

# **System-to-System Data Collection in business surveys applied to an agricultural survey: small-scale pilot results**

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22 May 2024

(EU grant: 101036345 - 2020-NL-AGRI-SISA)

Expert Meeting on Statistical Data Collection and Sources  
22-24 May 2024, Geneva, Switzerland

# General idea

4.4.1 Fosfaatproductie in dierlijke mest per landbouwgebied in 2016



Oogstraming

0002345678  
4567979

Controler of reburcode in het venster zichtbaar is

Periode: Statistiekjaar  
Retourdatum: PARAMETER?

Correspondentienummer: R23901 - 123

A Oogstraming akkerbouw 2016

Oogst en productie	Geogafische oppervlakte (ha)	Totale productie (t) (dus niet per hectare)	Percentage
Grassen met korrelvrucht			
Wintergerst			
Zomergerst			
Wintergerst			
Zomergerst			
Rogge			
Haar			
Triticale			
Korrelmaïs			



Pre-fill

“Why do I still have to do this manually?”

Pre-filling:  
How to make this work?

Pilot with  
 JOHN DEERE



Technoboer heeft de toekomst:

Techno farmer has the future

Smart industries  
Smart farming



# MyJohnDeere data



## A Crop yield survey

- Data: operations per field (event-based)
- Almost 100% overlap with data in **Crop Yield Survey** questionnaire
- > **MyJohnDeere** is (potentially) a good source!

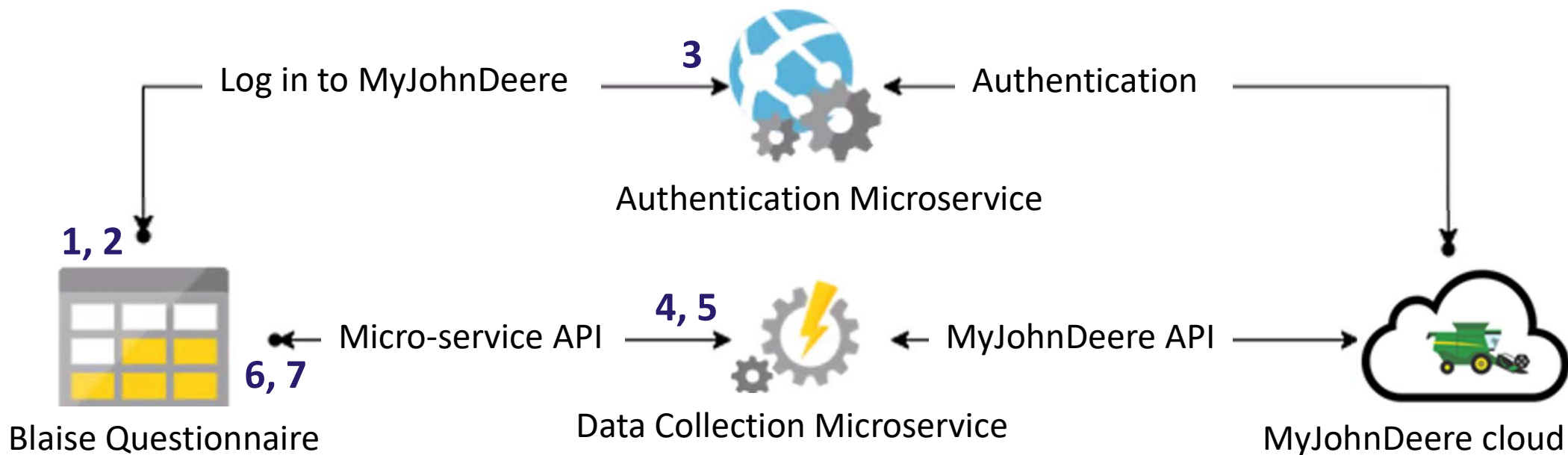
	Yield			Crop failure
	Harvested area	Total yield	Moisture content	Area not harvested
A1 Grains	hectare	Tons	Percentage	hectare
Winter wheat	<input type="text"/>	<input type="text"/>	<input type="text"/> %	<input type="text"/>
Summer wheat	<input type="text"/>	<input type="text"/>	<input type="text"/> %	<input type="text"/>
Winter barley	<input type="text"/>	<input type="text"/>	<input type="text"/> %	<input type="text"/>
Summer barley	<input type="text"/>	<input type="text"/>	<input type="text"/> %	<input type="text"/>
Rye	<input type="text"/>	<input type="text"/>	<input type="text"/> %	<input type="text"/>
Oats	<input type="text"/>	<input type="text"/>	<input type="text"/> %	<input type="text"/>
Triticale	<input type="text"/>	<input type="text"/>	<input type="text"/> %	<input type="text"/>
Grain corn	<input type="text"/>	<input type="text"/>	<input type="text"/> %	<input type="text"/>

▼ calculated_crops:	
▼ winter_wheat:	
harvest_area_ha:	70
production_t:	700
no_harvest_area_ha:	5
humidity_prct:	5
▼ rye:	
harvest_area_ha:	4
production_t:	40
no_harvest_area_ha:	1
humidity_prct:	5
▶ corn:	{...}
▶ seed_onion:	{...}

*vervolg op volgende pagina*

# System-to-system data communication



## The farmer's completion process:

1. Comprehension
  2. Data retrieval
  3. Computation
  4. Evaluation and reporting
- } Automate



# Test: Sandbox + technical test

It worked!

## 1. Sandbox:

- open data from John Deere
- Virtual farm

Next:

## 2. Technical test:

**In theory the system works!**



## Test 3: Small-scale pilot with farmers

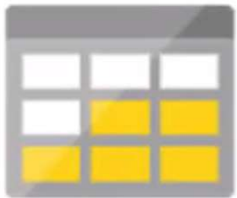
- How does it work in practice?
- Pre-test with 5 farmers
  - Hard to recruit!
- Pre-test results:
  - Technical issues
  - Usability issues (the farmer/user's perspective)
  - Data quality issues
  - Perceived workload
  - Trust
  - General attitude

**Assumption:  
the data in MyJohnDeere  
are correct!**



# The implemented system pre-tested

1



Blaise Questionnaire

## The farmer's completion process:

1. Farmer logs in to Q

# The implemented

cb  
Centraal Bureau voor de Statistiek

NED

Log in

User name: 123456

Password: ●●●●●●

Crop Yield Survey 2022

Due date: 1-1-2023

Company name 1  
Contact person 1  
Respondent number 1

Save Save and close Print Help

Welcome to this questionnaire

**How to Complete**  
We recommend filling out this questionnaire on a desktop computer or laptop.

**Explanations**  
The "?" button indicates additional explanations. Press this button to show these explanations.

**Saving**  
Data is saved automatically only when navigating between pages. If you work for a long time in one page, it is therefore advisable to save the data regularly yourself by pressing the 'Save' button at the top right corner of the page. You can interrupt the fill in process of the questionnaire with 'Save and close' button. Your previously completed answers will then be saved. The "?" button indicates additional explanations. Press this button to show these explanations.

**Printing**  
You can create a PDF of the questionnaire at any time using the "Print" button and save and/or print it for your own use.

**If you have any questions**  
Please visit [www.cbs.nl](http://www.cbs.nl) for frequently asked questions about this survey.  
If the answer to your question is not listed here, please call us at (045) 570 6400 or send an e-mail to [contactcenter@cbs.nl](mailto:contactcenter@cbs.nl), quoting the correspondence number: 123456789.  
We are available from Monday to Friday between 9.00 am and 5.00 pm.

Now press 'Next' to start the questionnaire.

Back Next

1



Blaise Questionnaire

## The farmer's completion process:

1. Farmer logs in to Q



# The implemented system pre-tested

1, 2



Blaise Questionnaire

## The farmer's completion process:

1. Farmer logs in to Q
2. MyJohnDeere?



MyJohnDeere cloud



# The implemented system pre-tested

First design

1, 2



Blaise Questionnaire

The farmer's completion

1. Farmer logs in to Q
2. MyJohnDeere?

The screenshot shows a web interface for a survey. At the top, it says "Crop Yield Survey 2022" and "Due date: 1-1-2023". There are fields for "Company name 1", "Contact person 1", and "Respondent number 1". Below this is a section for authentication, showing a laptop and a smartphone displaying the survey interface. A question asks "Would you like to use this option?" with "Yes" selected. Below the question, it says "Click on the green button below" and shows a "JOHN DEERE" logo button circled in blue. At the bottom are "Back" and "Next" buttons. A blue speech bubble points to the "JOHN DEERE" button with the text "First design". Another blue speech bubble points to the "JOHN DEERE" button with the text "Usability issues: The 'John Deere' button was not recognized as button. How to use the 'Back' and 'Next' buttons?".

Usability issues:

- The "John Deere" button was not recognized as button
- How to use the "Back" and "Next" buttons?



# The implemented system

Revised design

1, 2



Blaise Questionnaire

The farmer's complete

1. Farmer logs in to
2. MyJohnDeere?

**Crop Yield Survey 2022**  
Due date: 1-1-2023

Company name 1  
Contact person 1  
Respondent number 1

### Authentication

You can use your information from the John Deere Cloud

Would you like to use this option?

Yes  
 No

Back Next

**Crop Yield Survey 2022**  
Due date: 1-1-2023

Company name 1  
Contact person 1  
Respondent number 1

### Authentication

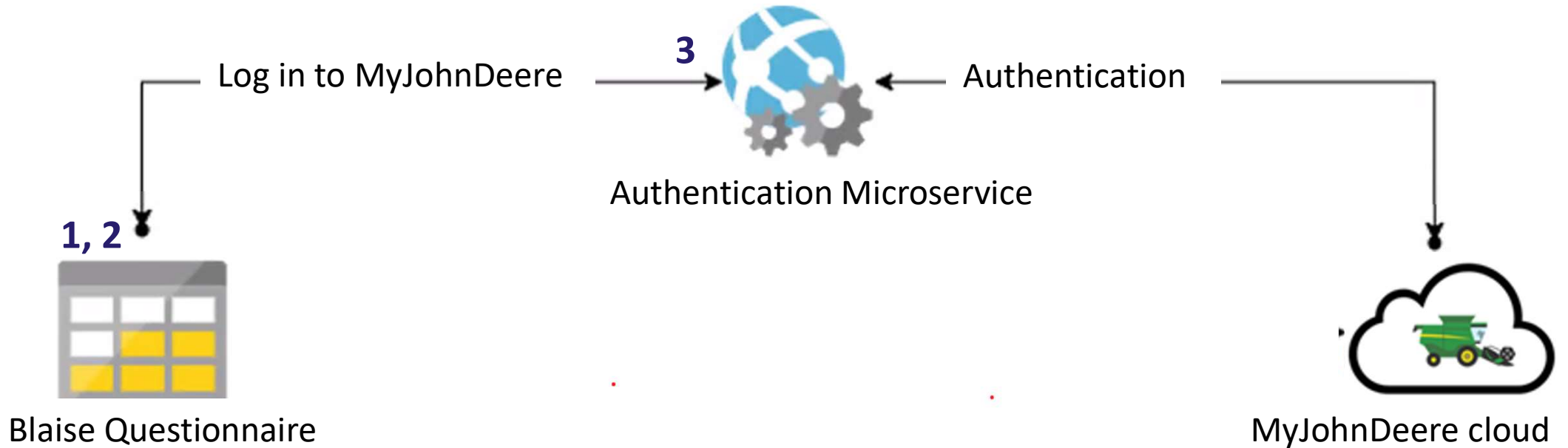
Click on "Login to John Deere" to login to John Deere. You will be redirected to John Deere.

**Login to John Deere**

Back

Save X Save and close Print

# The implemented system pre-tested



## The farmer's completion process:

1. Farmer logs in to Q
2. MyJohnDeere?
3. Authentication  
Import data?

# The implemented system pre-tested

In practice:  
more complex  
process

1, 2



Blaise Questionnaire

The farmer

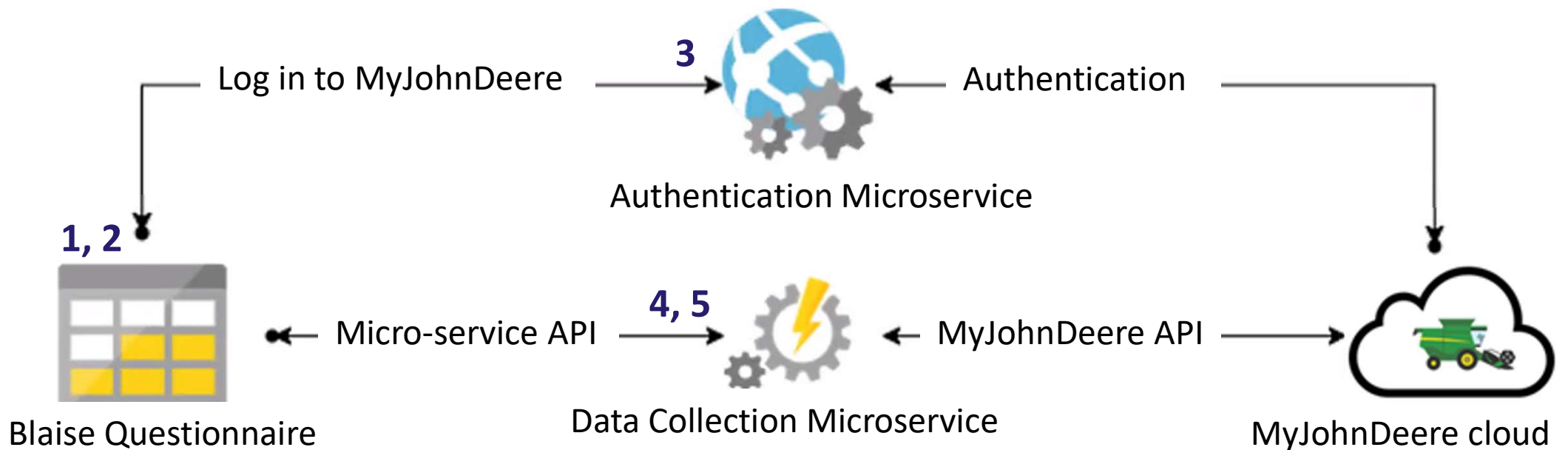
1. Farmer logs in to MyJohnDeere?
2. MyJohnDeere?
3. Authentication Import data?

The screenshot shows a web browser window with the John Deere logo and a 'Sign In' form. The form has fields for 'Username' (containing 'Methodology') and 'Password'. Below the form is a yellow bar. The second part of the screenshot shows a survey confirmation page titled 'Crop Yield Survey 2022' with a 'Due date: 1-1-2023'. It includes an 'Authentication' section with a green checkmark and the message: 'The authentication was successful! You can now continue to fill out the questionnaire.' Below this is a question: 'Do you agree to use the retrieved data fill in questions in the questionnaire?' with radio buttons for 'Yes' (selected) and 'No'. At the bottom are 'Back' and 'Next' buttons.

Technical issues:

- Authentication did not work properly: two-step procedure
- Unstable systems
- Unreliable communication between systems
- Not all retrieved data were shown in the questionnaire

# The implemented system pre-tested



## The farmer's completion process:

1. Farmer logs in to Q
2. MyJohnDeere?
3. Authentication  
Import data?
4. Blaise Q <-> Microservice <-> John Deere
5. Data are pre-filled

# Crop Yield Survey 2022

Due date: 1-1-2023

Company name 1  
Contact person 1

Ophalen data John Deere

Result calculated crops Standard

wintertarwe

harvest\_area\_ha

production\_t

no\_harvest\_area\_ha

humidity\_prct

zomertarwe

harvest\_area\_ha

production\_t

no\_harvest\_area\_ha

humidity\_prct

wintergerst

harvest\_area\_ha

production\_t

no\_harvest\_area\_ha

humidity\_prct

zomergerst

harvest\_area\_ha

production\_t

no\_harvest\_area\_ha

humidity\_prct

rogge

harvest\_area\_ha

production\_t

no\_harvest\_area\_ha

humidity\_prct

**Farmers didn't recognise these totals**

▼ calculated\_crops:

▼ winter\_wheat:

harvest\_area\_ha: 70

production\_t: 700

no\_harvest\_area\_ha: 5

humidity\_prct: 5

▼ rye:

harvest\_area\_ha: 4

production\_t: 40

no\_harvest\_area\_ha: 1

humidity\_prct: 5

▶ corn: {...}

▶ seed\_onion: {...}

led

Calculated answers by  
Data Collection Microservice  
(JSON output)



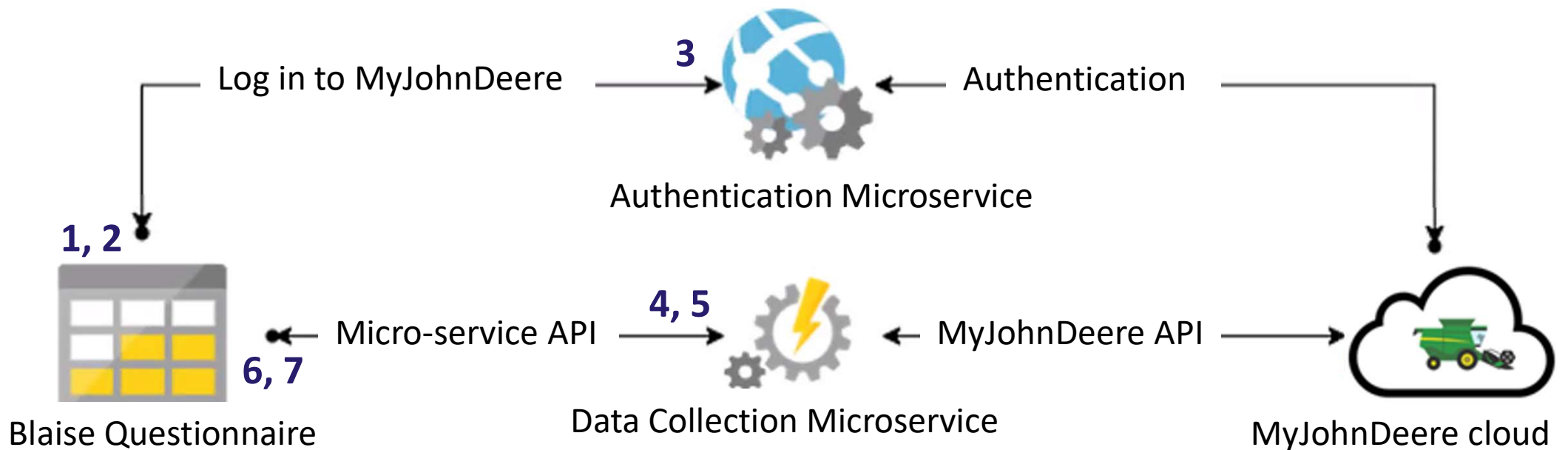
## Pre-test results

~~Assumption:  
the data in MyJohnDeere  
are correct!~~

- Data quality issues:
  - Farmers indicated that data in “MyJohnDeere” may not be correct:
    - not calibrated (sensor calibration)
    - data in MyJohnDeere cannot be edited
    - MyJohnDeere is not designed to be a Farm Management Information System; primary purpose is for machine maintenance
    - Farmers used their FMIS to check the data (Dacom & AgroVision)
  - Missing data:
    - Crops harvested with machines not connected to MyJohnDeere: JohnDeere tractors, other brands
    - Crops harvested by contractors
  - Unit issues:
    - Data from neighbours: helping out
  - Selectivity:
    - Market share (small; FMIS: 50% of arable farmers) and take-up rate



# The implemented system pre-tested



## The farmer's completion process:

1. Farmer logs in to Q
2. MyJohnDeere?
3. Authentication  
Import data?
4. Blaise Q <-> Microservice <-> John Deere
5. Data are pre-filled
6. Check, edit, and add
7. Submit

## Crop Yield Survey 2022

Due date: 1-1-2023

Company name 1  
Contact person 1  
Respondent number 1

### Winter wheat estimates

#### Production data from 2021

- Please complete all answer fields and make an estimation if necessary. Enter a 0 in the fields that are not applicable.  
- Round up area questions to two decimal places and other questions to one decimal place.

#### Harvested area of winter wheat

Indicate the total area harvested or to be harvested.

70,00 ha

#### Total winter wheat

Indicate the total gross weight of all the crops harvested or to be harvested.  
The weight of the crop left in the field should not be included.

700,00 ton

#### Yield per hectare

##### The yield per hectare seems improbable

Please correct your answer on the total grain corn yield.  
Please provide an short explanation otherwise.

10,00 ton/ha

#### Percentage moisture content

5,0 %

#### Area not harvested

Area with crop that has not been or will not be harvested.

5,00 ha

Back

Next

3. Authentication  
Import data?

6. Check, edit,  
7. Submit

ion

API



MyJohnDeere cloud

## Crop Yield Survey 2022

Due date: 1-1-2023

Company name 1  
Contact person 1  
Respondent number 1

### Submission

This is the end of the questionnaire. Press the "Submit" button to submit the answers to Statistics Netherlands.

Back

Submit

# Pre-test results

- Perceived workload:
  - “This doesn’t make it easier.”
  - “This doesn’t reduce the time I need compared to completing the questionnaire in the usual way.”
- Trust:
  - Trust in the government
    - Farmers don’t trust the government with their data: data are NOT shared
  - Trust in the system
    - Safe and secure data communication
    - Farmers are unaware of safety measures being taken: penetration test (to find leaks, prevent hacking)



# Pre-test results

## General conclusions:

- General attitude:
  - These farmers were positive about the S2S approach
  - It could work, but improvements are needed to make it work in practice
- Selective group of farmers:
  - Innovative farmers
  - Positive attitude towards data and innovations
  - They are the early adopters!
- “Use FMIS systems instead”: better source to connect to!



# Conclusions

- Go/No-Go decision:  
not implemented in the Crop Yield Survey
  - Too many issue: the risks of failure weres too high.  
This operationalisation was not efficient for farmers
  - Low market share and low take-up rate
  - Production issues for this operationlisation of the methodology:  
maintainability, scalability, and costs were not met, compared to  
the assets
  - No time / resources for improvements
- Still: we have a working proof-of-concept

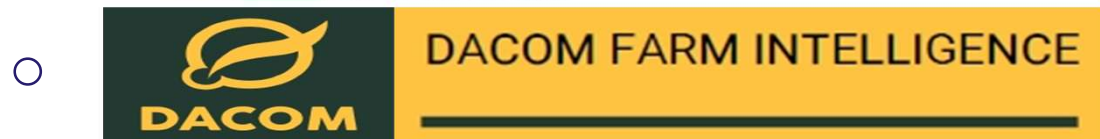
This was  
the goal of this  
project



## Next step

### Farm Management Information Systems (FMIS):

- Two most-used systems in Netherlands:



- 35-55% of farmers:
  - Crop Yield Survey: AgroVision 21%, Dacom 5%, other 7% of farmers
  - Annual Agricultural Counts: 56% of all farmers use a FMIS
  - 45% of fields with the largest crops is registered in AgroVision
- Next project: connect to these systems  
> **positive business case!**

