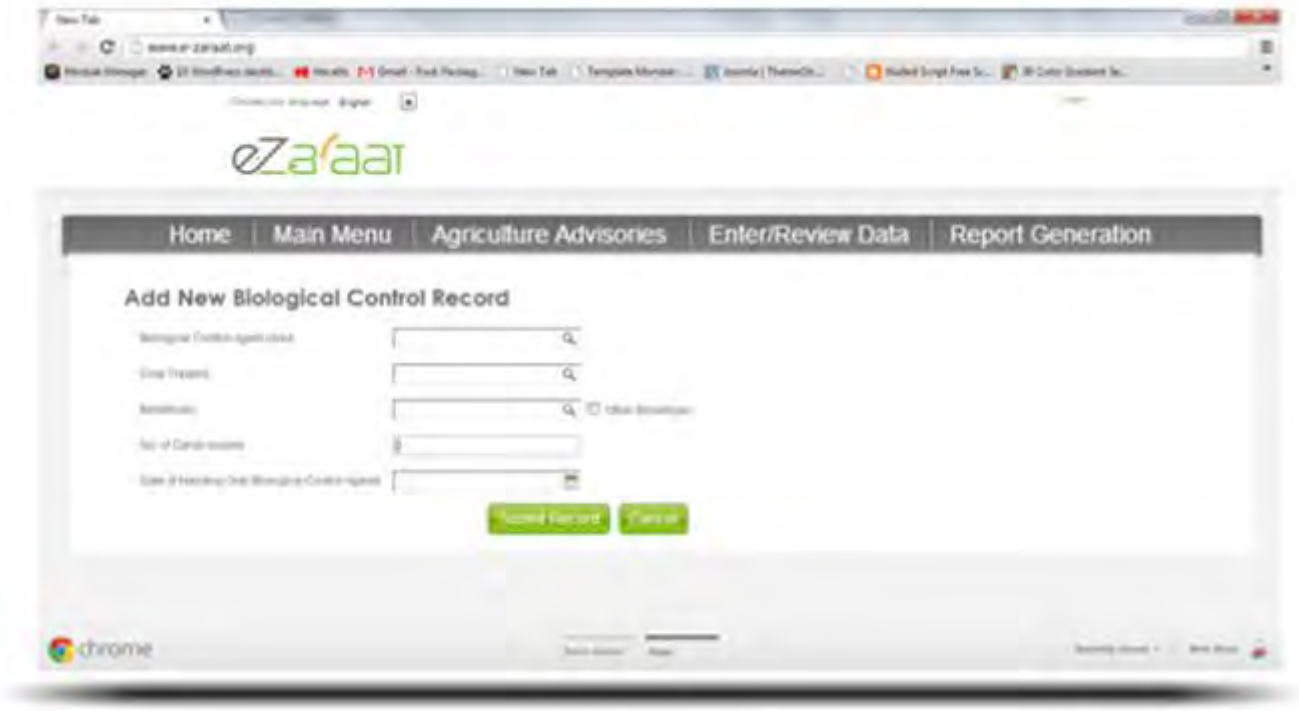


Here is a closer view of the enter/edit data screen where you can enter new data or check previously submitted records.

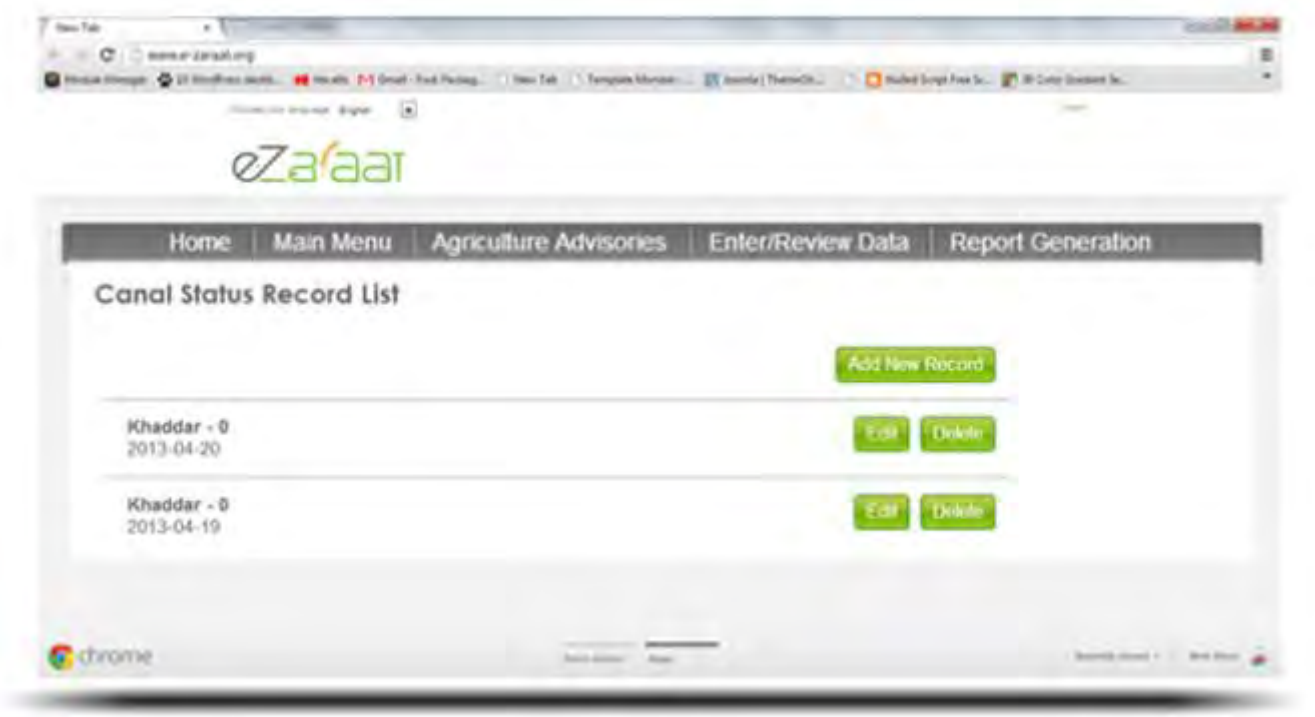


In order to add a new record, click on “New Record” and to view records submitted previously, click on “Previous Records”.

By clicking on the New Record option, the following screen will appear. To add a new record you are required to fill in certain mandatory fields and click on the submit record button at the bottom of the page to save the record into the database.



By clicking on the Previous Records option, a screen will appear where you can edit or delete the data already entered, as shown in the image below.



2.1.1.2. Report Generation

The second category in the Data section is report generation. Please select your desired region from the drop-down menus, select the time period for that report i.e. daily, weekly, monthly, and yearly or within a custom date range, and click on the “Generate Report” option as shown in the image below.

By clicking on the Generate Report button, a report will be generated in pdf format, which can be saved as a file for printing.

Agriculture Extension Department - Canal Water Status Report

DISTRICT: Vehari

Dated 2013-05-08

Serial No.	Dated	Canal Name	Canal/ Minor	Indent	Actual Discharge	Canal Status	Action Taken	Remarks	Recorded By
1	2013-05-08	S. M. Link	Nawaz Minor	9	0	Closed		warabandi	Talib Hussain
2	2013-05-08	S. M. Link	Kikkri Minor	18	18	100%			Talib Hussain
3	2013-05-08	S. M. Link	Kotli Minor	48	48	100%			Talib Hussain
4	2013-05-08	S. M. Link	Khakwani Disty	14300	12000	75%			Ms Sobia Javed
5	2013-05-08	S. M. Link	Mailsi Minor	78	0	Closed			Talib Hussain
6	2013-05-08	Pakpattan Upper	BR Disty	0	0	100%			Muhammad Shahid

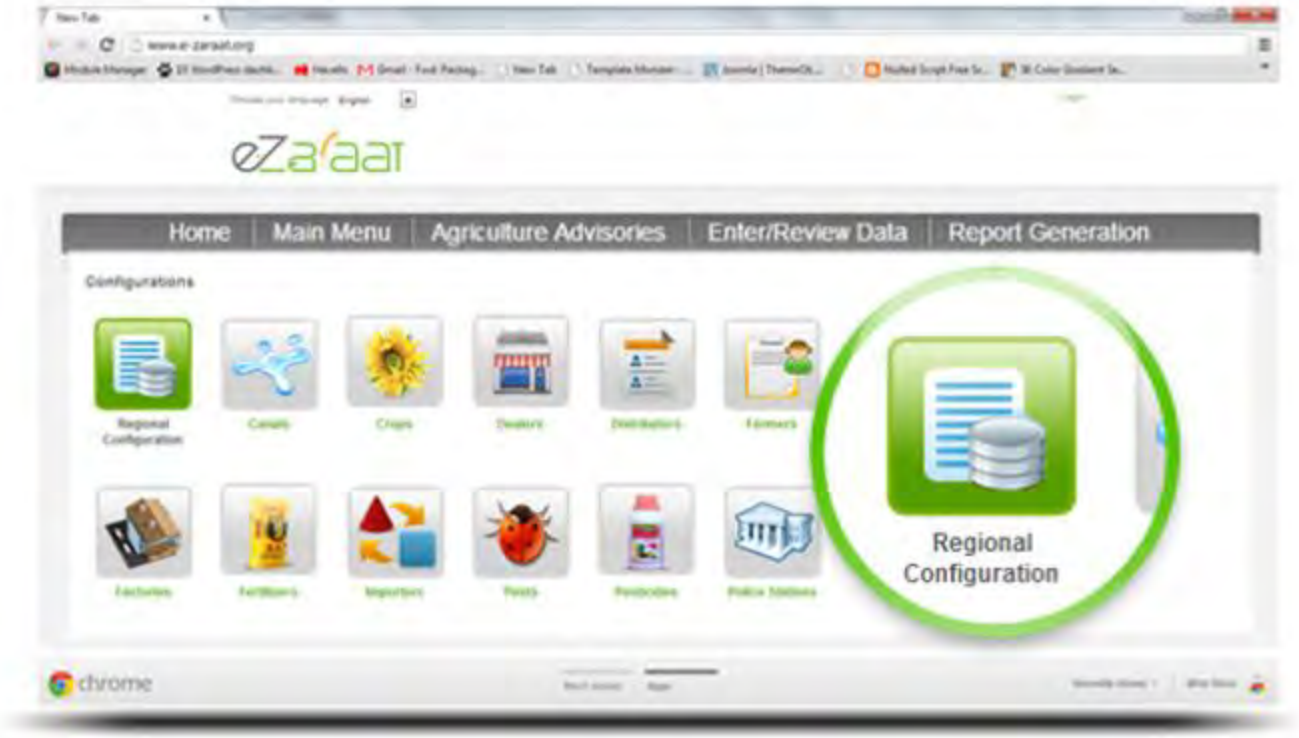
DISTRICT OFFICER AGRICULTURE (EXTENSION), Vehari.

Endst. No._____/Dev.

Vehari Dated, the_____/2013

2.1.2. Configurations

The Configurations section is further divided into the following categories:



2.1.2.1. Regional Configuration

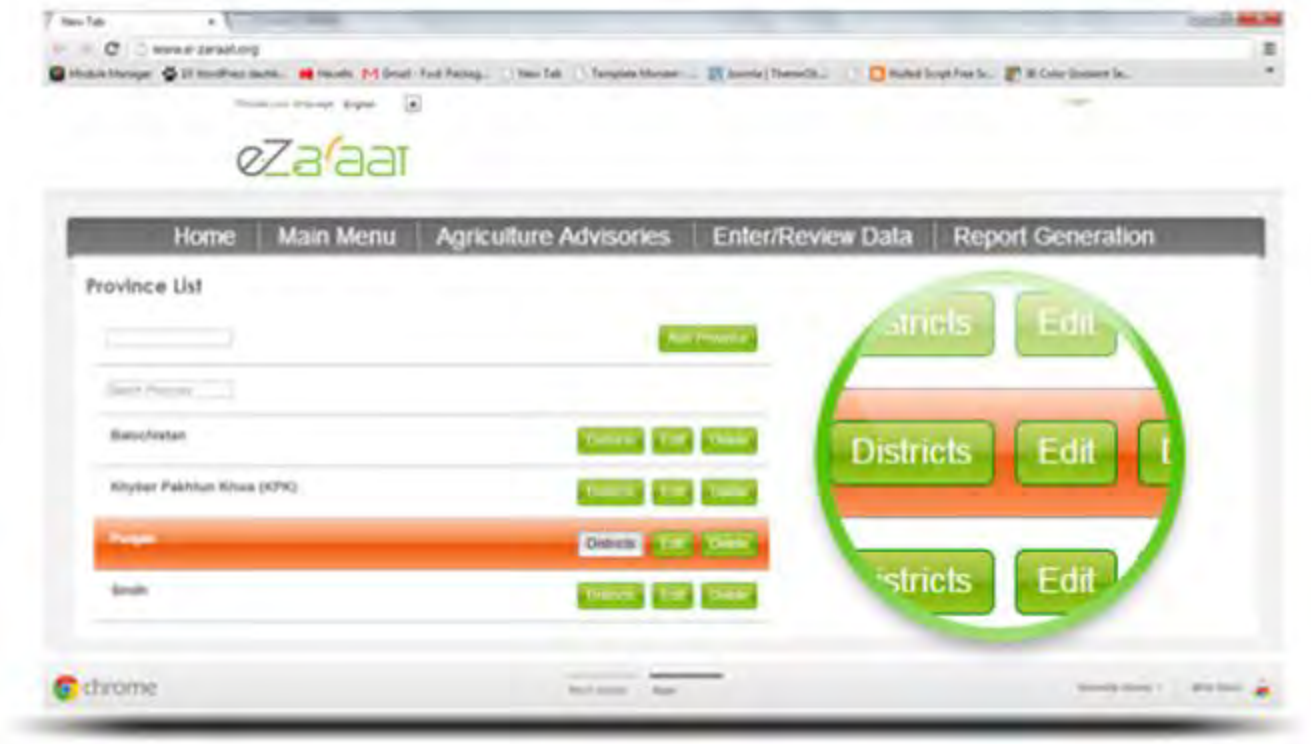
By clicking on “Regional Configuration”, the following screen will appear.

The Regional Configurations screen shows a regional hierarchy, as depicted below:

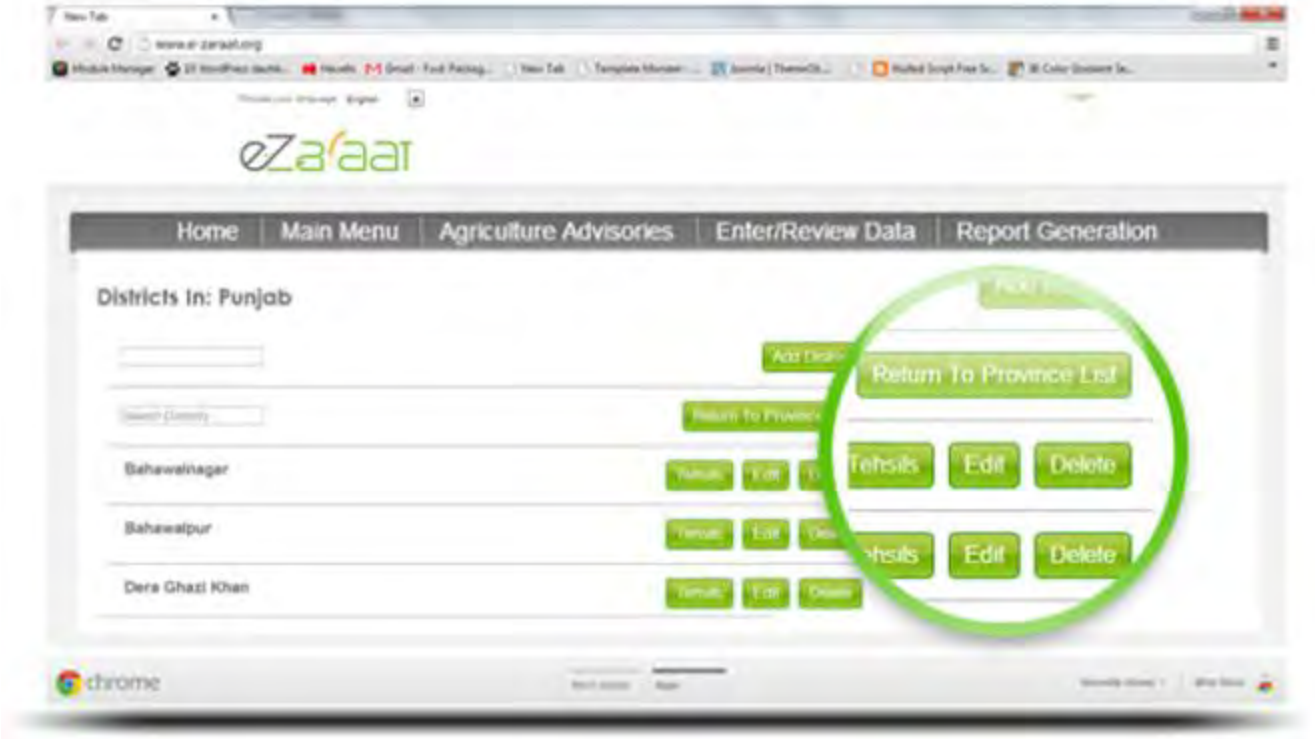
a. Province
b. District
c. Tehsil
d. Markaz
e. Union Council
f. Village

All this data needs to be entered in the same hierarchy, as shown below in the following diagrams:

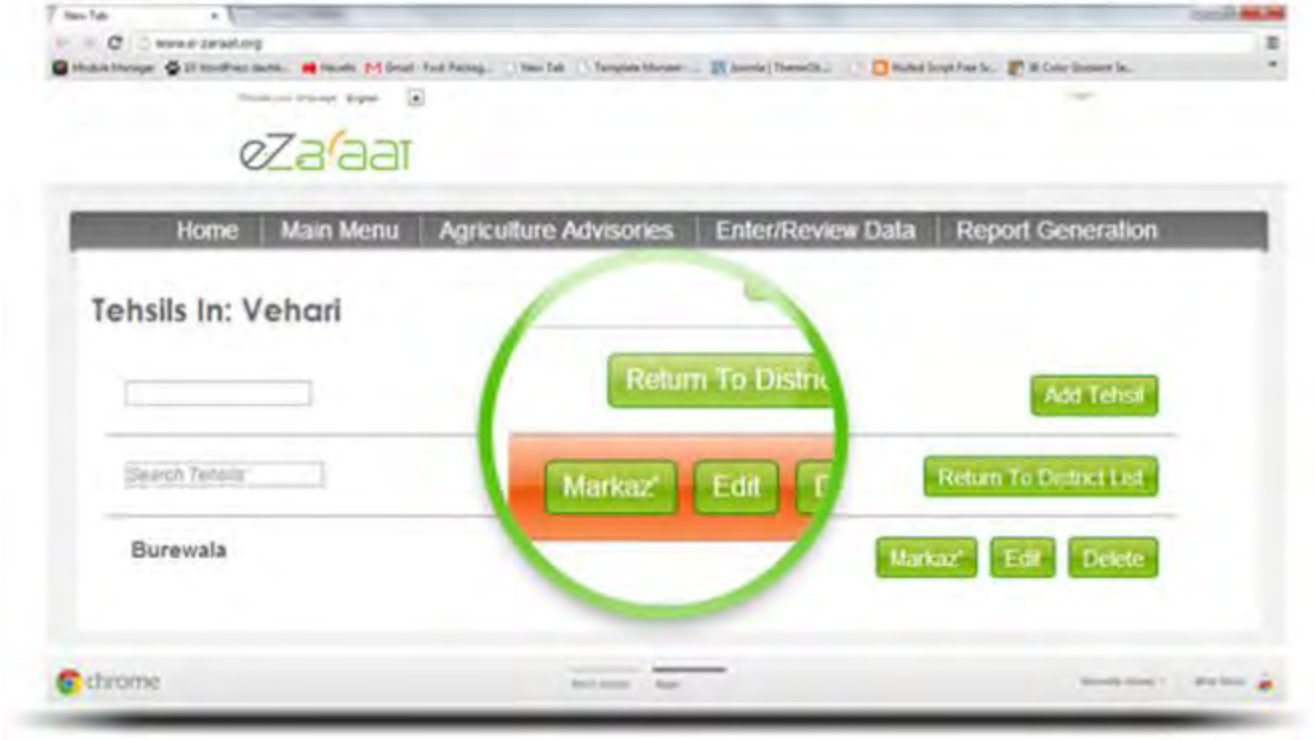
a. Province



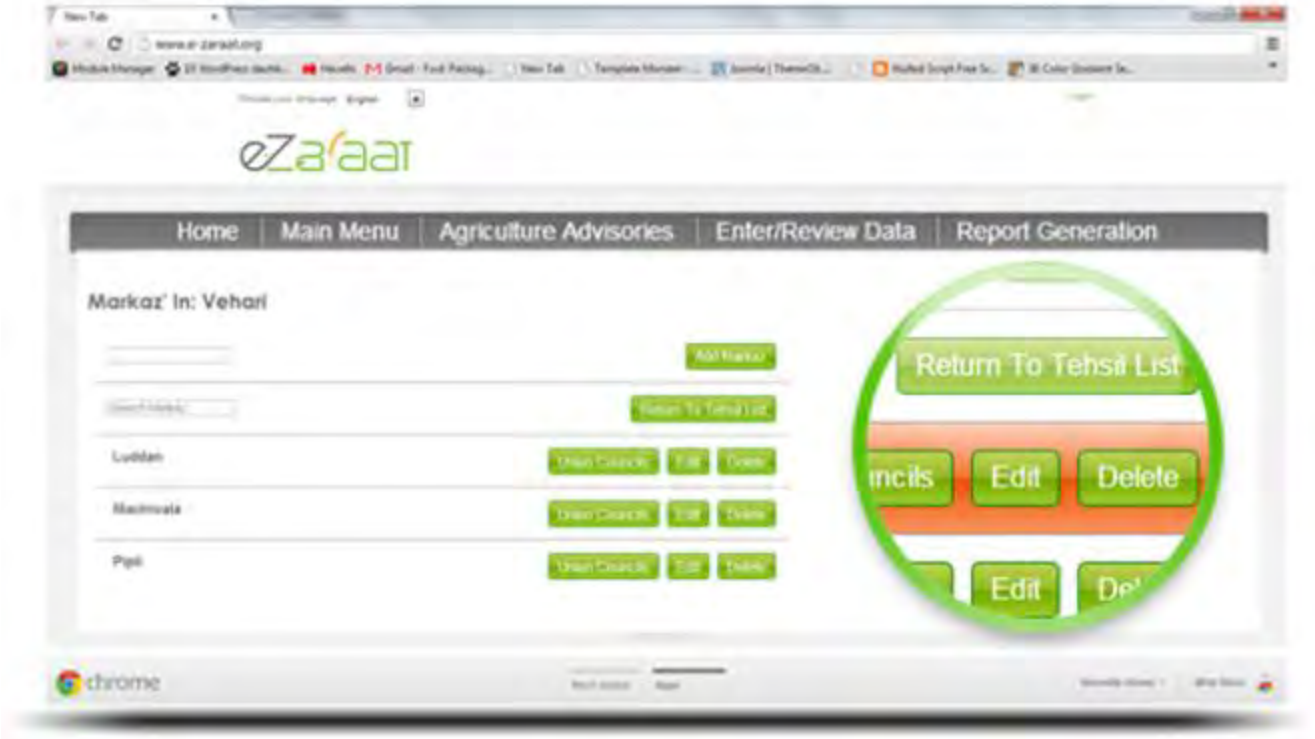
b. District



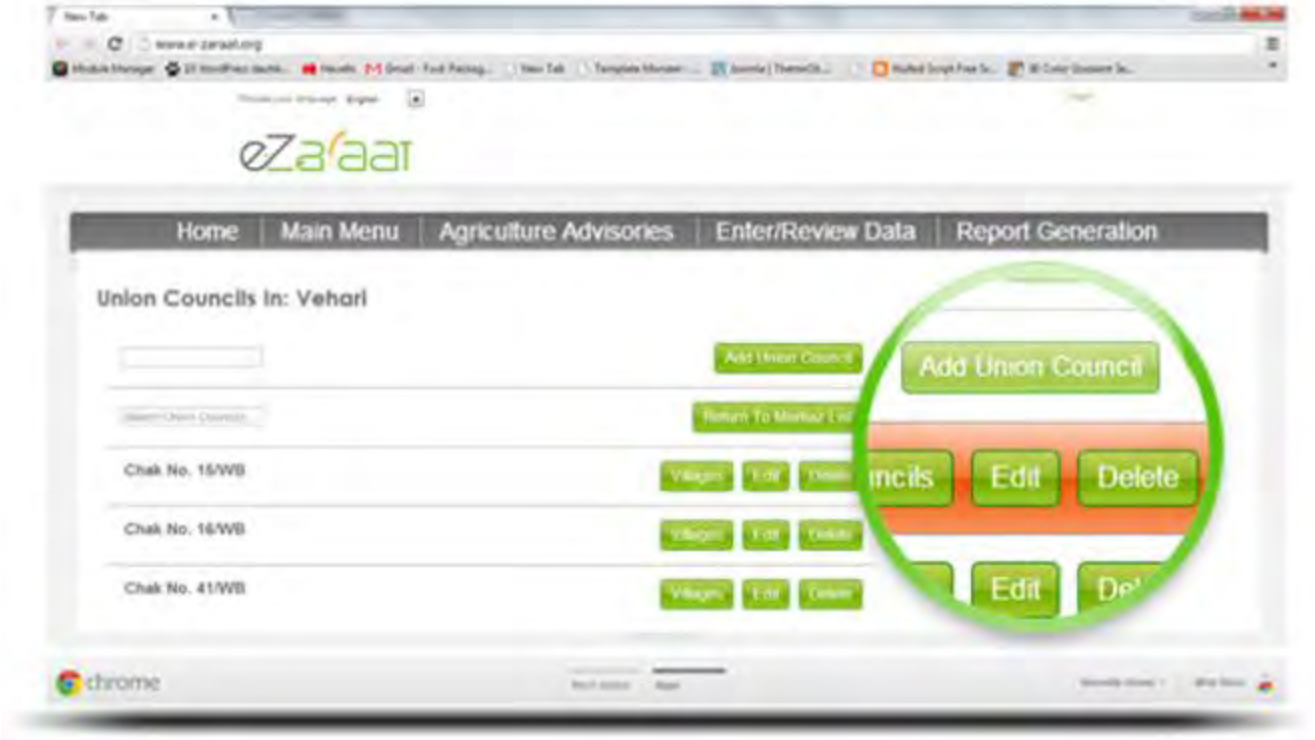
c. Tehsil



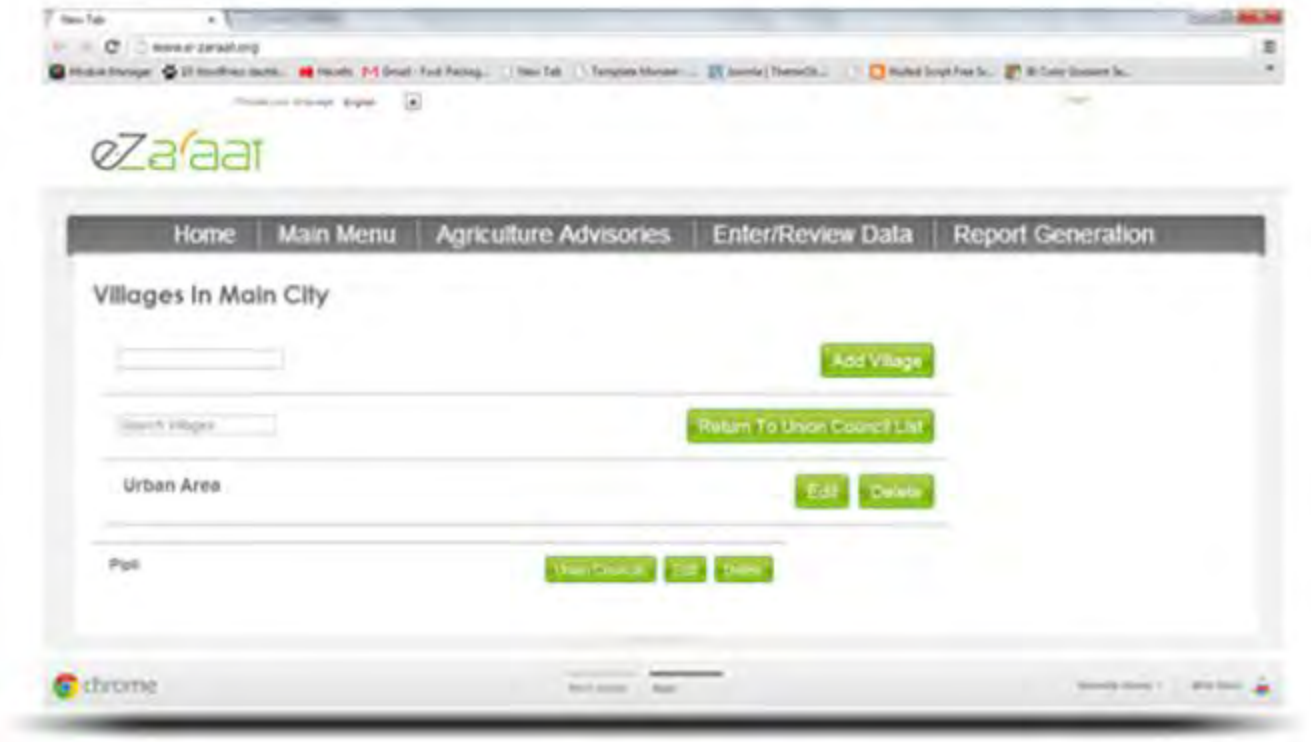
d. Markaz



e. Union Council

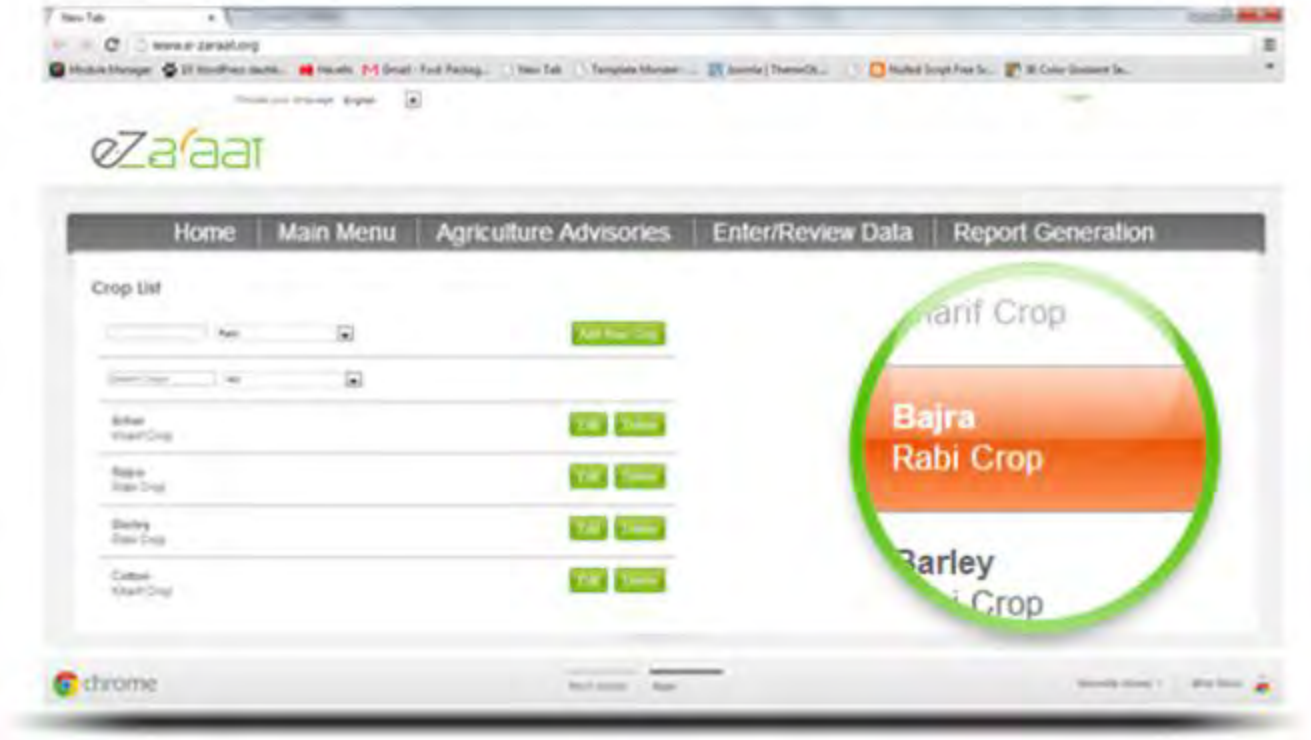


f. Village

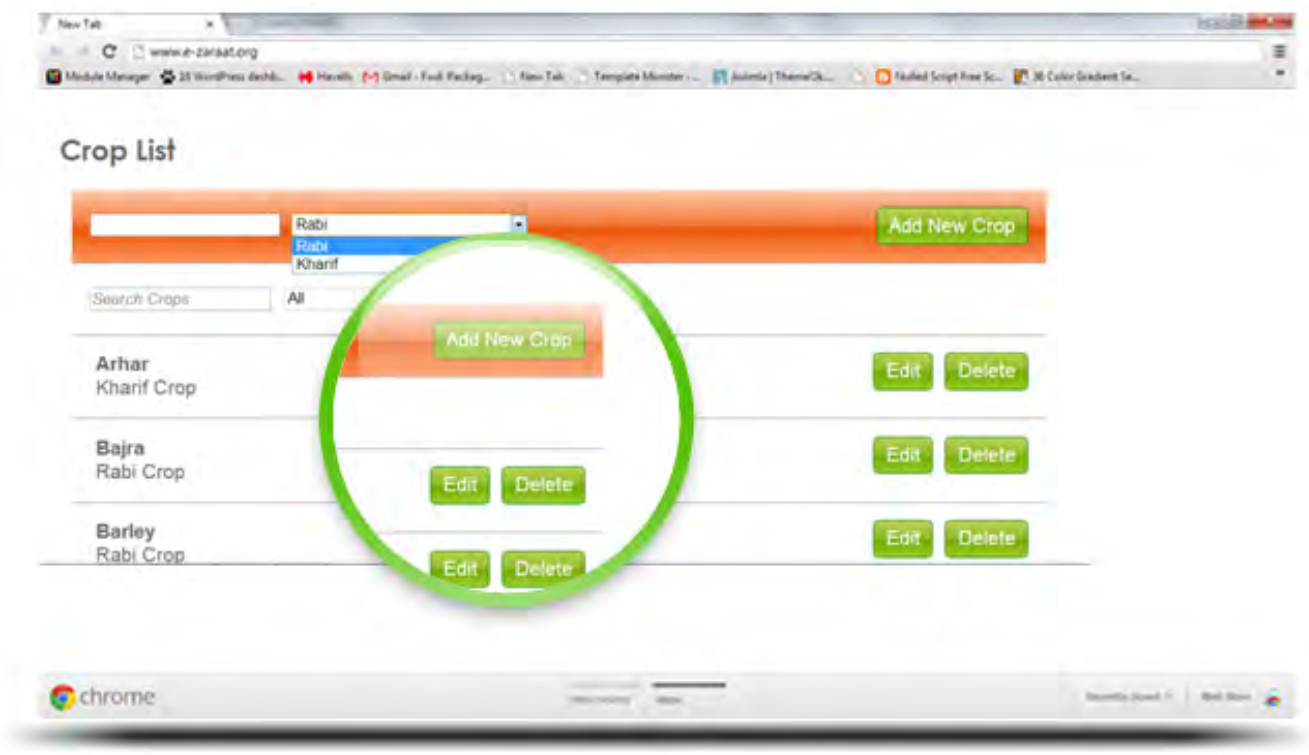


2.1.2.2. Crops

Clicking on the "Crops" link, opens the current list of crops in the database.



Clicking on the "Add New Crop" link (shown below) provides you with a form in which you can enter the new crop name.



Every record can be edited by clicking on the Edit button, as shown above.

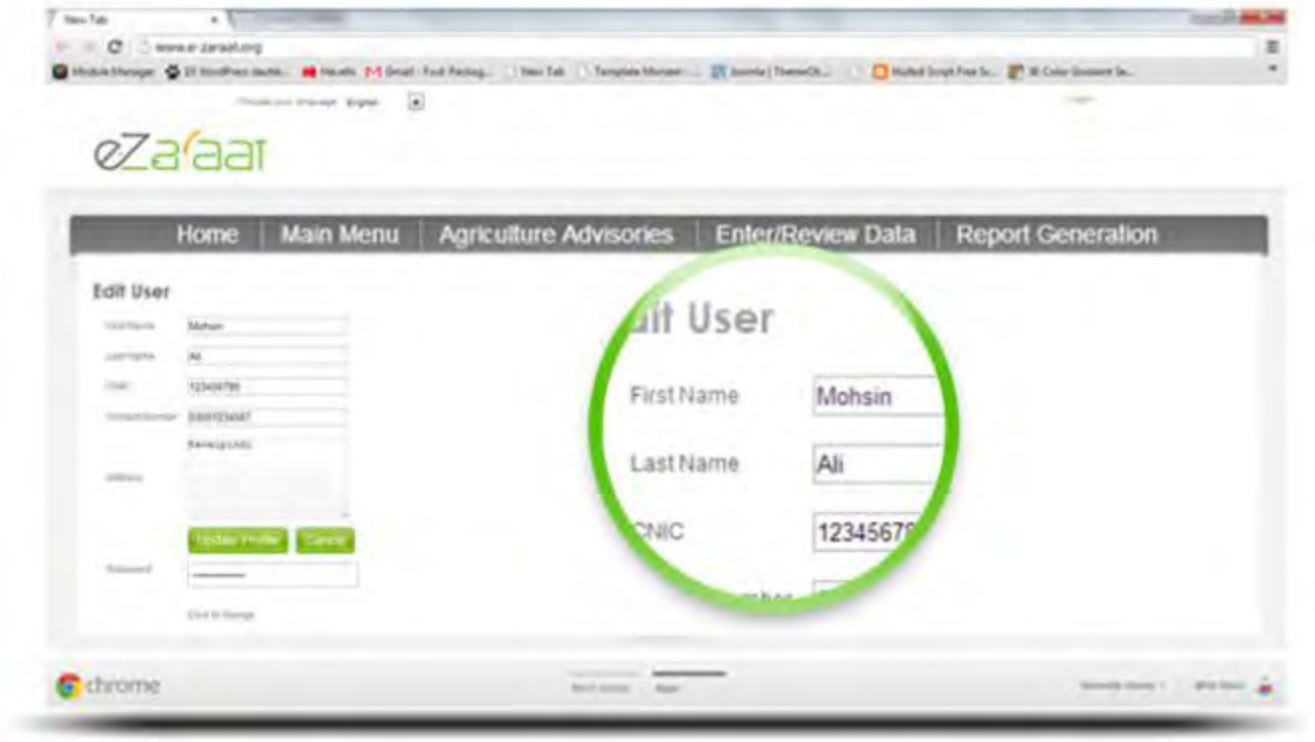
All other configuration data for Canals, Dealers, Distributors, Farmers, Factories, Fertilizers, Importers, Pests, Pesticides and Police Stations can be entered in the same way as described above for Crops.

Note: The fields would be different in all the configurations forms, depending on the specific requirements for that data.

2.1.3. Settings

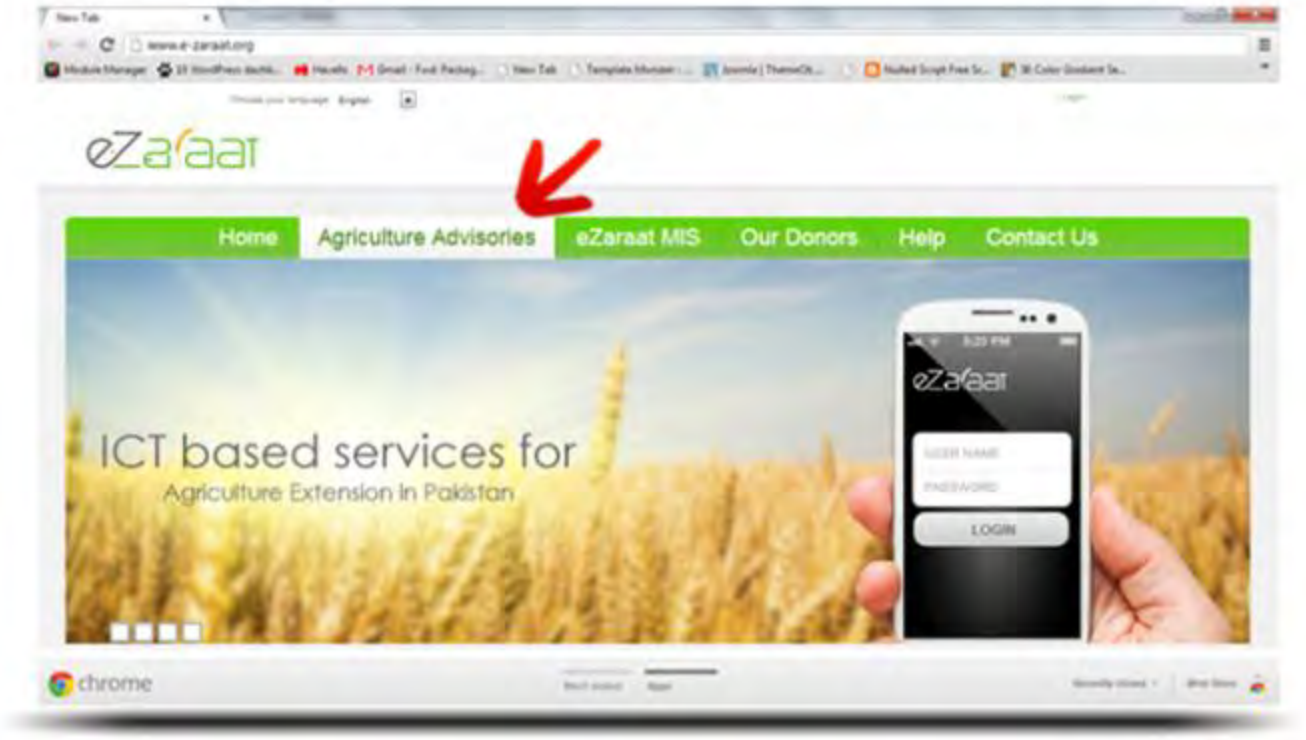
The Settings section includes the User Profile.

By clicking on the “User Profile”, the following screen appears where you can edit your user information:

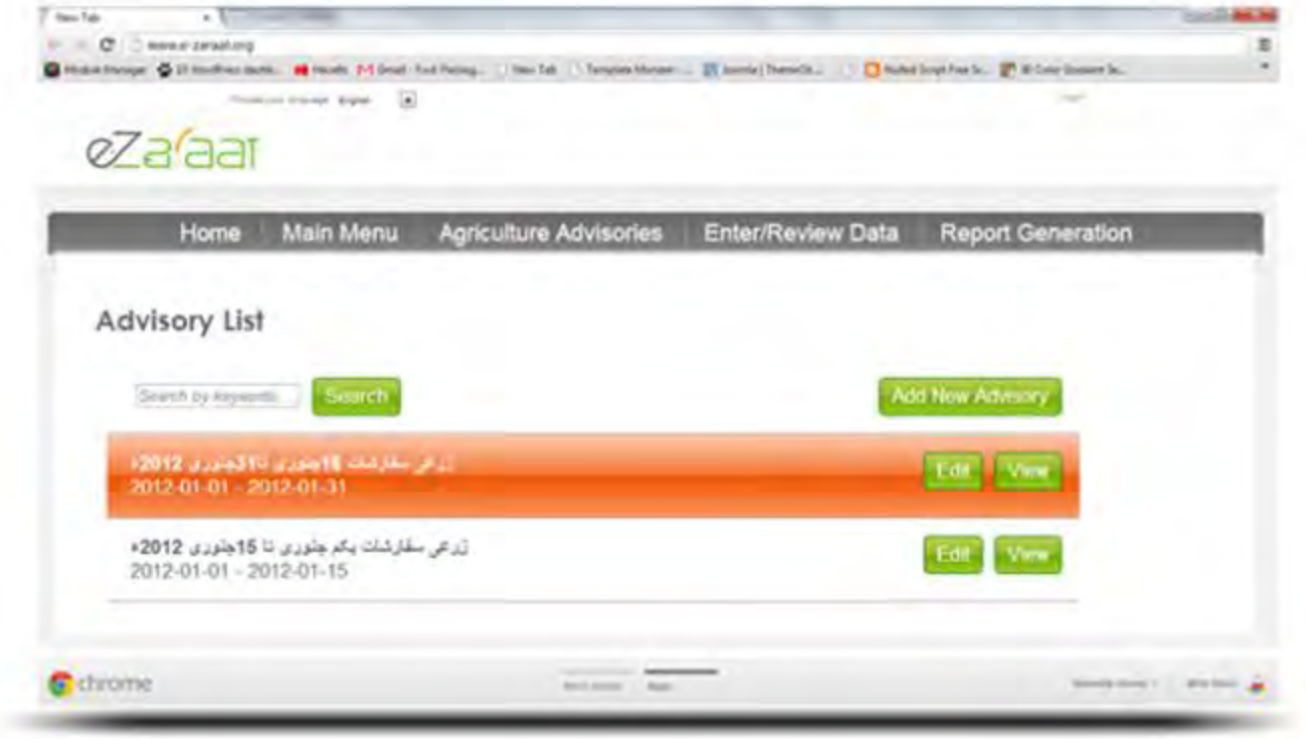


2.2. Agriculture Advisories

Agriculture Advisories are also available on the home page as shown in the image below.



By clicking on the Agriculture Advisories option the following screen will appear

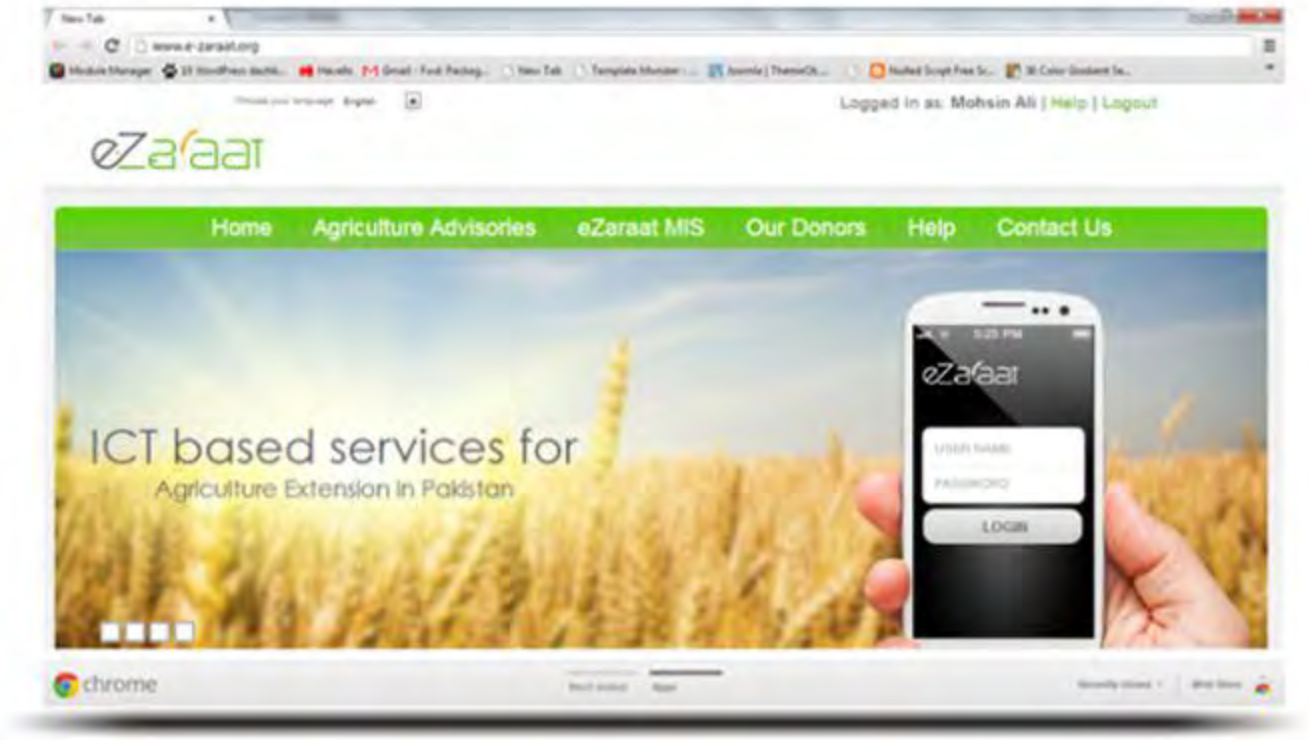


Using the “Search” option you can enter keywords e.g. crop names and the Agriculture Advisories containing information about those crops will be filtered and presented as a list. As shown in the above image, you have the option to view all/selected advisories provided by the Government of Punjab. By clicking on the “View” option the following screen will appear.

2.3. Log Out from the e-Zaraat Web Application

After using the application, you are required to log out. The Logout option is at the top right corner of the screen as shown below.

The Logout option redirects you to the main page of the system as shown in the image below.



3. e-Zaraat Mobile Application

Welcome to the e-Zaraat Mobile Application! This User Manual provides a detailed description of this application.

3.1. Mobile Requirements

In order to have access to the e-Zaraat Mobile Application, make sure your device meets the following requirements:

- Tablet running the android operating system
- Internet connection
- GPS should be turned on
- A valid e-Zaraat user account to access the e-Zaraat Mobile Application.

3.2. Turning on the Device

Click on the power-on button of the tablet and keep it pressed for 3 to 5 seconds to power up as shown in the image below.

When your device has booted, it will show the following screen with a lock in the middle.

Tap on that lock and drag the lock to the "unlock" icon which will unlock the device.

Now you will see the home screen which shows your shortcuts, much like a computer desktop screen. This screen shows all the applications installed on the device. In order to start the e-Zaraat application, tap on the CABI logo, as shown in the image below.

You can also swipe your hand across the screen to left or right to preview other home screens which may have different widgets or shortcuts.

4. Logging into the e-Zaraat Mobile Application

By tapping on the CABI icon, the following login screen will appear.

On the sign-in screen of the e-Zaraat Mobile Application, enter the User ID and Password with which you have been supplied. If you want the device to remember your credentials, tap the "Remember Me" option before tapping on the submit button.

If your login is successful, you will see the following e-Zaraat logo screen:

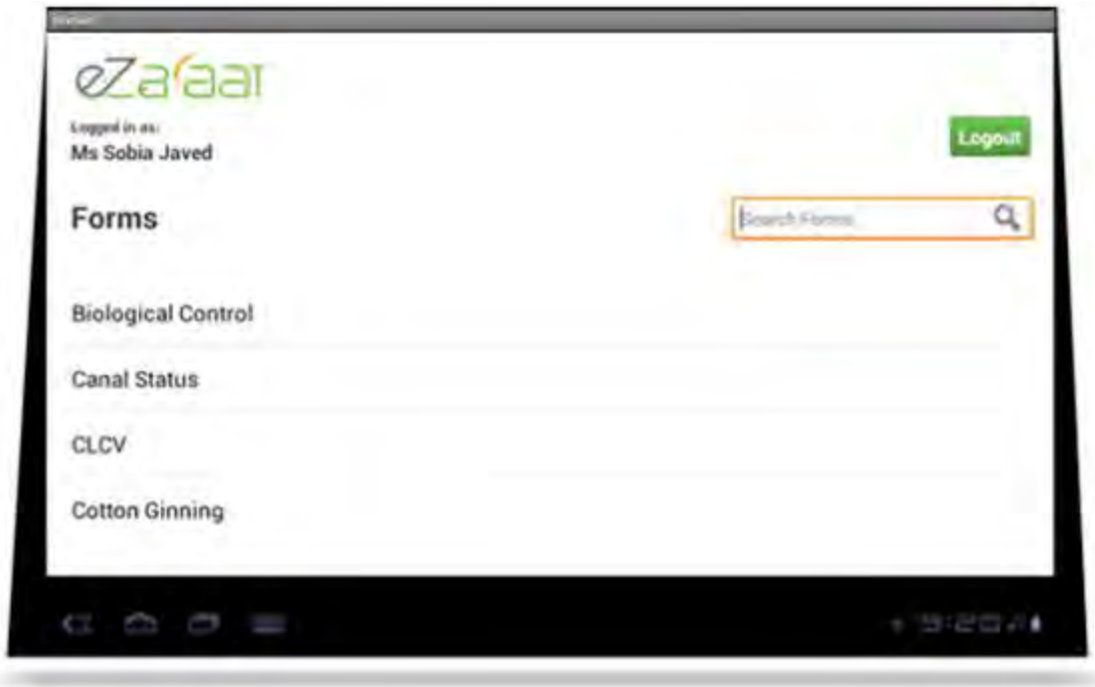
If this fails, you will see the message "Invalid User" and you will need to enter your credentials again.

4.1. Main Menu

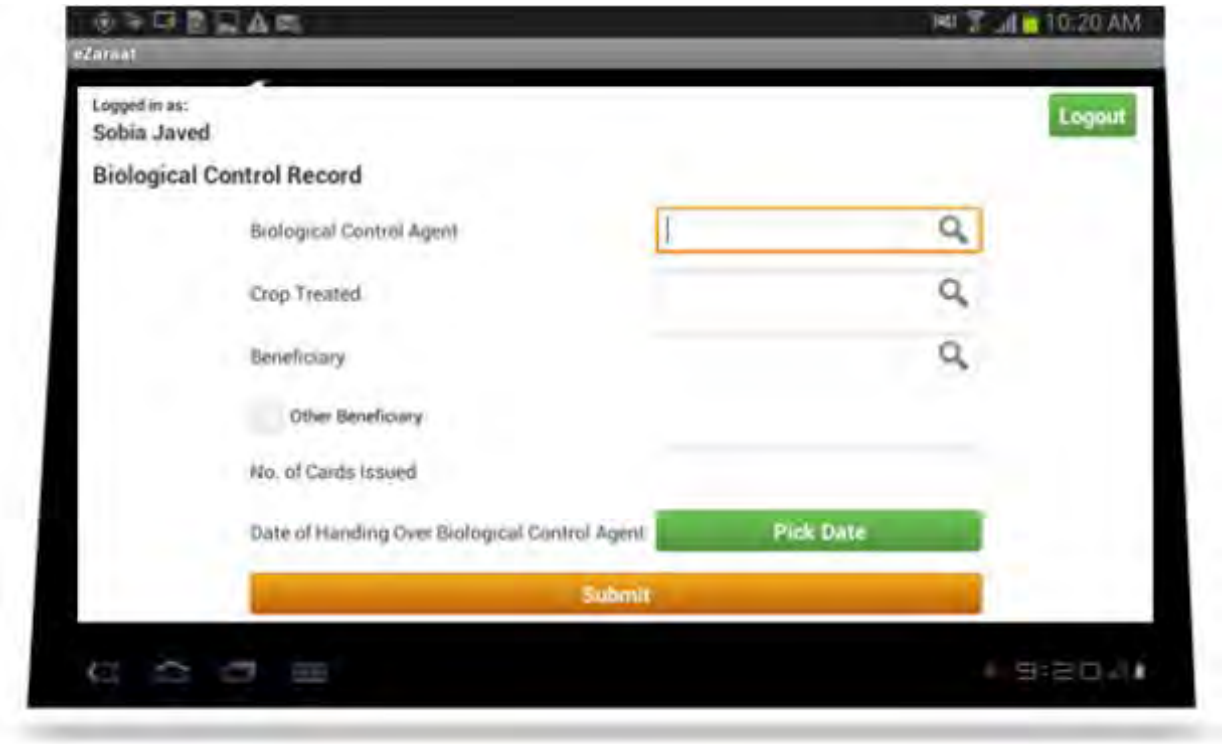
After successfully logging in to the e-Zaraat Mobile Application, you will see a menu which will show all the options for the application. Tap on the Synchronize Device icon to update the device with the latest configuration data available on the server, as shown in the image below.

4.2. Enter Data

By tapping on “Enter Data”, the following screen will appear:

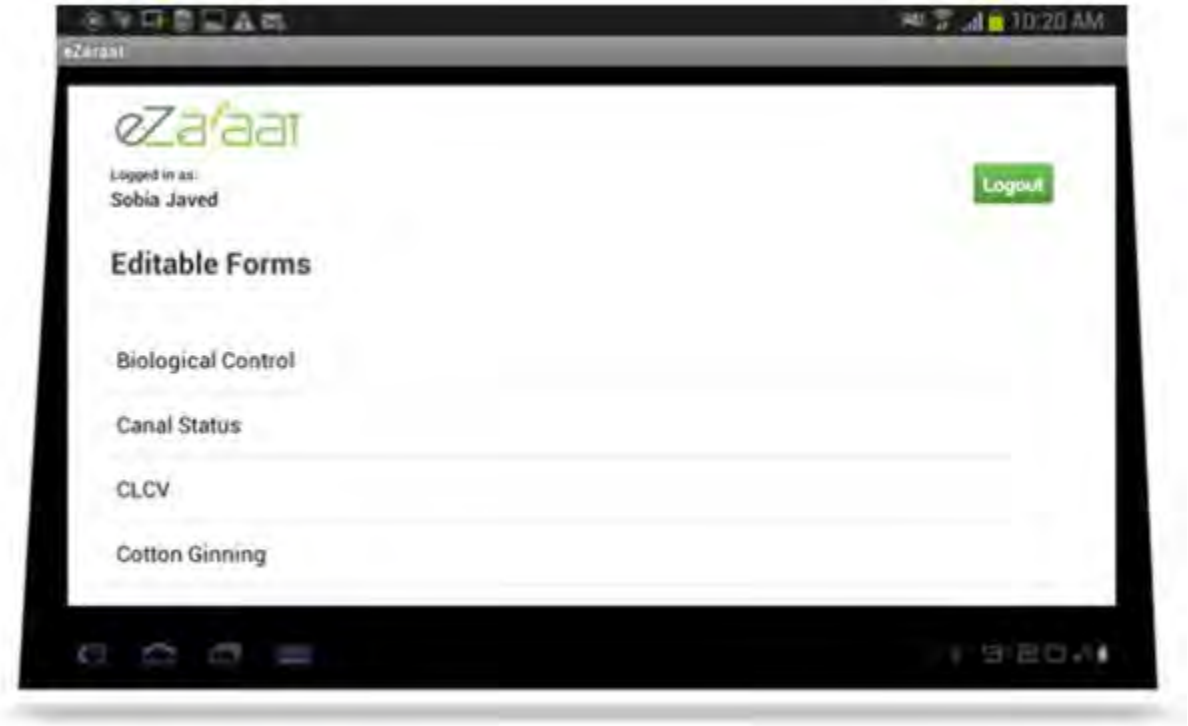


In order to enter new data, tap on any of the desired options and the following screen will appear. To add a new record you are required to fill in certain mandatory fields and tap the submit button at the bottom of the page to save the record into the database.

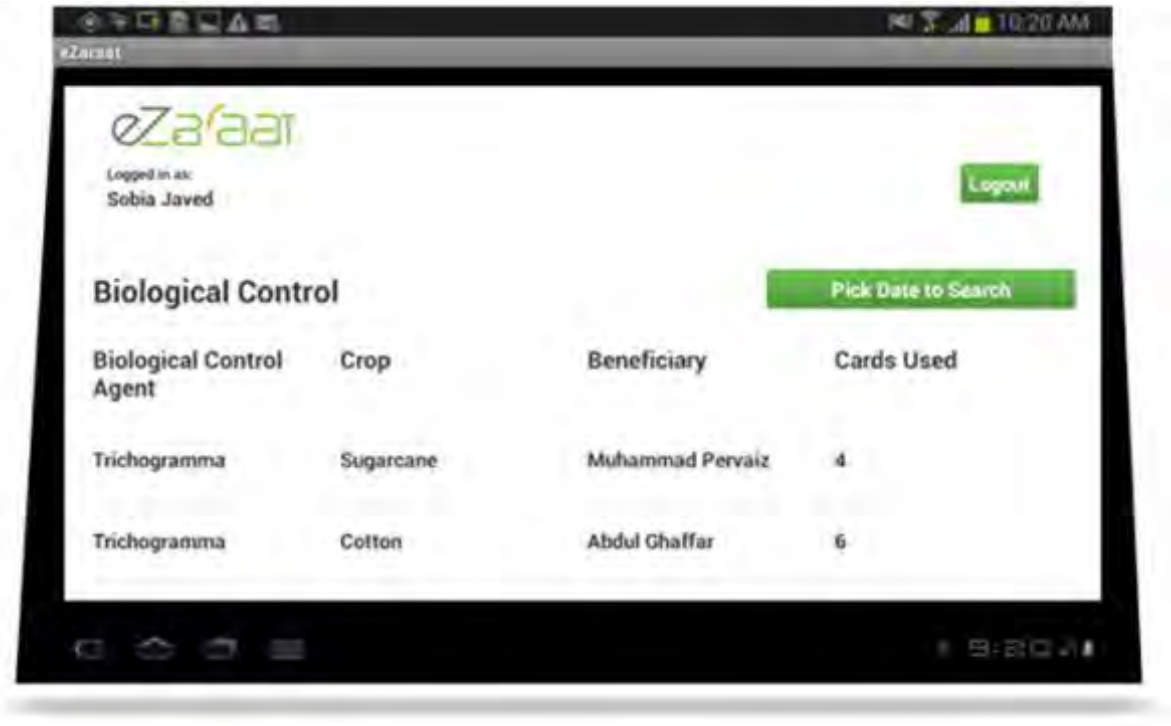


4.3. Edit Data

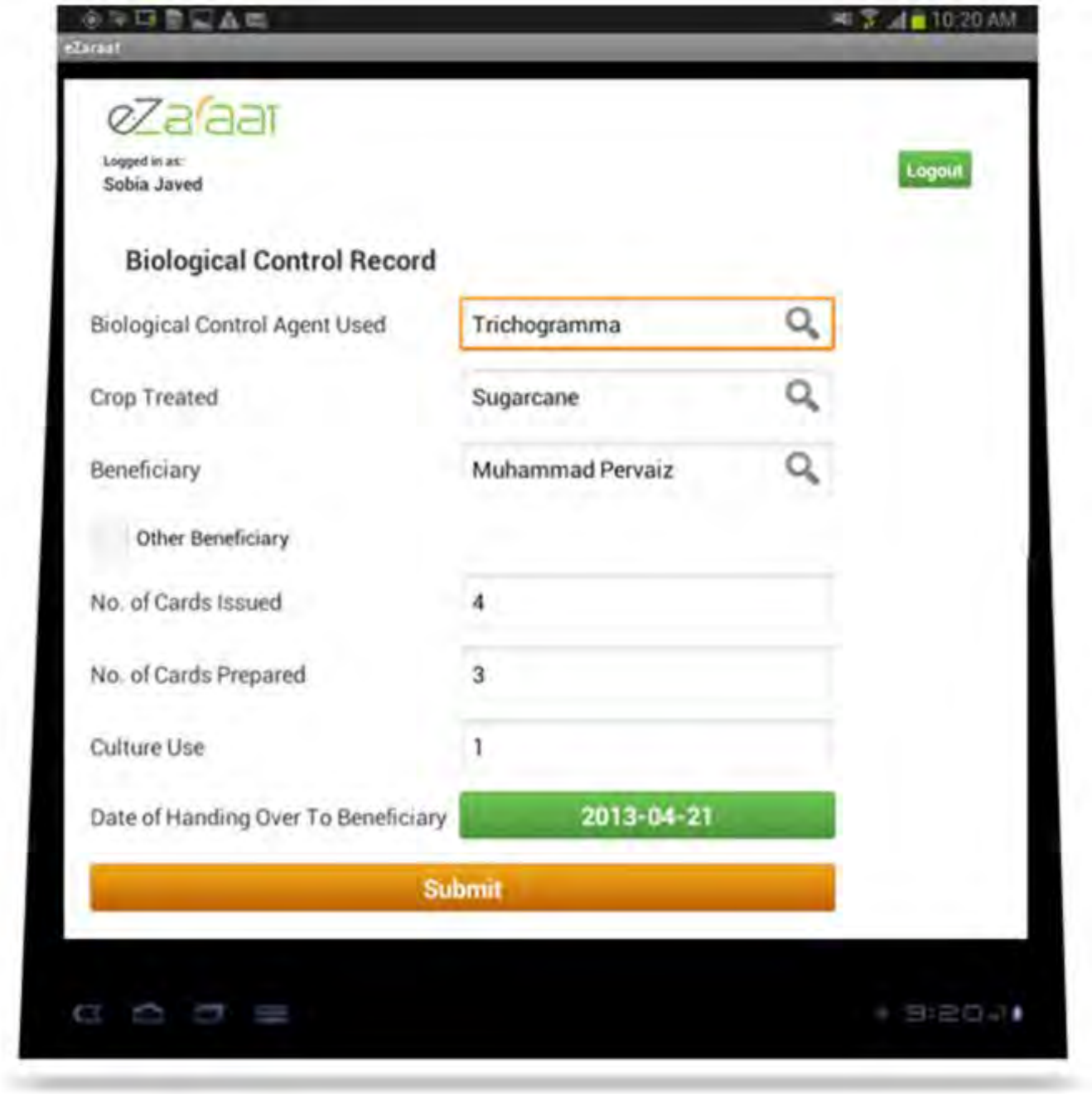
The second category of Data is Edit Data where you can edit the data which has already been entered.



In order to edit data, tap on any of the desired options, the following screen will appear:

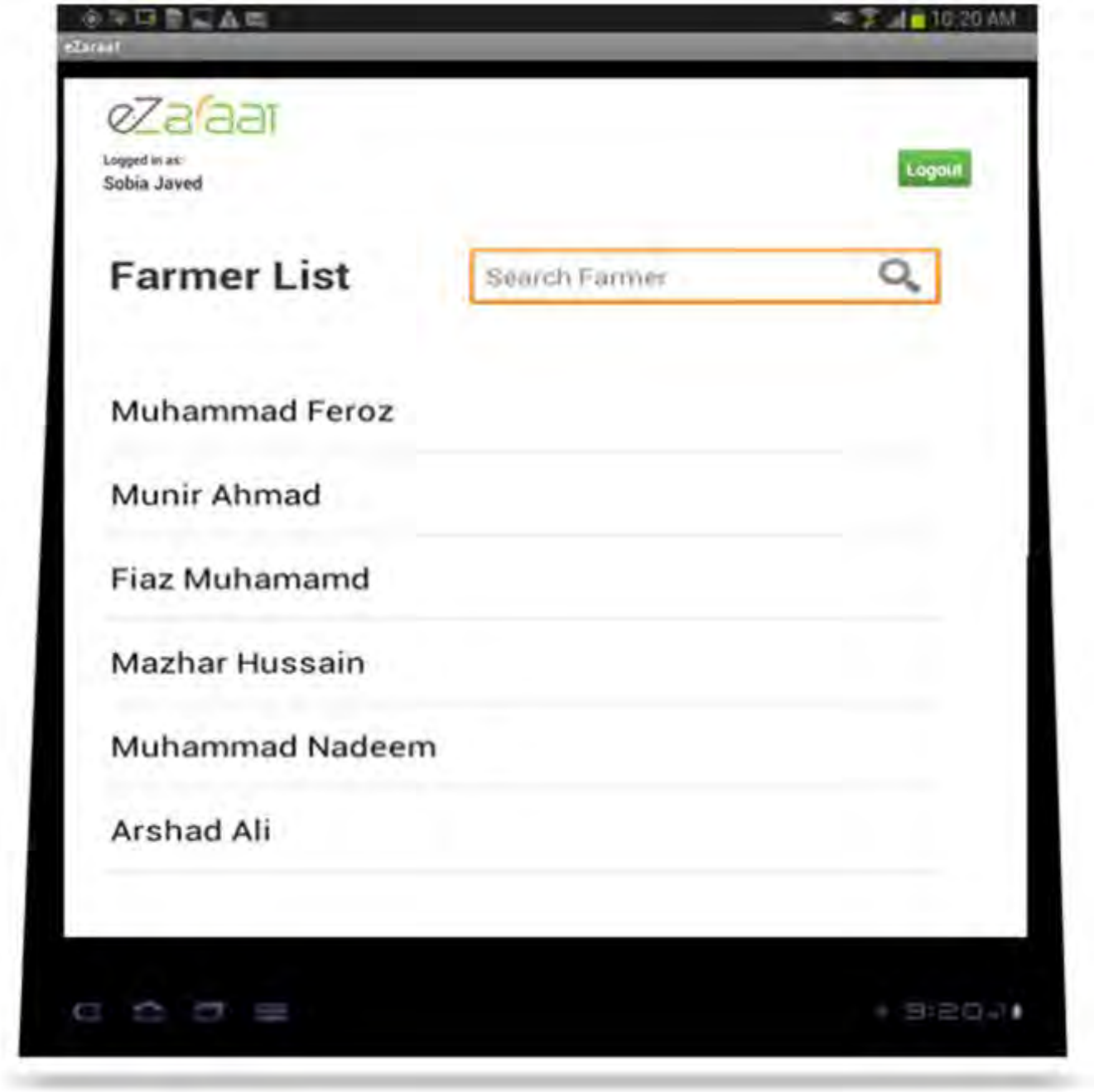


To edit the record you need to tap on the data and the following window will appear. Simply edit the fields and tap the submit button at the bottom of the page to save the record into the database.

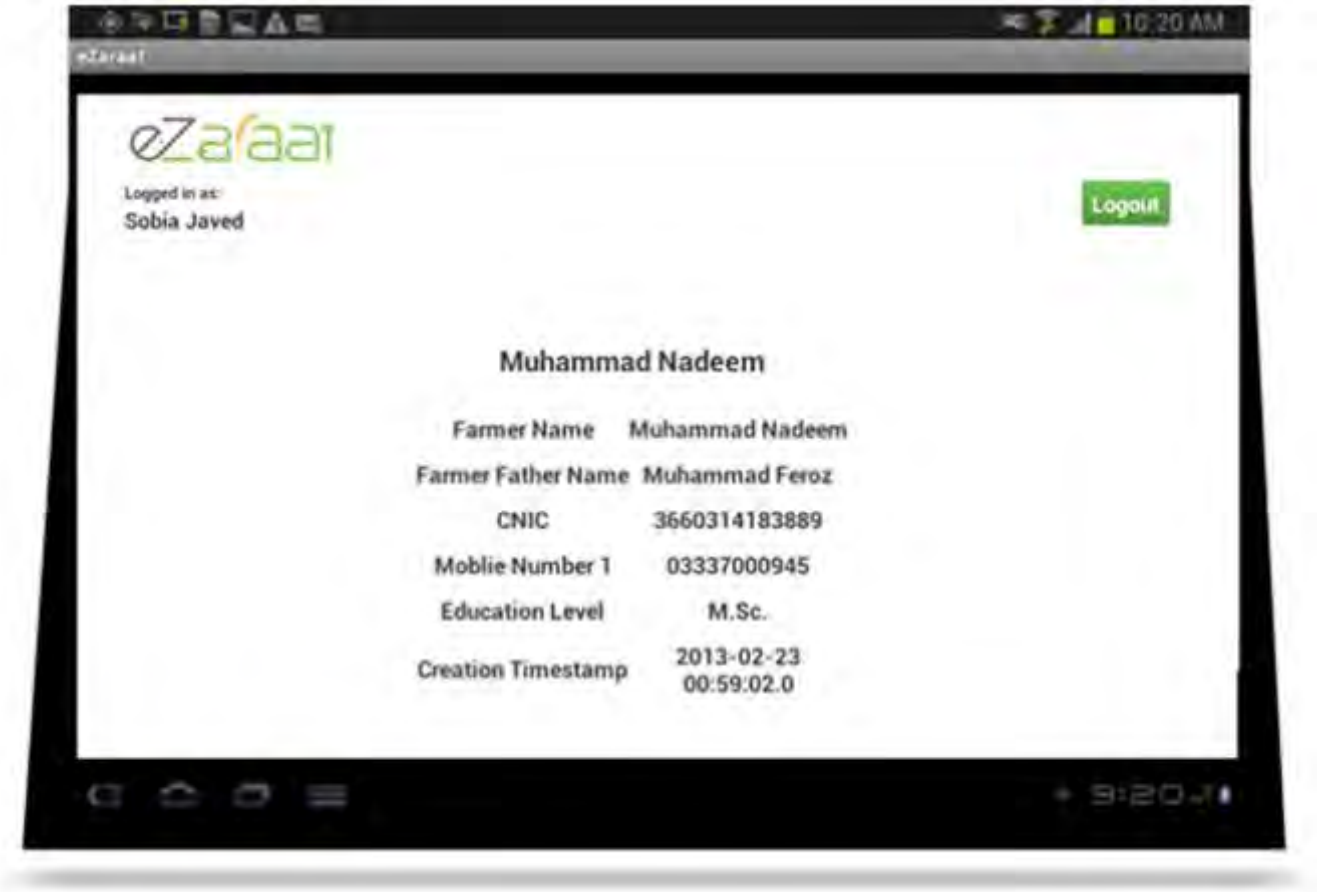


4.4. Farmer List

By tapping on the “Farmer List”, the following screen will appear:



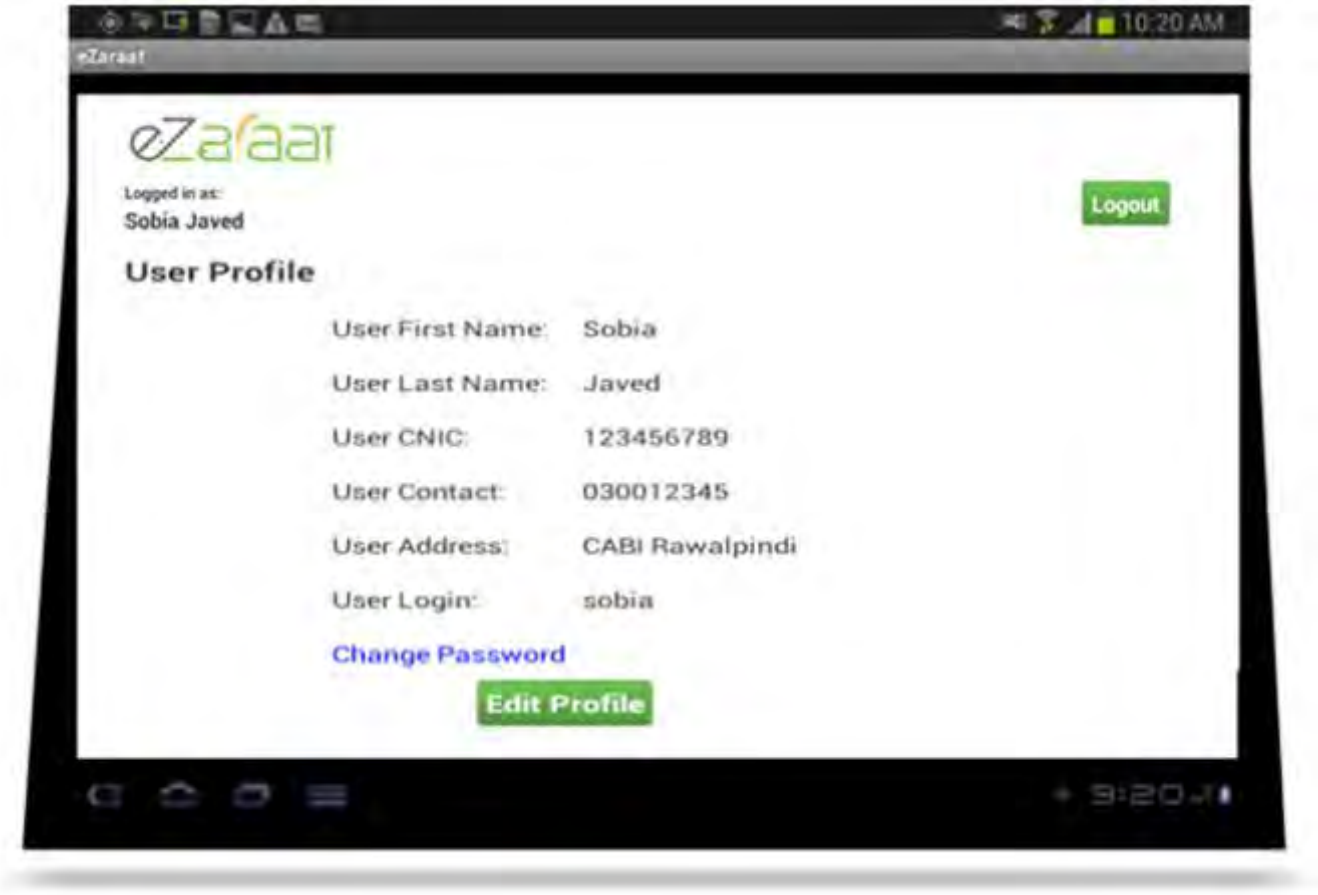
To view the farmer's information, tap on the particular name and the following screen will appear with the farmer's complete details.



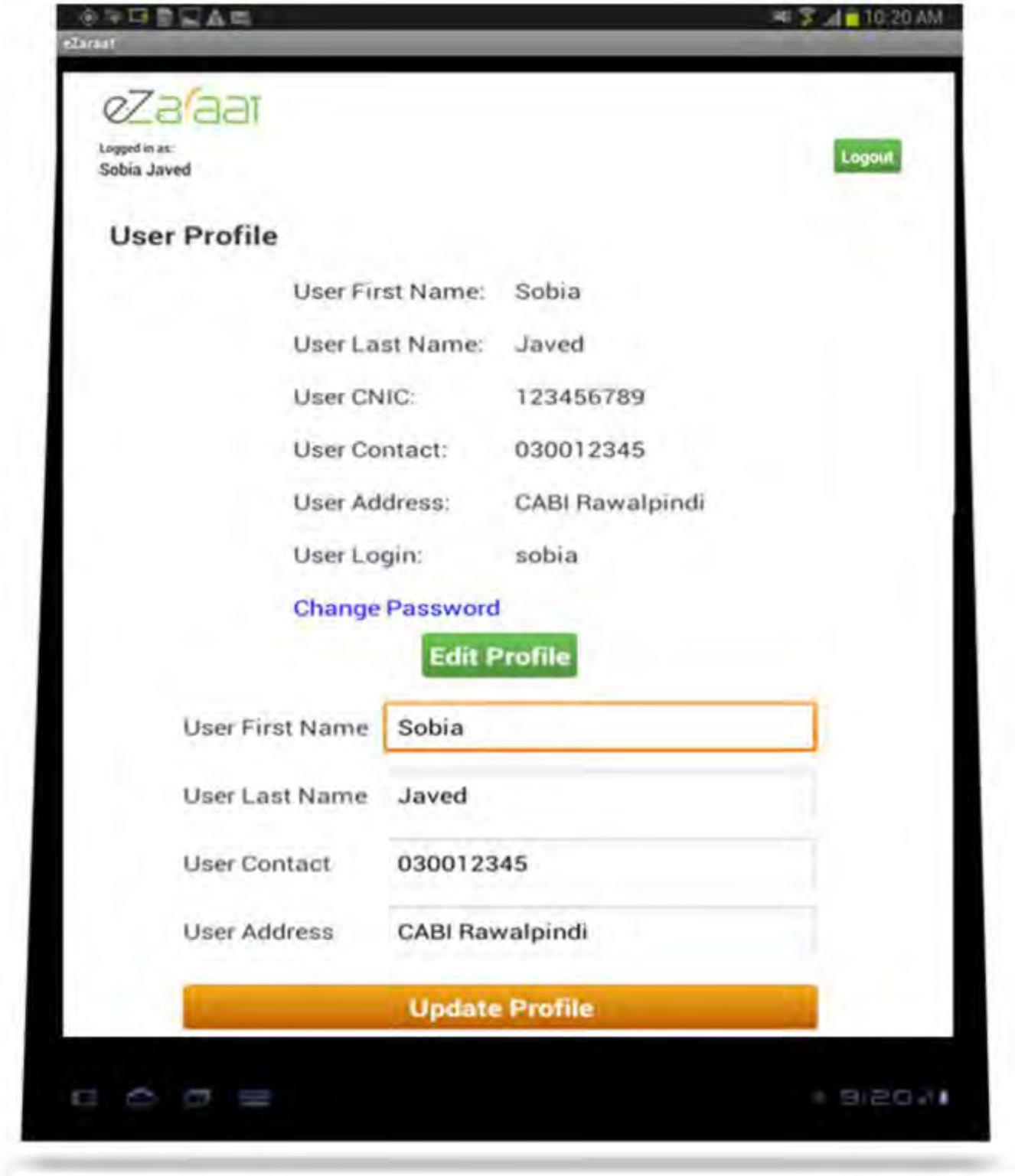
Note: All other data for Dealer List, Crop List, Pesticide List, Fertilizer List and Agriculture Advisories can be viewed in the same way as described above for the Farmer List.

4.5. User Profile

In this section you can view your user details and can also edit your profile as shown in the image below.



By clicking on the “Edit Profile”, the following screen will appear where you can edit your user information.



After entering your user information, tap on the Update Profile option to update the record.

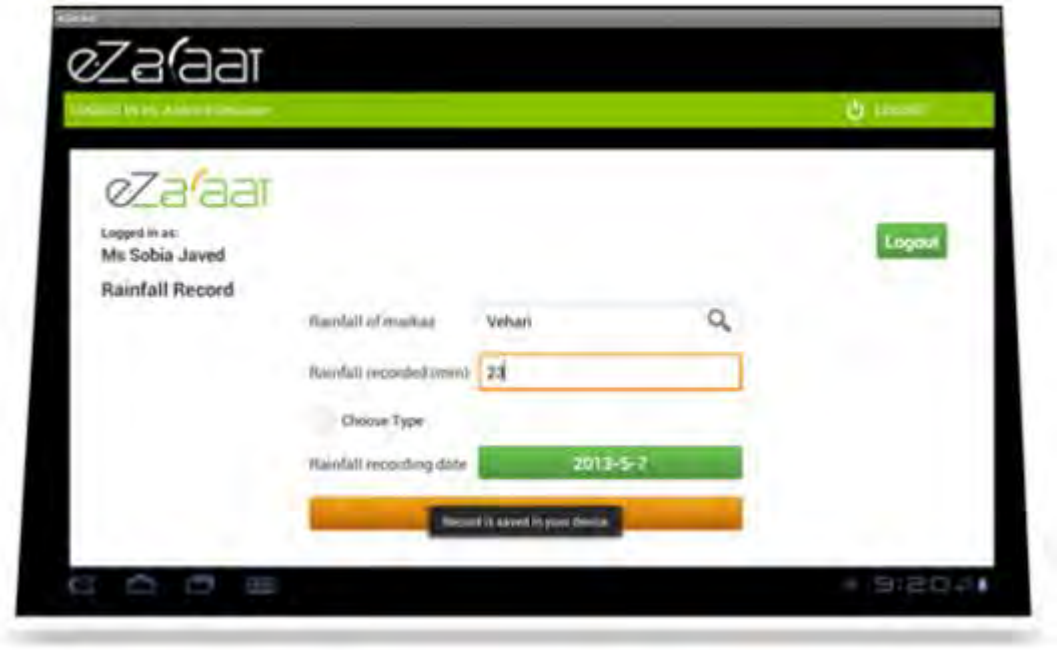
4.6. Logging Out of the e-Zaraat Mobile Application

After using the application, you are required to log out. The Logout option is at the top right corner of the screen as shown below.

The Logout option redirects you to the main screen of the application as shown in the image below.

5. Using the e-Zaraat Mobile Application in Offline Mode

If the internet is not available, your device will still work offline. You can enter the data and tap on the Submit option. The message “Record is saved in your device” will appear, which means that the record has been saved in your device’s database, as shown in the image below.



You can also edit data that has already been entered, in the absence of the internet. You need to open the record, make the changes to the existing data and tap on the Submit option. The message “Record is updated in your device” will appear, which means that the record has been saved in your device’s database, as shown in the image below.

Note: Although the data you have entered will be saved in your device's database in the absence of the internet, bear in mind that you will be required to tap on the sync option when your device gets connected to the internet, as shown in the image below.

By performing this action, the local database (data saved in your device) will be updated on the server database.