



System-to-System Data Collection in business surveys applied to an agricultural survey: a Proof of Concept

2022 UNECE Expert Meeting on Statistical Data Collection ‘Towards a New Normal?’, 26-28 October 2022, ISTAT, Rome

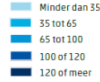
Ger Snijkers, José Gómez Pérez, and Tim de Jong (Statistics Netherlands)
27 October 2022

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

General idea

4.4.1 Fosfaatproductie in dierlijke mest per landbouwgebied in 2016

kg fosfaat per ha



Pre-filling:
How to make
this work?

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

Pilot with
JOHN DEERE



7h1 Vaste mest: werkresultaat mesttoediening			
Geef per werkresultaat het percentage vaste mest aan op bouwland en grasland.		% van totaal toegesende vaste mest op grasland	% van totaal toegesende vaste mest op onbebouwd bouwland
Bouwland	bewegingsgrond, daarna ondergewerkt	n.v.t.	
Grasland en bouwland	mest ligt verdeeld over perceel na bewegingsgronden toedienen		
Totaal			

7h2 Drijfmet: werkresultaat mesttoediening			
Geef per werkresultaat het percentage drijfmet aan op bouwland en grasland.		% van totaal toegesende drijfmet op grasland	% van totaal toegesende drijfmet op bouwland
Bouwland	bouwländjektour, d.m.v. injectoren direct in de grond gebracht	n.v.t.	
Grasland en bouwland	de mest ligt verdeeld over het perceel zoals bij breedwielbewerking op bewegingsgronden ondergewerkt		
Grasland	de mest ligt op de grond in strookjes zoals bij juist gebruik van een sleepvoetmachine of bij gebruik van een sleepfouder of zodenbester die geen sleepje maakt of niet snijdt		
Grasland	de mest ligt gedeeltelijk in strookjes in de grond en gedeeltelijk op de grond zoals bij gebruik van een sleepfouder of bij onderwerken met een zodenbester		
Grasland en bouwland	de mest is geheel in de grond gebracht in strookjes zoals bij juist gebruik van een zodenbester		
Totaal			

Pre fill



Technoboer
heeft de
toekomst:

200+ registries

Techno farmer has the future

Smart industries
Smart farming



©John Deere

MyJohnDeere data



- Data: operations per fields
- Almost 100% overlap with data in questionnaire Crop Yield

A Crop yield survey

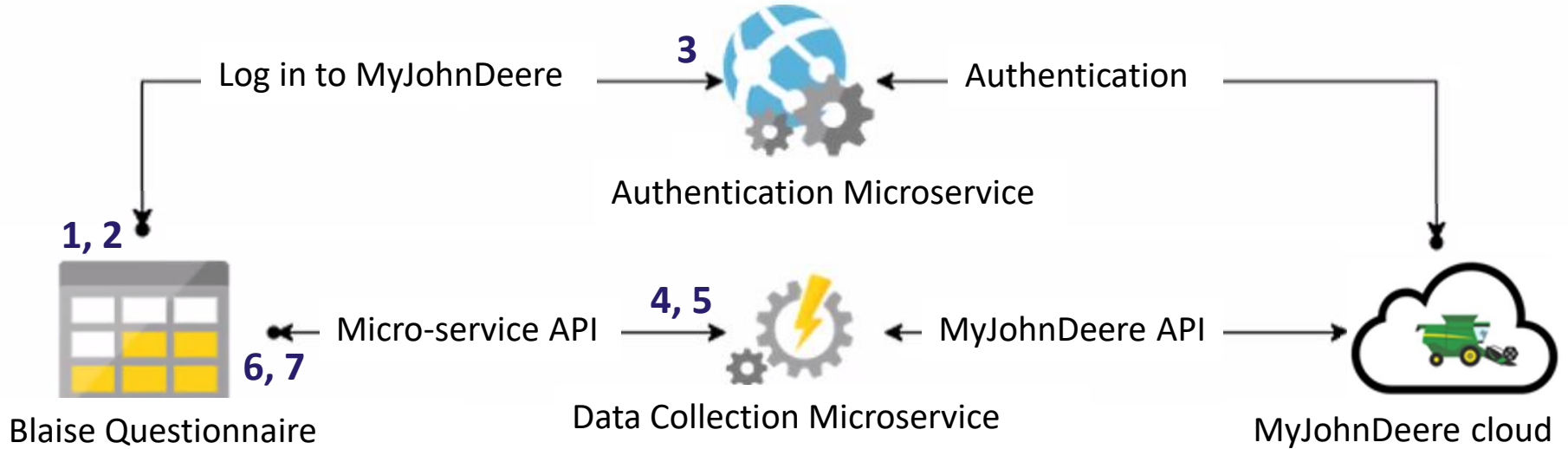
	Yield			Crop failure
	Harvested area	Total yield	Moisture content	Area not harvested
A1 Grains	hectare	Tons	Percentage	hectare
Winter wheat	<input type="text"/>	<input type="text"/>	<input type="text"/> %	<input type="text"/>
Summer wheat	<input type="text"/>	<input type="text"/>	<input type="text"/> %	<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_prCNT: 5
- ▼ **rye:**
 - harvest_area_ha: 4
 - production_t: 40
 - no_harvest_area_ha: 1
 - humidity_prCNT: 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
- } Automation



System-to-system

1



Blaise Questionnaire

The farmer's completion process:

1. Farmer logs in to Q

The screenshots show the following steps:

- Log in:** The user enters the username '123456' and a password (represented by dots).
- Oogstraming Akkerbouw 2021:** The user is prompted to fill in the questionnaire for the year 2021. The form includes fields for 'Invullen voor: 1-1-2022', 'Bedrijfsnaam 1', 'Contact persoon 1', and 'Correspondentienummer:'.
- Welkom bij de vragenlijst:** A welcome message for the questionnaire.
- Oogstraming 2021:** The first question asks: 'Heeft u in seizoen 2021 akkerbouwgewassen geoogst of gaat u deze nog oogsten?' (Did you harvest or plan to harvest arable crops in the 2021 season?). The user has selected 'Ja' (Yes).

Navigation buttons 'Vorige' (Previous) and 'Volgende' (Next) are visible at the bottom of the questionnaire screen.

System-to-system data communication

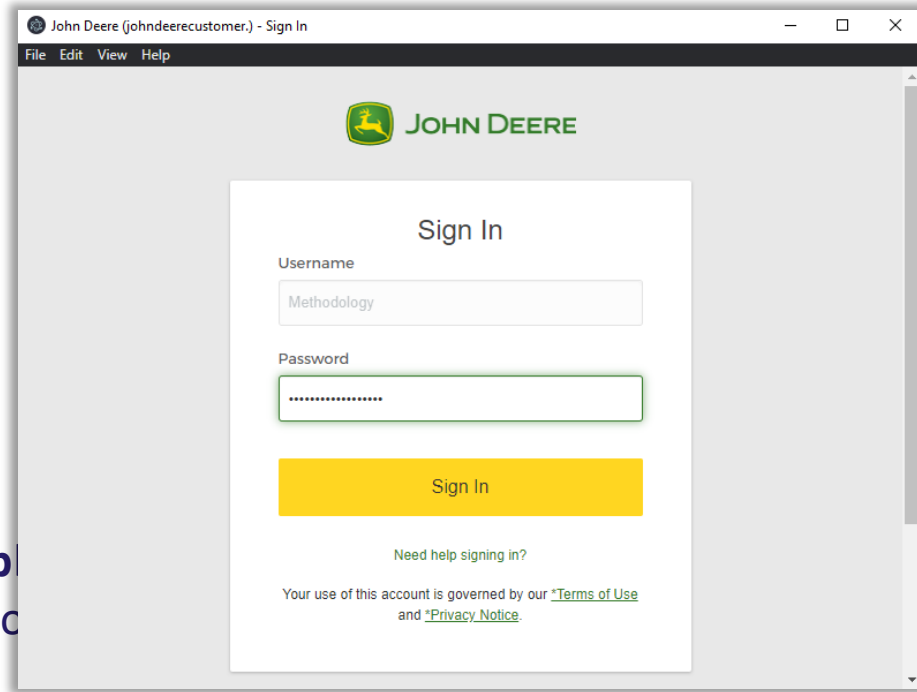
1, 2



Blaise Questionnaire

The farmer's computer

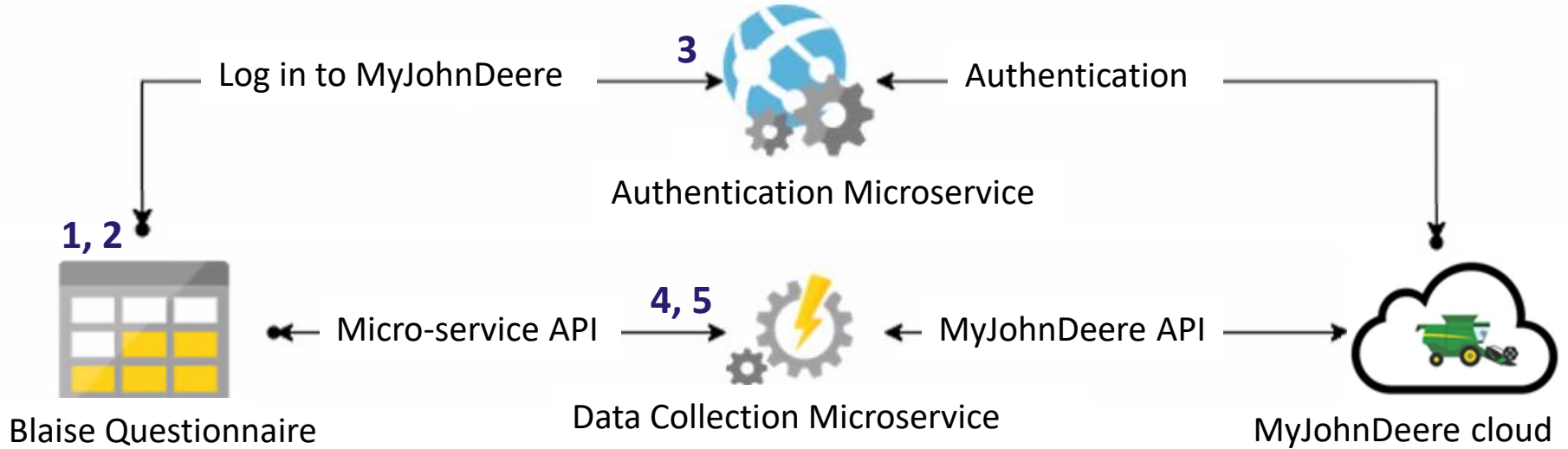
1. Farmer logs in to
2. MyJohnDeere?



MyJohnDeere cloud



System-to-system data communication



The farmer's completion process:

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



Data are pre-filled into Q

Calculated answers by Data Collection Microservice
(JSON output)

```
▼ 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: {...}
```

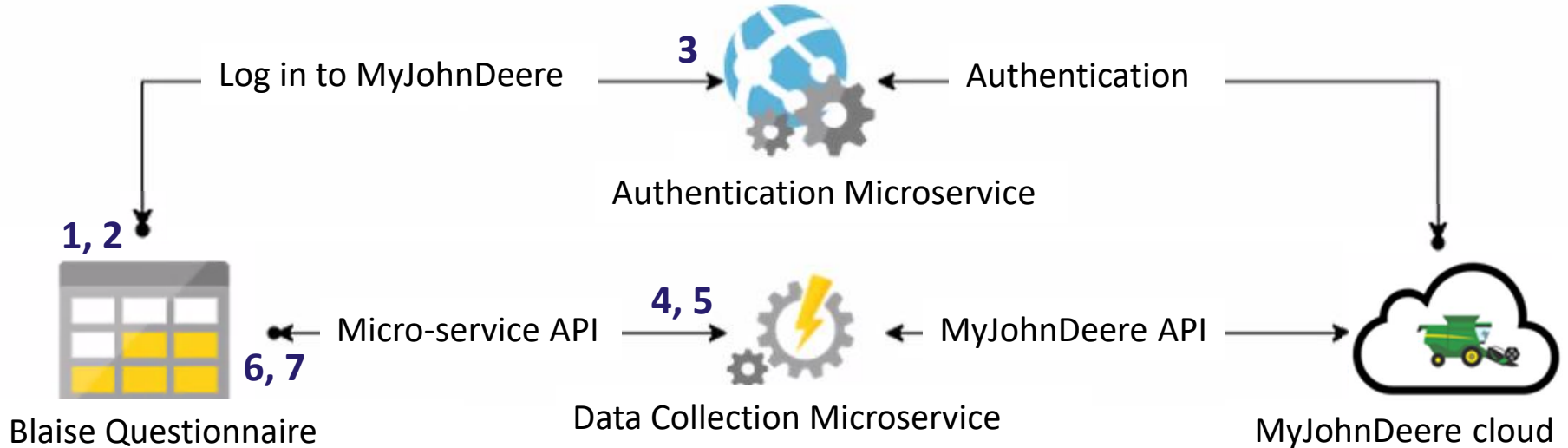
A Crop yield survey

A1 Grains

	Yield			Crop failure
	Harvested area	Total yield	Moisture content	Area not harvested
	hectare	Tons	Percentage	hectare
Winter wheat	<input type="text" value="70,0"/>	<input type="text" value="700,0"/>	<input type="text" value="5,0"/> %	<input type="text" value="5,0"/>
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" value="4,0"/>	<input type="text" value="40,0"/>	<input type="text" value="5,0"/> %	<input type="text" value="1,0"/>
Oats	<input type="text"/>	<input type="text"/>	<input type="text"/> %	<input type="text"/>



System-to-system data communication



The farmer's completion process:

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



Sandbox

It worked!

- Open data from John Deere
- Virtual farm



Research questions

Expected effects:

- Reduced response burden
- Cost reduction
- Real-time statistics
- Better data quality
- More data, more details

Is this the case?

Assumption: JD data are correct!

What do you think?
- Is this a feasible data collection method?
- Experiences?



• How does it work in practice? **Small-scale pilot:**

- Farmers: data from the correct farmers (units), contracted businesses, linking the data (ambiguities), trust, user experience, take-up rate, ...
- Stats NL: legal issues, system adaptations, maintenance, ...
- Script/guidelines for future projects > New vision



Precision farming

- 10-15% van farmers use precision farming techniques

Precision farming technologies penetration in Dutch arable farming (n=233)

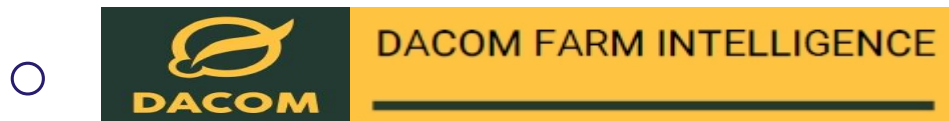
Technology	%
GPS-based steering system	>85
Site-specific crop protection	Almost 19
Crop registration software	Around 50
Business administration software	33
Decision support	30
Variable nitrogen fertilization	12,4
Field maps	14,2
Precision weed removal	4,7
Soil scans	12,4
Moisture sensors	15,5
Sow / Plant / Paw variable	11,6
Crop sensors	8,5
Satellite images	11,6
Drone images	9,5

Source:
Rabobank (2020)



Farm Management Information Systems (FMIS)

- ± 50% of farmers
- Two most-used systems in Netherlands:



- 2nd project: connect to these systems
using S2S data communication

General idea

4.4.1 Fosfaatproductie in dierlijke mest per landbouwgebied in 2016

kg fosfaat per ha

- Minder dan 35
- 35 tot 65
- 65 tot 100
- 100 of 120
- 120 of meer



Oogstraming

0002345678
4567979

Periode: Statistiekjaar

Inhoudstadium: PASARMETER

Controler of referentiecode in het veld van de achtergrond

Correspondentijsnummer: RZ3901 - 123

A Oogstraming akkerbouw 2016

A1	Oogst en productie		Percentage
	Geogrote oppervlakte	Totale productie	
	(ha)	(t/ha)	(%
Grassen met korrelstengels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wintertarwe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Zaairogge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wintertarwe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Zaairogge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rogge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Haver	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Triticale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Korneraad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Pre-fill

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

Pre-filling:
How to make
this work?

FMIS

PoC met
 JOHN DEERE

Technoboer
heeft de
toekomst:

AgroVision
AGRICULTURAL SOFTWARE


DACOM

DACOM FARM INTELLIGENCE

©John Deere

200+
registries

Techno farmer
has the future

Smart industries
Smart farming



