



USER MANUAL AND CONTEXT SENSITIVE HELP

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FIELDFACT-WP3-ALT-DEL-3.8



User Manual and Context Sensitive Help	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 2 / 22



FIELDFACT: GNSS INTRODUCTION IN THE AGRICULTURE SECTOR			
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User Manual and Context Sensitive Help	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 4 / 22

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User Manual and Context Sensitive Help	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 5 / 22

TABLE OF CONTENTS

FOREWORD	6
EXECUTIVE SUMMARY	7
1 INTRODUCTION.....	8
1.1 Purpose and scope.....	8
1.2 Intended audience / Classification.....	8
1.3 Associated documentation	8
1.4 Reference Documentation	9
1.5 Abbreviations and Acronyms	9
2 DESCRIPTION OF THE WORK CARRIED OUT.....	10
2.1 Introduction.....	10
2.2 Methodology	10
3 RESULTS OF WORK CARRIED OUT.....	11
3.1 Introduction.....	11
3.2 FieldFact Web Portal Manual.....	11
3.3 FieldFact demonstrator instruction booklet.....	11
3.4 Context-sensitive help.....	12
4 CONCLUSIONS & RECOMMENDATIONS	13
4.1 Conclusions	13
4.2 Recommendations.....	13
APPENDIX 1: FIELDFACT DEMONSTRATOR INSTRUCTION BOOKLET.....	14



User Manual and Context Sensitive Help	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 6 / 22

FOREWORD

This report is prepared in the framework of the FieldFact project.

The FieldFact project was initiated by GJU for the introduction and promotion of GNSS in the agricultural community. It is co-financed by the GALILEO Joint Undertaking (GJU) under the 6th Framework Programme. There are six consortium partners participating in the project - Alterra, Vexcel (as per 1st of February replaced by Terrasphere) and PPO from the Netherlands, University of Warmia and Mazury (UWM) from Poland, Ekotoxa Opava from the Czech Republic and the European Commission's Joint Research Centre. Starting the 1st of February 2007, the business activities of Vexcel were terminated and the remaining work in the project has been transferred to Terrasphere,

In the agricultural sector, GNSS applications have not yet been widely used, even though interest in them has been on the rise. They require investments in equipment, but also in specialized inputs, services and skills. The pace of adoption of precision agriculture has slowed in recent years compared to the mid- and late 90's. The spread of GNSS use has been hindered also by occasional inadequate accuracy, availability, reliability and continuity of the Signal in Space (SIS) of current GNSS and a lack of beneficiary applications. The opinion of the user community on the possible benefits of GNSS is changing however, influenced by a number of external and internal factors. Production chain parties and governments demand more extensive and accurate documentation including spatial data on the agricultural production process, the production site, and agricultural products. On the technical side, equipment is getting cheaper, more energy efficient, more advanced, and readily available to the user community.

GALILEO is expected to accelerate the use of GNSS by the agricultural community by reducing the currently existing barriers in the field of accuracy, availability, reliability and continuity of the SIS. In combination with the mentioned developments and change of opinion in the user community, this leads to new opportunities and new feasible applications in agriculture.



User Manual and Context Sensitive Help	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 7 / 22

EXECUTIVE SUMMARY

This document describes the work performed to create the user documentation for the FieldFact demonstrators.

In the FieldFact project 2 major pieces of user documentation have been developed. A manual was written to support the use of the FieldFact portal by FieldFact demonstration personnel as well as by end-users. Besides, an instruction booklet was developed that has served as the major supporting document for the attendees of the FieldFact demonstrations.

In practice, especially the instruction booklet proved to be very useful and valuable. In combination with the easy to use end user applications developed in the project it was a very effective way to be able to make users familiar with the possibilities and backgrounds of the use of GNSS in agricultural applications in a relatively short time.



User Manual and Context Sensitive Help	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 8 / 22

1 INTRODUCTION

1.1 Purpose and scope

This document describes the work performed to create the user documentation for the FieldFact demonstrators. It reports on the development of the following project deliverables:

- User manual
- Context-sensitive help

1.2 Intended audience / Classification

The demonstrators developed in the FieldFact project were intended to be used in the FieldFact demonstration events and for training purposes in the FieldFact project. Nevertheless, the developed user documentation will provide readers additional insight in the intentions of the FieldFact project and the functionality of the demonstrators as well as in the possibilities and background of using GNSS and especially EGNOS and Galileo in agricultural applications. Thus, this documentation is valuable for a broader public and this document will be classified PUBLIC.

The intended audience of this document is threefold:

FieldFact work packages

The developed user documentation is primarily developed as for support during FieldFact demonstrations. Demonstration personnel from the project will use the developed documentation as a reference for their demonstration work and to support demonstration attendees using the demonstrators.

GSA

The user documentation will provide GSA an impression on how the demonstrations were supported by user documentation.

General public

Especially the user documentation that was specifically developed to provide the demonstration attendees with supporting background and application information is written in such a way that it provides insight in the FieldFact demonstrations as well as in the possibilities and backgrounds of the use of GNSS in agriculture.

1.3 Associated documentation

This list states the project documents that were used as input documents for the elaboration of this document:

- Functional and non-functional analysis report and user-interface design for FieldFact Low End Demonstrator, version 1.0.2, October 2007. Reference FIELDFACT-WP3-ALT-DEL-3.3.
- Architectural Model Report for FieldFact Demonstrator Applications, version 1.0.2, October 2007. Reference FIELDFACT-WP3-ALT-DEL-3.4
- Functional and non-functional analysis report and user-interface design for FieldFact High End Demonstrator, version 1.0.2, October 2007. Reference FIELDFACT-WP3-ALT-DEL-3.5.
- FieldFact Web Portal Manual, version 1.0, September 2008. Reference FIELDFACT-WP3-ALT-DEL-3.8.1.



User Manual and Context Sensitive Help	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 9 / 22

1.4 Reference Documentation

There is no reference documentation for this document.

1.5 Abbreviations and Acronyms

EGNOS	European Geostationary Navigation Overlay Service
EU	European Union
GJU	GALILEO Joint Undertaking
GNSS	Global Navigation Satellite System
GSA	GNSS Supervisory Authority
HED	High End Demonstrator
LED	Low End Demonstrator
PDA	Personal Digital Assistant
WP	Work Package



User Manual and Context Sensitive Help	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 10 / 22

2 DESCRIPTION OF THE WORK CARRIED OUT

2.1 Introduction

This chapter describes the work carried out to develop the user documentation for the FieldFact demonstrators.

2.2 Methodology

The FieldFact demonstrators were developed based on the technical architecture described in the Architectural Model Report (FIELDFACT-WP3-ALT-DEL-3.4) and the functional and non-functional specifications described in the Functional and non-functional analysis report and user-interface design documents for the LED and HED (FIELDFACT-WP3-ALT-DEL-3.3 and FIELDFACT-WP3-ALT-DEL-3.5 respectively).

The development process for the demonstrators has followed an iterative approach, where subsequent versions of the architecture and software were developed, deployed and tested. In each iteration, new functionality was added and existing functionality was extended and adapted based upon test results and user comments. In the first iterations, these tests were performed informally with a limited group of internal users from the FieldFact project. Later on, fully functional versions of the demonstrators were used in the FieldFact demonstration events that were organized in the frame of WP 6 (Promotion) of the project.

During the development iterations we built up experience on the use of the FieldFact web portal and the issues that demonstration personnel as well as demonstration attendees would face during demonstrations. In order to be able to cope with these operational issues, a user manual was developed that could be used by demonstration personnel (e.g. for all kinds of administrative tasks) and by the attendees (using the end-user oriented functions).

Besides, from the work and experience with demonstrations in various other projects it was concluded that to support the majority of attendees of demonstrations a brief and clear and easy to read piece of user documentation was required. In WP 6 (Promotion) an instruction and reference booklet was created which has been distributed among attendants at the promotion events. This instruction booklet aimed at being a manual and information source for end users during demonstrations as well as afterwards.



User Manual and Context Sensitive Help	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 11 / 22

3 RESULTS OF WORK CARRIED OUT

3.1 Introduction

This chapter briefly describes the user documentation that was developed in the FieldFact project. In paragraph 3.2 the contents of user documentation for the FieldFact web portal are summarized. Paragraph 3.3 describes the goals and contents of the instruction booklet that was created to support demonstration attendees. In paragraph 3.4 it is motivated why context-sensitive help, one of the user documentation deliverables described in the project plan, is not delivered as part of the project.

3.2 FieldFact Web Portal Manual

To support the FieldFact demonstration personnel in the execution of administrative and operational tasks to be performed during demonstration events, and to support end-users using the web portal, the Manual for the FieldFact Web Portal Manual (FIELDFACT-WP3-ALT-DEL-3.8.1) was created.

This manual serves the following goals:

- 1) Instruction on the use of administrative and operational tasks for FieldFact personnel
 - Viewing of parcels for individual or all users
 - User management
 - Monitoring and management of data processing
 - Importing datasets
- 2) Instruction on the use of operational web portal functions for end-users
 - Login / Authentication
 - Viewing of parcels for individual users

The FieldFact Web Portal Manual has been published as a separate Annex to this document with reference FIELDFACT-WP3-ALT-DEL-3.8.1.

3.3 FieldFact demonstrator instruction booklet

A separate instruction booklet was developed as user documentation to support the attendees of the FieldFact demonstrations.

The instruction booklet was developed with the following goals:

- A brief and easy to read, attractive document that can be distributed among demonstration attendees.
- It must clearly and stepwise clarify the working and background of the FieldFact demonstrators as well as the possibilities and background of the use of GNSS and especially Galileo and EGNOS in agricultural applications.
- It should also serve as a short and comprehensible manual for the (restricted) part of the FieldFact demonstrator functionality that is developed to be directly used by the attendees.



User Manual and Context Sensitive Help	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 12 / 22

- It should be able to serve as a reference document that demonstration attendees can “take home” and read afterwards, e.g. in order to recall the demonstrations and the related backgrounds.

The demonstrator instruction booklet is formally a product developed in WP 6 as promotion material. Because we also see it as part of the user documentation for the FieldFact demonstrators, we have also included the contents of the instruction booklet in Annex 1 of this document.

3.4 Context-sensitive help

In the FieldFact project plan, context-sensitive help was defined as a user documentation deliverable. Context-sensitive help is a means of supporting a user with on-line help information on demand and specifically related to the context that applies to the function a user is using.

When developing the FieldFact demonstration scenarios and the demonstrator applications that would support these scenarios, it became clear that only a limited part of the application functionality would be used directly by the demonstration attendees as end-users. Furthermore, this functionality has been implemented on mobile devices (e.g. Smartphone or PDA), where the possibilities to work with context-sensitive help are limited and where applications usually are “lightweight” and are forced to have light and easy to use user-interfaces. We decided to apply a “one-button approach” for these applications. Implementation on these devices was done by keeping the user-interface simple and by designing the application workflow in such a way that the “directions to follow” are always obvious. In this way we created end-user applications for the demonstrators that were intuitive and easy to use, without the need to have context-sensitive help functions available.



User Manual and Context Sensitive Help	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 13 / 22

4 CONCLUSIONS & RECOMMENDATIONS

4.1 Conclusions

In the FieldFact project two major pieces of user documentation have been developed. A manual was written to support the use of the FieldFact web portal by FieldFact demonstration personnel as well as by end-users. Furthermore, a demonstrator instruction booklet was developed that has served as the major supporting document for the attendees of the FieldFact demonstrations.

In the FieldFact project plan, context sensitive help was defined as a second deliverable. It was decided however, not to implement context-sensitive help into the FieldFact applications. Only a small part of the FieldFact demonstrator software is directly used by end-users. Instead of implementing (context-sensitive) help functionality into that software, we chose to apply a so-called “one-button approach” for these applications. This was done by keeping the user-interface simple and by designing the application workflow in such a way that the “directions to follow” are always obvious.

In practice the FieldFact web portal manual has been used several times during the project. It was mainly used as a supporting document to train the FieldFact personnel in using the portal for demonstration purposes. Although this document was also developed to serve as a manual for end users, it has not been used for that purpose.

The demonstrator instruction booklet developed to be distributed among the FieldFact demonstration attendees, proved to be very valuable. It is valued by attendees as a very comprehensible document that is attractive and easy to read. It clearly describes the ‘scenario’ of the FieldFact demonstrations and at the same time explains relevant background information regarding the use of GNSS and especially EGNOS and Galileo in agricultural applications.

4.2 Recommendations

We have had positive experiences using the demonstrator instruction booklet described in this document in combination with the easy to use end user applications developed in the project. We can therefore recommend using the instruction booklet as an example for the development of user documentation for the support during demonstration events where large groups of users need to be reached and where users only have limited time to attend a demonstration. Documentation should be brief, comprehensible, attractive and easy to read. It should enable and encourage users to recall on the demonstration facts and demonstration backgrounds afterwards.



User Manual and Context Sensitive Help	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 14 / 22

Appendix 1: FieldFact Demonstrator Instruction Booklet

Contents

Introduction

FieldFact Instruction Booklet



User Manual and Context Sensitive Help	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 15 / 22

Introduction

This Appendix depicts the contents of the FieldFact instruction booklet. This booklet was developed as a support for FieldFact demonstration attendees during the demonstration as well as reference material to be used by attendees to further study the subject of GNSS in agricultural applications and to recall the contents of the demonstrations.

The goals of the booklet were:

- Educate the attendee on the backgrounds of using GNSS in agricultural applications.
- Instruct the attendee on how to operate the end-user part of the FieldFact demonstrator software (having the character of a “quick-start manual”).
- Inform the attendee on the added value of EGNOS and the Galileo differentiators in agricultural applications.
- To serve as a reference document that can be used to recall the contents of the FieldFact demonstration and for further study.
- To refer to the FieldFact project and website for further information.

User Manual and Context Sensitive Help	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 16 / 22

FieldFact Instruction Booklet



FieldFact Mobile


New technology for farmers




 **Opportunities for farmers:**

- Measure distance and area.
- Parcel measurement.
- Measure areas, spots and zones with divergent features (stones, erosion, waterlogged, poor crop growth).
- Store previously marked areas, spots and zones.
- Map parcel features.
- Locate previously marked areas, spots and zones.







Parcel measurement

1. Go to parcel you want to measure.
2. Mark starting point measurement.
3. Select from menu:

Measure Parcel

4. Keep Fieldphone at shoulder height, 50 cm away from body.
5. Start walking parcel boundary.
6. Apply "stop" button few meters before reaching starting point.
7. Parcel boundary closes automatically.



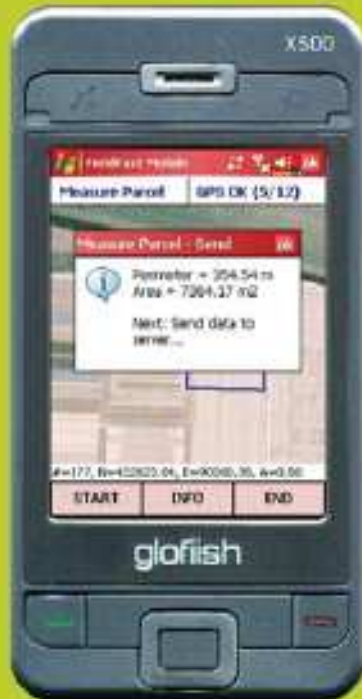


Measurement completed

Available information:
Shape, perimeter and area of the measured parcel appear in the screen.

Store and Process Data

Sent data to farm management system server (using phone). Server for demonstrator is located in the Netherlands. Information can be collected from database when required.
Information can be combined with other farm data and knowledge.



ACCURACY of MEASUREMENT

The (built-in) GPS receiver is the actual measuring device. While measuring it should follow the field boundary.

GPS receivers use satellite signals to determine their position. GPS has 27 satellites in orbit. The satellite constellation in reach is changing continuously.

As a result also accuracy changes. Accuracy is expressed as PDOP.(Position Dilution of Precision). PDOP less than 2 is good over 6 is bad.

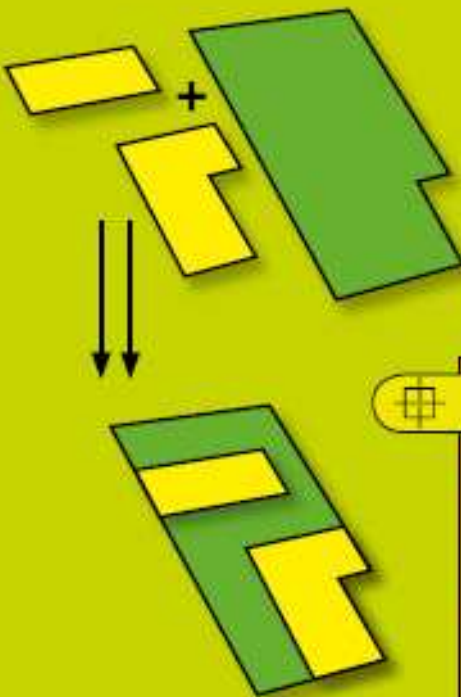



Parcel Updates / Split Parcel

1. Go to parcel you want to split.
2. Mark starting point Split line:
3. Select from menu:

4. Keep Fieldphone at shoulder height, 50 cm away from body.
5. Start walking parcel split line.
6. Apply "stop" button few meters before reaching parcel boundary.







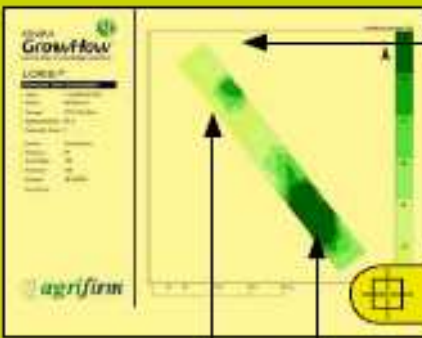
FieldFact Mobile


⊞

Support for Field Scouting

Measuring zones and spots within parcel.
Send zones to Farm management system.
(Same procedure as parcel measurement).

On farm management PC combine parcel & zones in one map.
Add spraying doses to zones for spraying.





Remote Sensing & Field Scouting

⊞

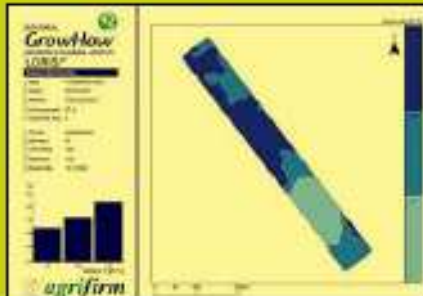
Finding causes of variation

1. Satellite image shows biomass variation.
2. Scout causes of variation with FieldFact Mobile in zones indicated on satellite image.
3. Divide parcel into management zones.
4. Add previously marked areas, spots and zones, like conservation zones for fine-tuning the application map.
5. Sent data to geo database on server.

Conservation zone

Extra biomass because of weed growth

High organic matter content



Application map

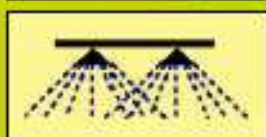
Determine doses to be applied for each zone

1. Transfer zone map into application map by adding advised dose to each zone.
2. Export the application map easily by using standard e.g. ISOBUS connection.



Opportunities for farmers:

- Economize on fertilizer.
- Protect environment by minimizing emission outside parcel boundary
- Increase crop yield and quality.
- Comply with regulations



From map to application

1. Transfer application map to dose regulator computer of sprayer.
2. Put GPS receiver on tractor and connect it to computer of sprayer.
3. GPS receiver indicates position of sprayer on the application map.
4. When sprayer passes to another zone spraying dose is adjusted automatically.



<h2>User Manual and Context Sensitive Help</h2>	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 21 / 22



Application machinery

Use the newest techniques. Sprayers equipped with computers and interface



Opportunities for farmers:

- New techniques for GNSS based Variable Rate Application.
- Equipped with pneumatic controlled nozzles which can be switched on and off for a quick change in variation of dose.
- Each section in the sprayer can be controlled separately.



As applied map

Spray computer stores spraying data: area, product and quantity.








Transfer data from sprayer to farm management system.



Opportunities for farmers:

- Evaluation of farm operations
- Tracking and Tracing.
- Proof of Good Agricultural and Environmental Practice to Government and customers.
- Use communication standards like ISOBUS and AgroXML.

User Manual and Context Sensitive Help	Ref: FIELDFACT-WP3-ALT-DEL-3.8	
	Issue: 1.1	Date: 19-FEB-2009
	Class: PUBLIC	Page 22 / 22

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Agriculture benefits from EGNOS & Galileo

+

EGNOS

Improves accuracy of GPS (DGPS).
FieldFact Mobile uses Egnos DGPS signal.

+

Galileo

European Satellite System operational by 2013.

Higher accuracy
Better positioning, more precise parcel measurement, accurate zone spraying.

Better availability
In Northern Europe.

Integrity signal
Reliable measurement, if signal indicates invalid position repeat measurement.

Authentication
Proof of evidence for operator.