



D2.1

Database Specifications

Version : **Final Version**

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TABLE OF CONTENT

Summary.....	4
Introduction	4
Specifying the profile of the user	5
Collect the data from the farmers	5
Names of tables and fields.....	5
Pilot Group Leader	5
Pilot Group	5
Group membership (equivalent to driver specifications)	5
Farm specifications.....	6
Tractor specifications	6
Implements specifications	6
Multilingual	7
Operations specifications.....	8
Collect large amount of data.....	11
Collect others data	11
Solutions	11
Question for discussion	11
Lists	11
Type of tractor	11
Agricultural Tractor Brand	12
Forest Tractor Brand.....	12
Self propelled Brand.....	13
Power origin	13
PTO type.....	13
Transmission type.....	13
Capacity, volume, weight	13
Dose rate, volume/ha, units/ha	14
State of the Soil	14
Measurement method	14
Coupling	14
Type of work	14
Database administration	15
Structure of the database.....	15
Operating Mode.....	15
The operating mode of a leader	15
The operating mode of a farmer (without pilot group).....	16
Numbering groups	17
Reports.....	17
For the Pilot Group Leader	17
For the farmer	17
Use of the spreadsheet	17
PGL Sheet.....	18
Pilot Group Sheet	18
Farm Sheet.....	18
Group Membership Sheet.....	18
Tractor Sheet.....	18
Implements Sheet	18
Operations sheet	18

Multilingual Sheet	19
References Sheet.....	19
Form Sheet.....	19
Form per Farm	19
Id Maintenance	19

Annexe : Excel Spreadsheet
(Electronic Version Only)

Summary

The aim of this document is to present the different data to be collected in the database, the way they could be organized and a first content of feeding lists. This work has been done in collaboration with RuralNet, Aile and Cemagref.

An Excel Spreadsheet has been established to allow the start of data recording in the different countries. It is annexes to this document and constitutes a guide to the database functioning.

Introduction

From the EU Project, the database should be able to :

- precise the profile of the user (Restricted access pages – accessible only via authorized login)
- collect the data from the farmers
- collect large amount of data
- be used as a modeling tool and decision making aid
- analyze and interpret the data stored in the database
- Be fed simply with an online form
- be accessible for trained farmers and counselors
- Be used in multi-language
- Distinguish the different categories of data to guarantee a proper interpretation
- compare results of farmers of different regions or countries

So we first should define which data are needed and how it should be organized.

Terminology : farmers, in this document, is a generic term which also includes foresters except when foresters specific case is mentioned. As far as possible, our aim is not to create different databases for farmers and foresters but to try to mixed the different sources of data.

Specifying the profile of the user

There are several types of people to link with the database. The two main types are the Pilot Group Leader (PGL) and the farmers. There is also the associate members' case to define. The PGL and the farmers included in Pilot Groups (PG) should be able to login and add the information.

The PGL should be able to see and verify the information of a farmer and have a global view of the group. A farmer (apart of a pilot group) should be able to see and verify his information. The results can be seen without any information about privacy.

Collect the data from the farmers

The PGL or the farmer should fill several forms :

- Pilot group leader (not for the farmer)
- group membership
- farm specifications (plots, fuel consumption)
- tractors specifications
- implements specifications
- operations specification (features and consumption)

Caution : Some fields are not relevant for the foresters. It should be possible to hide them. In this case, a specific field in the pilot group table should be included.

Names of tables and fields

Names of fields always begin by the first three capital letters of the table's name, followed by _ and field description without space (_ between words if needed). All fields about Id (as primary key or foreign key) are in capital letters.

Pilot Group Leader

The following fields should be filled

PGL_ID

PGL_Login : Login for the website

PGL_Name

PGL_Adress

PGL_Country

Pilot Group

The following fields should be filled

PG_ID

PG_Name : Group Name by the PGL or the Group

PG_Place : Location of the group (or cluster center)

PG_Date_beginning : Start date

PG_Date_end : End Date to allow to hide old Pilot Group

PG_PGL_ID : to link with the PGL.

Group membership (equivalent to driver specifications)

The following fields should be filled

GM_ID

GM_Name

GM_Adress

GM_Zip_code
GM_Town
GM_Country
GM_Mail_adress
GM_Mobile_phone
GM_Driver Photos : URL of the photo.
GM_PG_ID

A group contains farms, drivers, tractors and implements.

Farm specifications

The following fields should be filled

FAR_ID
FAR_Name : Name of the farm (or the society)
FAR_Zip_code
FAR_Adress
FAR_Production_type : Production type (not relevant for foresters)
FAR_Total_surface : Total surface (not relevant for foresters)
FAR_Crops : Crops (not relevant for foresters)
FAR_Fields : Fields (not relevant for foresters)
FAR_Surface_fields : Surface of fields (not relevant for foresters)
FAR_Employees_number
FAR_Annual_fuel_consumption : annual consumption in liter
FAR_Agri_Forest : are there specialized in agriculture or forest activities
FAR_PG_ID

Tractor specifications

The following fields should be filled

TRA_ID
TRA_Tractor_type : the precise architecture and the global use of the "tractor"
TRA_Brand : a new brand can be added. See list.
TRA_Model : Type
TRA_Date_sale : Date of sale (year)
TRA_Number_hours : total number of hours since new
TRA_Identification_number
TRA_Transmission : see list
TRA_Power : in horse power
TRA_Reference_power : See list
TRA_Photo
TRA_PG_ID
TRA_Farm_id : Identification number to link with the farm id, to be able to select the tractors of a specific farm in the Farm form of the spreadsheet.

Implements specifications

The following fields should be filled if relevant. It is not sure this form is relevant for forest work (to be discuss with forest groups).

IMP_ID
IMP_Type of work : Breeding, Tensile work, Transport

IMP_Brand
IMP_Model
IMP_Coupling : Mounted, semi-trailed, trailed, self propelled, front (if self propelled, a "self propeller" should be added to record power, ...).
IMP_Characteristic : precision about the implement
IMP_Tool_features : precision 2 about the implement
IMP_Capacity
IMP_Width
IMP_Other
IMP_Sale_date
IMP_Multilingual_Name : See multilingual Sheet
IMP_Multilingual_Id :
IMP_PG_ID
IMP_Farm_id : Identification number to link with the farm id, to be able to select the implements of a specific farm in the Farm form of the spreadsheet.

Question for discussion

Implement specifications : the wide variety of implement inside a country and between the countries could make very difficult the comparisons between operations. The possibility (or the need) to add implement' photo could be an answer.

Multilingual

The proposal is to create a multilingual Id for implement to be able to characterize machines whatever their national names. The basis for this work is the Belgian work named BDD mecaocost. This work brings together a description of the implements used in agriculture including self propelled machines. The description is divided in four columns : the operation type to separate the different operations in families (harvesting, soil tillage, ...) ; the type of implement, the model in the implement type and the main characteristics in the fourth column. More than 400 machines have been described. The project partners have added their national translation.

The aim is to allow the characterization of the implements of the pilot groups participants to link their machines with an id shared through the project. So we will be able to compare data from different countries into a same operation type or implement type or implement model according to our needs. It will help a farmer (out of the pilot groups) to link his data with previous ones and help the database management to compare results.

The forest partners have participated to that work in providing informations about forest machines. If needed, new implements will be added to the list in a common way to allow a good multilingual id definition.

The following fields are filled with the help of the project partners. For each language, 4 fields are needed.

MULTILINGUAL_ID
OPERATION TYPE
TYPE_ENG
MODELE_ENG
CHARACTERISTICS_ENG
OPERATION_SPA
TYPE_SPA
MODELE_SPA

CARACTERISTICS_SPA
OPERATION_ITA
TYPE_ITA
MODELE_ITA
CARACTERISTICS_ITA
OPERATION_POL
TYPE_POL
MODELE_POL
CARACTERISTICS_POL
OPERATION_DUT
TYPE_DUT
MODELE_DUT
CARACTERISTICS_DUT
OPERATION_GER
TYPE_GER
MODELE_GER
CARACTERISTICS_GER
OPERATION_FRE
TYPE_FRE
MODELE_FRE
CARACTERISTICS_FRE
OPERATION_SLO
TYPE_SLO
MODELE_SLO
CARACTERISTICS_SLO

Operations specifications

The following fields should be filled whether they are mandatory or optional and according to the operation type

OPE_ID
OPE_Date
OPE_GM_ID
OPE_FAR_ID
OPE_TRA_ID
OPE_IMP_ID
OPE_Fuel_consumption : liters number during work
OPE_Worked_surface : ha worked
OPE_Used_solution : fill list
OPE_Solution_precisions
OPE_Global_duration : number of hours
OPE_Measurement_method : type of measurement method
OPE_State_soil : fill list
OPE_Work_duration : specific time for work (hours)
OPE_Travel_duration : specific time for travel (hours)
OPE_Other_duration : same
OPE_Quantity_treated_number : important for silage or round bale by example
OPE_Quantity_treated_m3 : important for forestry or spreading by example
OPE_Quantity_treated_ton : important for loading or transport by example
OPE_Plots_number : important for tillage
OPE_Plots_surface : important for tillage (ha)

OPE_Crop_yield : important for harvesting (t/ha)
OPE_Dose_rate : important for spraying
OPE_Speed_work : important for spraying and many operations (km/hour)
OPE_travel_distance : important for forage transport or slurry spreading (km)
OPE_distance_1_trip : : important for tillage (km)
OPE_Travel_speed_full : important for forage transport or slurry spreading (km/h)
OPE_Travel_speed_empty : important for forage transport or slurry spreading (km/h)
OPE_Trips_number : important for forage transport or slurry spreading (km/h)
OPE_Depth_work : important for tillage (cm)
OPE_Tree_volume : important for forest harvesting
OPE_Tree_species : important for forest harvesting
OPE_Number_assortments : important for forest harvesting
OPE_Skidding_distance : important for forest harvesting
OPE_Skidroadsbetween_distance : important for forest harvesting
OPE_Slope : important for forest harvesting
OPE_Trimming_duration : important for forest preparation
OPE_Mulching_duration : important for forest preparation
OPE_Smallwood_duration : important for forest preparation
OPE_Strongwood_duration : important for forest preparation

The mandatory and optional fields are precised in the following table.

Informations	Harvesting	Breeding	Fertilization and crop protection	Forest harvesting	Forest Preparation	Loading	Manure and slurry spreading	Soil tillage	Transport
Fuel_consumption (l)	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.
Worked_surface (ha)	Mand.		Mand.				Mand.	Mand.	
Used_solution	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.
Solution_precisions	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.
Comp_Id	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.
Global_duration (h)	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.
Measurement_method	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.	Mand.
Quantity_treated_m3				Mand.	Mand.				
Quantity_treated_ton	Opt.	Opt.		Opt.		Opt.	Opt.		
Quantity_treated_number	Opt.			Opt.					
distance_1_trip (km)		Opt.	Opt.				Opt.		Opt.
travel_distance (km)							Opt.		Opt.
Travel_speed_full (km/h)									Opt.
Travel_speed_empty (km/h)									Opt.
Work_duration (h)		Opt.						Opt.	Opt.
Travel_duration (h)									Opt.
Other_duration (h)									Opt.
Trips_number									Opt.
Dose_rate (l or kg/ha)			Opt.						
Work_speed (km/h)			Opt.						
State_soil					Opt.			Opt.	
Depth_work (cm)								Opt.	
Plots_number			Opt.				Opt.	Opt.	
Plots_surface			Opt.				Opt.	Opt.	
Tree volume average (m3)				Opt.					
main tree species				Opt.					
number of assortments				Opt.					
skidding distance average				Opt.					
distance between skidroads				Opt.					
gradient, slope (%)				Opt.					
Trimming_duration (h)				Opt.	Opt.				
area mulching_duration (h)					Opt.				
smallwood ≤ 7cm_duration (h)					Opt.				
stronger wood > 7cm_duration (h)					Opt.				

Question for discussion

For which specifications should we add specific conditions description (such as very good, good, bad, very bad) : roads when transport, soils when tillage, ...

Collect large amount of data

The way to fill the database is a crucial point. It should be as easier as possible for the PGL to fill the database. The possibility to feed through excel files seems the good way but it needs to pay a great attention to the identification number needed by the database and to furnish a specific excel files to prepare the feeding. The possibility to feed online seemed more simple (identification numbers easier to get) but internet access plug is not everywhere and GSM internet access is not costless. The proposal is to feed through excel files.

About the amount of data, we can consider 30 pilot groups with approximately 10 farmers, 15 tractors and 40 implements per group. With two measurements per implements, we obtain the operations number of 2500 used in the presentation of Efficient20 project.

Collect others data

Solutions

None (“baseline” value for identifying measurements made before adopting any solutions)

Save tractors ‘use

Lower travel part

Eco-Driving

Economic Power Take Off

Match tractor/implement

Get work sequences longer

Adapt weights

Adapt implement’s settings

Use front implement

Tyre management

Question for discussion

Which specifications for the solutions to insert in the field OPE_Solution precision

Lists

The following filling lists are propositions to be discussed with pilot groups and it should be possible for a PGL to add a new data through the excel file.

Type of tractor

Agricultural tractor 2WD

Agricultural tractor 4WD (4-wheel equal)

Agricultural tractor MFWD (4-wheel unequal)

Agricultural tractor Tracks

Forest harvester 4WD

Forest harvester 6WD

Forest harvester 8WD

Forest forwarder 4WD

Forest forwarder 6WD
Forest forwarder 8WD
Forest skidder 4WD
Forest skidder 2WD
Forest tractor 2WD
Forest tractor MFWD
Self Propeller Tracks
Self Propeller 2WD
Self Propeller MFWD
Self Propeller 4WD
Self Propeller 6WD
Self Propeller 8WD

Agricultural Tractor Brand

BELARUS
CASE IH
CLAAS
DEUTZ FAHR
DOPPSTADT
FENDT
HURLIMANN
J.C.B.
JOHN DEERE
LAMBORGHINI
LANDINI
LINDNER
MASSEY FERGUSON
McCORMICK
NEW HOLLAND
RENAULT
SAME
STEYR
UNIVERSAL
URSUS
VALTRA VALMET
ZETOR

Forest Tractor Brand

BELL
BRUNETT
FMG
FORTEC
FRANKLIN
HEMEK
JOHN DEERE
LOGSET
MECAFOR
NOKKA
PONSSE
ROTTNE
SACMI
SILVATEC

TIMBERJACK
TIMBERPRO
VALMET

Self propelled Brand

BERTHOUD
BIZON
HARDI
TECNOMA
MATROT
MENGELE
MOREAU
GRIMME
FORTSCHRITT
BIZON
HARDI
TECNOMA
MATROT
MENGELE
MOREAU
GRIMME
FORTSCHRITT
AGROMECCHANICA

Power origin

Farmer's data
PTO tests
OECD tests
ISO TR 14396
ECE R24
DIN 7020

PTO type

540
540 Eco
750
1000
1000 Eco

Transmission type

Unsynchroised manual
Synchronised manual
Semi-powershift (powershift gears, mechanical ranges)
Full-powershift (powershift gears and ranges)
CVT (Continuously Variable Transmission)
Hydrostatic

Capacity, volume, weight

If a sprayer liter
If a trailer m3
If a slurry tanker m3

If a farm yard manure t
If a fertilizer spreader kg
If a forwarder t

Dose rate, volume/ha, units/ha

If a sprayer liter/ha
If a slurry tanker m³/ha
If a farm yard manure t/ha
If a fertilizer spreader kg/ha
If a seeder kg/ha
If a baler Bale/ha
If a harvester m³/ha
If a forwarder m³/ha
If a skidder m³/ha

State of the Soil

Sand – very firm
sand – firm
sand tilled
sand – soft
loam – very firm
loam – firm
loam – tilled
loam – soft
clay – very firm
clay – firm
clay – tilled
clay – soft.

Measurement method

Global fuel tank
Plot measurement
Instantaneous measure

Coupling

Mounted
Semi-trailed
Trailed
Self-propelled
Front-mounted

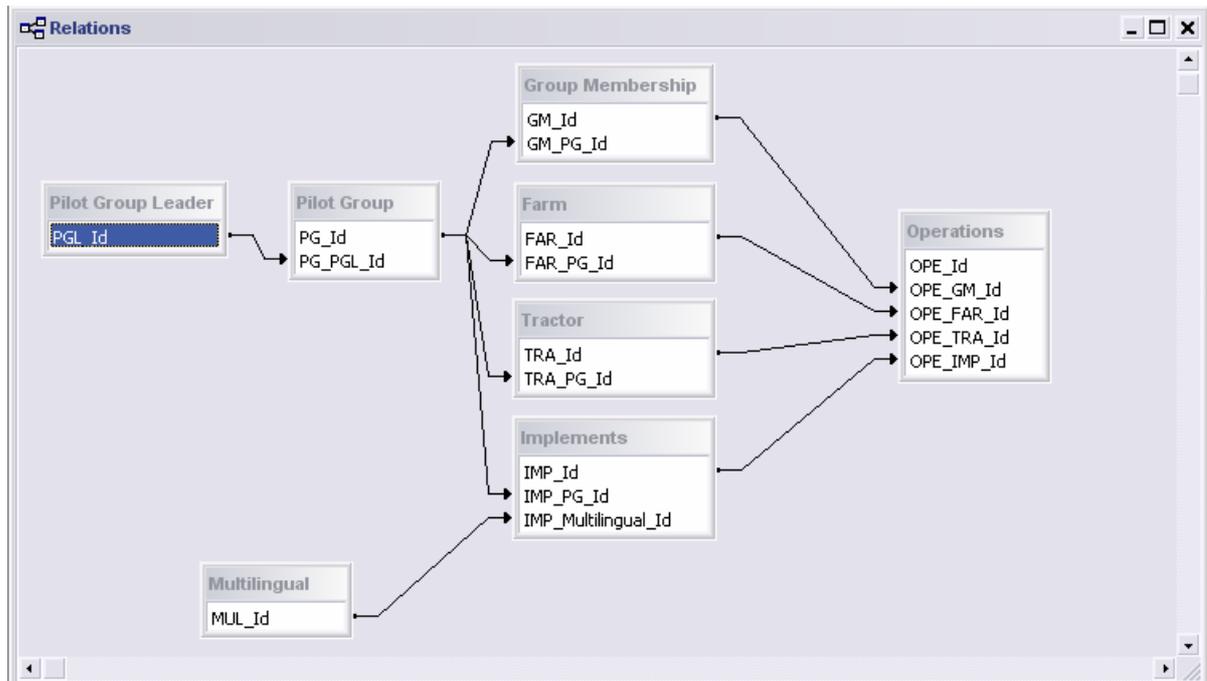
Type of work

Harvesting
Breeding
Fertilization and crop protection
Forest harvesting
Forest preparation
Loading
Manure and slurry spreading
Soil tillage
Transport

Database administration

It should be possible to export the whole database on an open format. It should be an option (that the PGL can enable or disable) to allow farmers to see (or not) the results of the farmers of the same group through the website.

Structure of the database



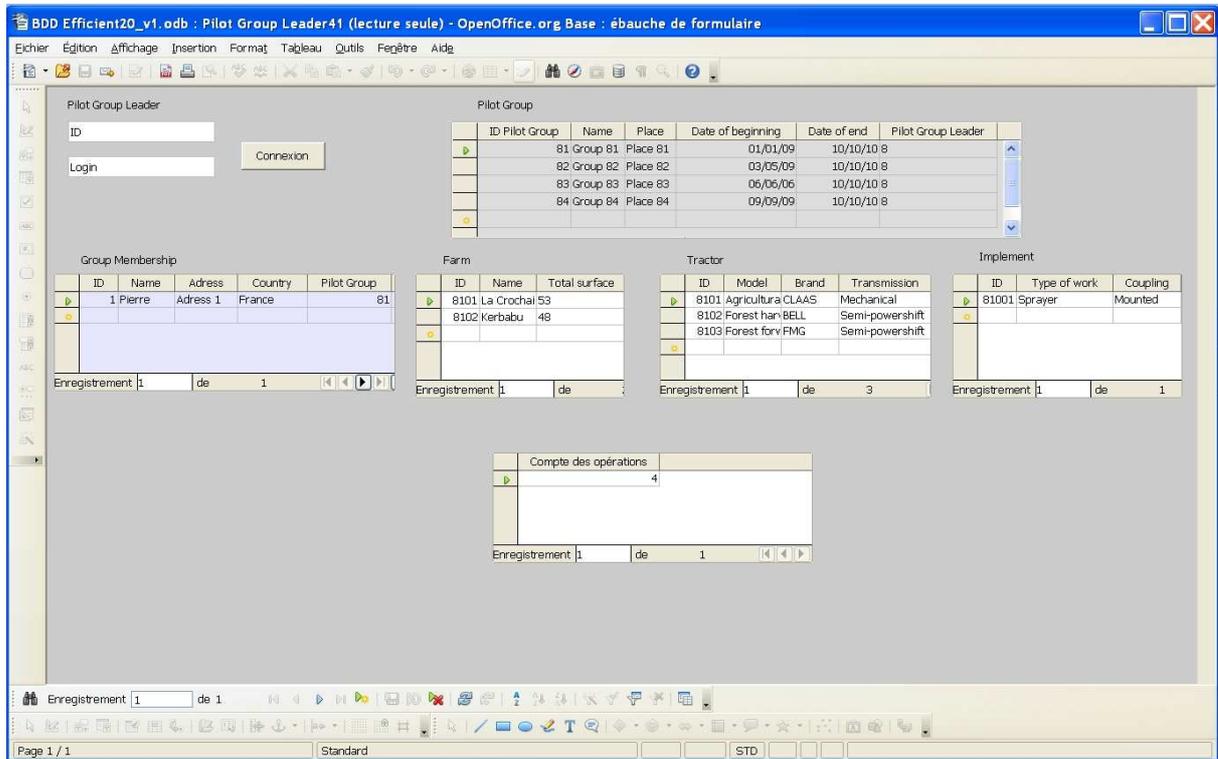
Operating Mode

The mode of operation is different for Pilot group leaders and farmers.

Their different passwords makes them arrive at a different space.

The operating mode of a leader

He connects to the database via the website with a login / password. This opens the description of its groups. This form contains a table of various groups managed by the leader. It can create or delete a group. This simple form is located on top of the page.



Clicking on a group it opens the forms of group management. There is a farmhouse tables of the group (Name of the farm), a table of tractors in the group (Make, Model, date of purchase), and a tool table group (Type of Work, Make, Model) and the number of transactions recorded in the database.

In the table Farms, adding a new farm can be achieved by either clicking on a record or clicking on an icon. It opens the form dedicated to the management firm (or company) to change the fields (features) of the table Farm. This form is linked to the parent form. It can also be used to remove a farm.

In the table of tractors, adding a new tractor can be achieved by clicking on a record or clicking on an icon. It opens the form dedicated to the management of tractors to modify the fields (features) of the table tractor. This form is linked to the parent form. It can also be used to remove a tractor.

In the table Implements, adding a new tool can be achieved by either clicking on a record or clicking on an icon. It opens the form dedicated to the management tools to modify the fields (features) of table tools. This form is linked to the parent form. It can also be used to remove a tool.

He can click on operations recorded in the database.

The operating mode of a farmer (without pilot group)

To make the db feeding as simple as possible, a farmer could get a login after a first connection (fill in the table group membership). It would not be connected to a pilot group but at a personal group number that would link its various data. Filling operations would be on the same principle and with the same information. He could enter its tractors and implements (with the same filling lists). So he could see (as a result) how many operations have been recorded with the same operation type in his country. So he could print a sheet (per operation

type as for pilot group farmers) with the data to record, then fill the database online after the work.

Numbering groups

The proposal is that each group PGL numbers his opportunities with 10 3-digit number (eg 080-089). 100 PG are possible. Farms, Drivers and tractors are numbered on two digits (eg 08001 to 08099). The tools are numbered 3 digits (eg 081001 to 081999). The operations are numbered on 4 digits (eg 0810001 to 0819999).

For the farmers alone, their group number is beginning at 1000, their Farms, Drivers and tractors are numbered on two digits (eg 100001 to 100099). Their implements are numbered 3 digits (eg 1000001 to 1000999). The operations are numbered on 4 digits (eg 10000001 to 10009999).

Reports

It must be possible to export data with different choice possibilities (per country, per operation type, per multilingual Id, ...).

The db must provide reports to illustrate the following points, when relevant, the time period should be precised in the report header.

For the Pilot Group Leader

The number of pilot group

The number of farms in total and by pilot group

The number of farmers in total and by pilot group

The annual fuel consumption in total and by pilot group

The total number of tractors and pilot group

The number of tools in total and by pilot group

The number of operations overall, by the pilot group and year

The amount of fuel consumed in operations

The number of operations with solutions, in total and by pilot group

The number of operations with solutions and point of comparison, total and by pilot group

The percentage reduction in consumption per operation, by solution, by type of operation by the pilot group and in total.

For the farmer

The amount of fuel consumed in operations

The number of operations with solutions,

The number of operations with solutions and point of comparison,

The percentage reduction in consumption per operation, by solution, by type of operation.

Use of the spreadsheet

This spreadsheet will help you to collect datas and to send them to the database. It will be the link with the database.

The aim is to prepare a spreadsheet per Pilot Group with the good Ids per Pilot group and country, to send them to the Pilot Group Leader, who could use it during the life of the Pilot group. When needed, the spreadsheet can be sent to the database to be synchronised and the Pilot Group Leader can see the results on the website.

In the spreadsheet, the grey part correspond to the number of datas included in the lists (beyond, the formulas must be modified). The coloured parts correspond to the places where the formulas have been copied. You can extend them if needed.

Each sheet (Pilot Group Leader, Pilot group, Group Membership, Tractor, Implements, Operations) correspond to a table of the database.

The datas of the sheets Group Membership, Farm, Tractor, Implements are used to fill lists in the Operations and Form sheets to make data collection easier.

PGL Sheet

This sheet (one line only) has been prepared before sending the spreadsheet to the Pilot Group Leader. In PGL sheet, you can choice the language used for multilingual part of the file.

Pilot Group Sheet

This sheet (one line only) will be prepared before sending the spreadsheet to the Pilot Group Leader.

Farm Sheet

This sheet collect data about the farms of the pilot group. For the forest contractors (who don't have a farm or a forest), you can mention only the name of the society. One farmer (in this project) have one farm. We would monitored separately if the individual farm are very separate (separate tractor) and we'll create 2 farmers.

Group Membership Sheet

This sheet collect data about the members of the pilot group and also the others drivers included in the operations.

Tractor Sheet

The Tractor sheet allow to collect datas about agricultural and forest tractor and harvesters. In this sheet for the harvesters, the collected informations are about power and the type is self propelled. If the drop down list of the brands does not contain the good one, you can add one in the Reference sheet. You can also add a tractor type if necessary.

The value of power is in horse power. About Power Origin, you can mention Farmer's data if anybody know the way the power has been measured. The agricultural tractor are mainly MFWD (mechanical front wheel drive) with 4 unequal wheels. The 4 WD is about 4 equal wheels.

Implements Sheet

The Implements sheet allow to give a name for the farmers (IMP_Model in your native language). The type of work is important to select the implements in the Form sheet. The multilingual name is very important to be able to compare data. The multilingual name of each row is filled with a drop down list defined by the Q2 cell's content. Please select the good multilingual implement with lower values than your implement and precise the characteristics of the implements if relevant (working width, capacity, ...). To make the selection easy, the multilingual name is in the language you have selected in F2 cell of PGL sheet.

Operations sheet

The Operations sheet is filled with the farmers ' recordings. It is the PGL work to fill it with the data recorded. For the database needs, the driver, farm, tractor and implement must be

filled with the Id of each table. So, drop down lists allow to select the good record and to fill the good Id per table.

Multilingual Sheet

The sheet Multilingual correspond to the common characterization of the different implements in order to facilitate the comparison between countries.

It is possible to add some new multilingual implement but you have to ask me and I will send to you (and to the others partners) a new multilingual sheet to paste in your spreadsheet.

References Sheet

The sheet References collect the fixed list of informations (brand name, state of the soil,...), and the content of filling list from other sheets.

Form Sheet

The Form sheet allow to prepare data sheets for farmers. They are automatically filled with the group's tractor, the group's implements defined by the operation type selected on the top (I1 cell) and the informations to collect. Once the tractor and implements defined, by choosing the operation type (I1 cell), you can edit the form for the farmers (one per operation type). All the tractors of the pilot group and all the implements (from the operation type) of the pilot group are collected for that form. You don't need to fill the TRA_Farm_id column and IMP_Farm_id column. Thanks to the translations, all the informations are in the farmer's native language (chosen in the PGL sheet).

Form per Farm

The Form_per_farm's sheet allow to prepare data sheets for farmers. They are automatically filled with the farm's tractor, the farm's implements defined by the operation type selected on the top (I1 cell) and the informations to collect. Once the tractor and implements defined, by choosing the operation type (I1 cell), you can edit the form for the farmers (one per operation type). You need to fill the TRA_Farm_id column and IMP_Farm_id column with the good Farm_id. Thanks to the translation, all the informations are in the farmer's native language (chosen in the PGL sheet).

The data to collect are listed in the references sheet (DF to DO column). You can modify the order of the list by modifying the values in these columns. The number 1 will put this date at the top of the list ...

Id Maintenance

Caution : The Ids are very important and the first line of the table gives the first value of the Ids.

In yellow, the Ids are automatically entered (+1, Primary Key of the table). In green, the Ids are automatically entered (same as above, Foreign Key of the table). You can delete the formulas and enter manually the Ids if needed.