Exploring precision farming data: a valuable new data source? A first orientation

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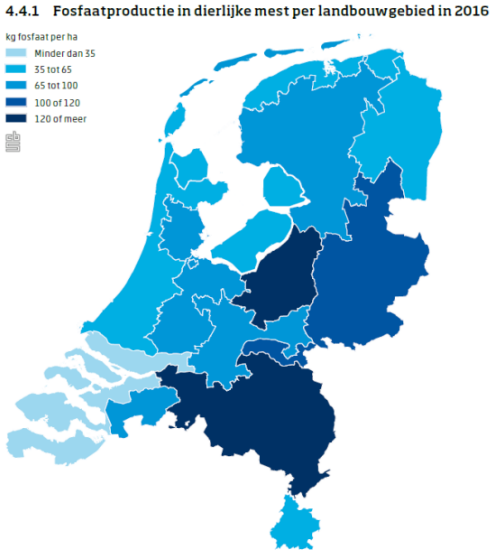
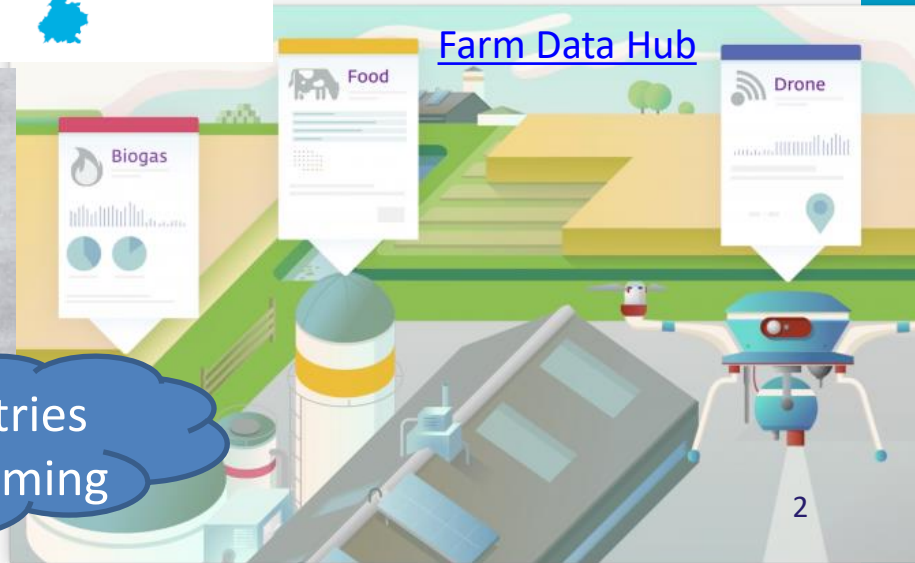
UNECE Workshop on Statistical Data Collection ‘New sources and New technologies’
14-16 October 2019, Geneva, Switzerland

Idea: …



Smart industries
Precision farming



Three research aim: Fitness for use

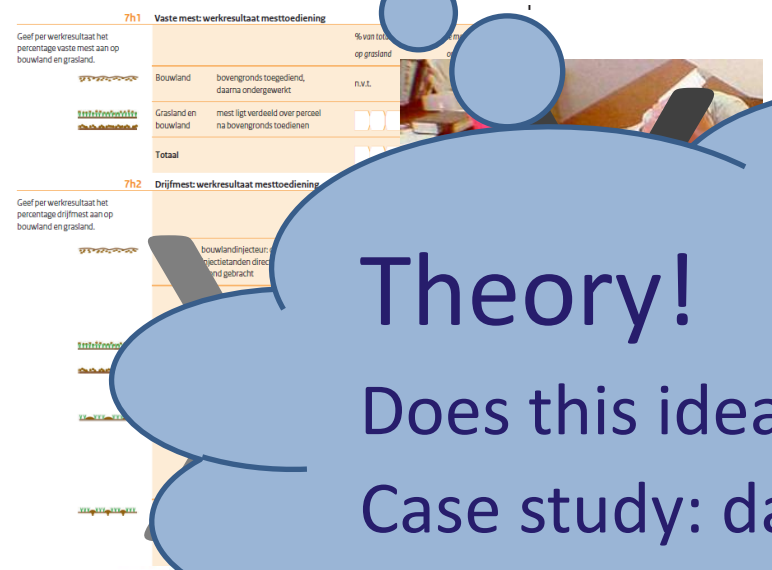
Explore the data with respect to:

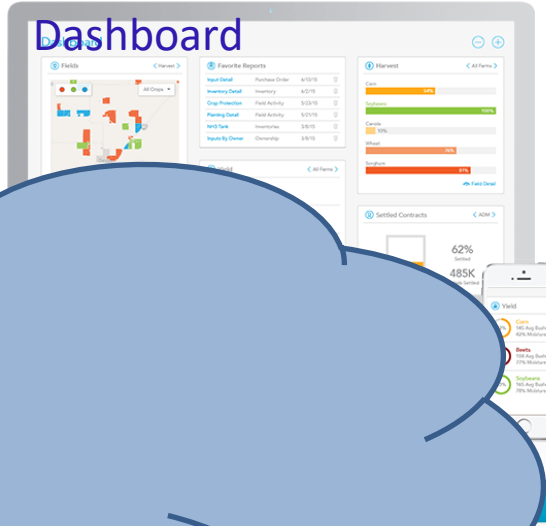
1. overlap with survey questions
   - Which information does CBS require?
   - What data are available in precision farming
   - Challenges

Case study:
one arable farmer

2. Additional data that is not currently asked
   - Can we use these data for new statistics?
3. Closing the data cycle:
   - Identify Key Performing Indicators (KPIs)
   - Dashboarding

Idea: …





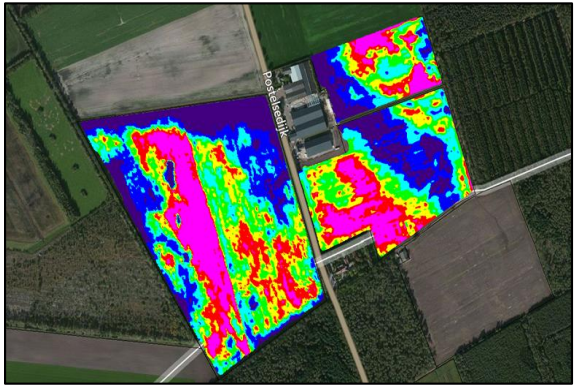
Theory!

Does this idea work in practice?

Case study: data from one arable farmer

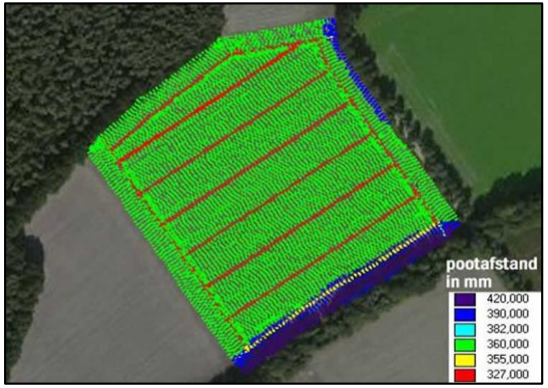
Smart industries
Precision farming

Precision agriculture cycle



Winter

- Draw parcels
- Yield potential
- Tractor lanes

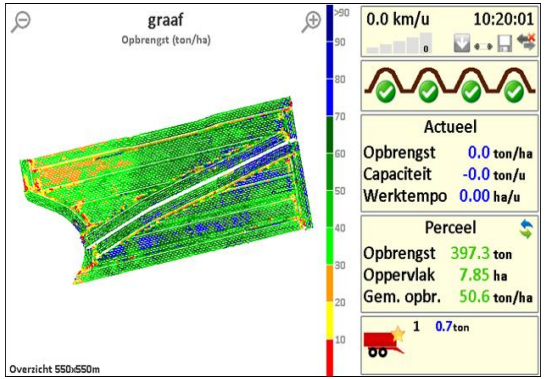


Spring

- Fertilization
- Variable planting

Summer

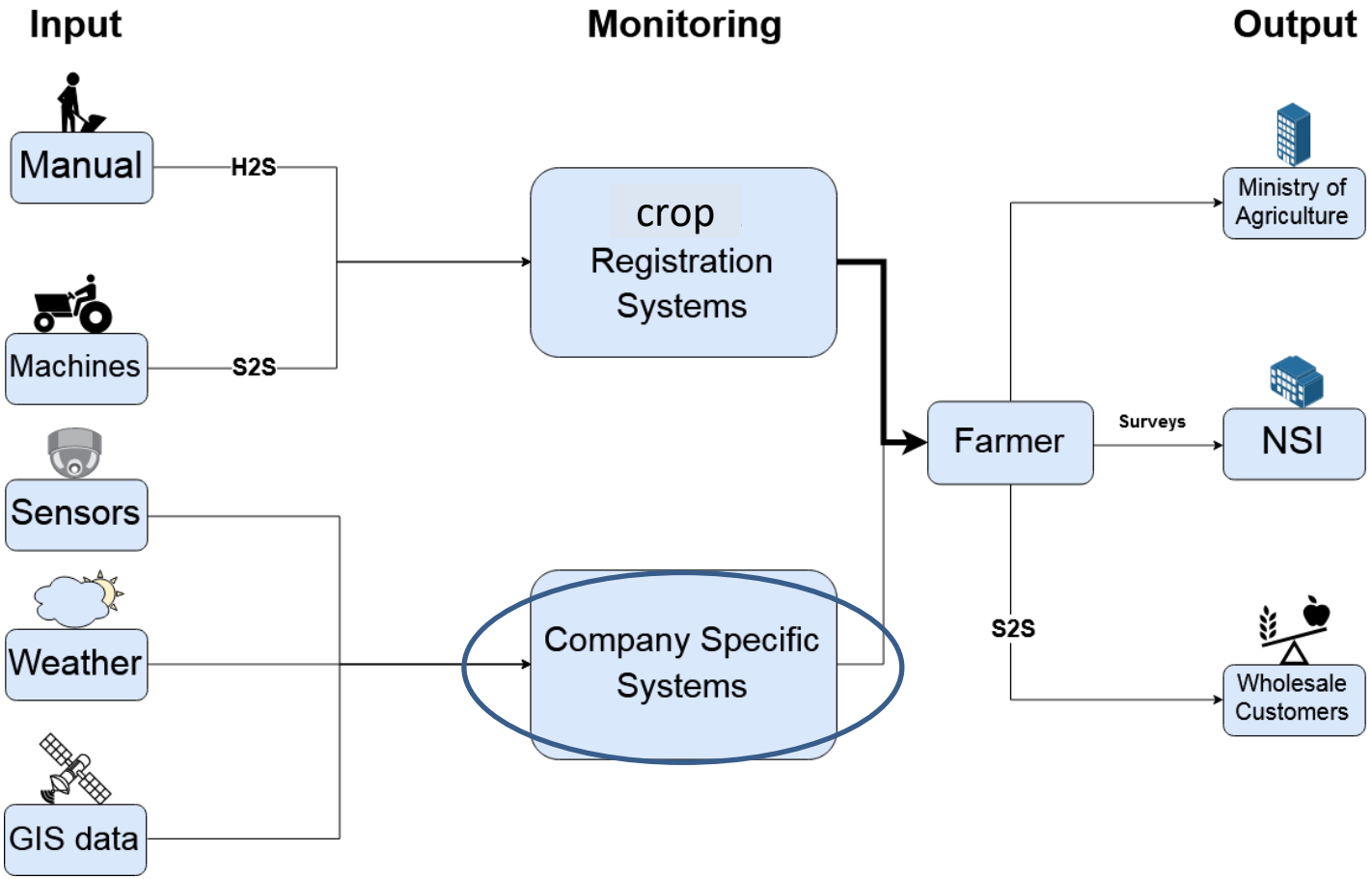
- Additional fertilization, pesticides & water
- Based on sensordata



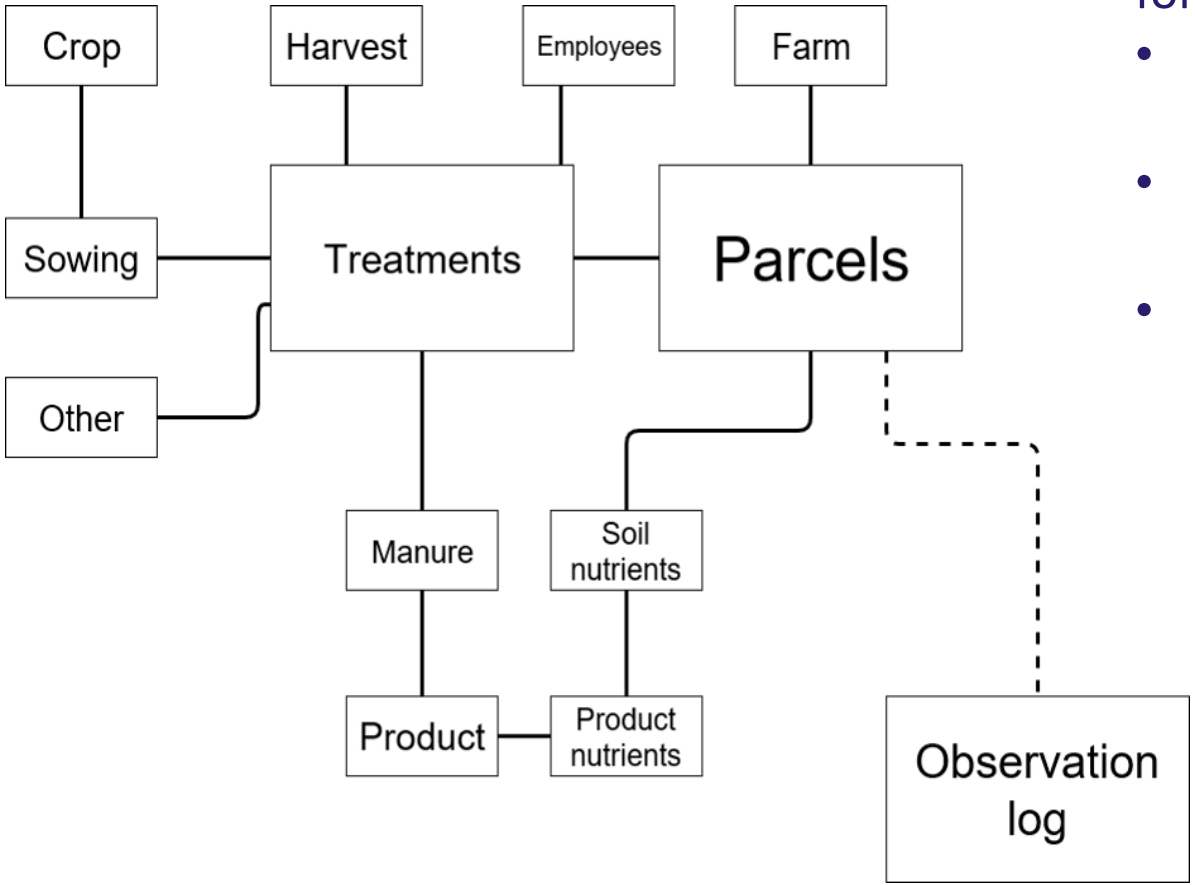
Autumn

- Harvest
- Storage

Farmer's data systems



Company specific system



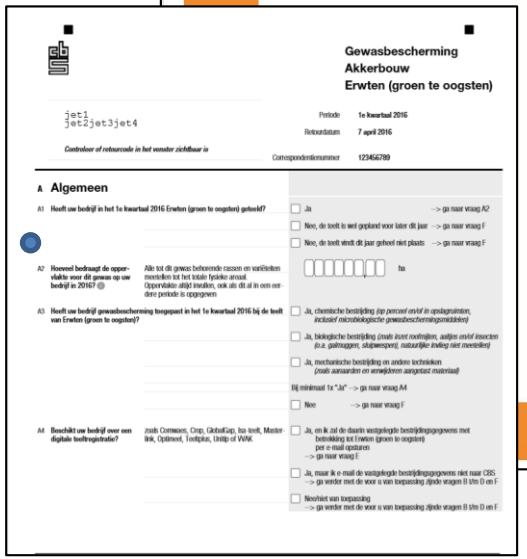
DIPPA: Data Integration System for Precision Farming (TUe)

- Farmer's fields and his actions are central in system
- log contains 26,000 individual observations
- Data on:
  - Parcels: size, crop, soil conditions, treatments, sowing
  - Crops
  - Crop conditions / crop protection / use of pesticides
  - Activities: when, workload

Data asked for in surveys

1. Combined survey (May)
2. Harvest estimate (October)
3. Crop protection (December)
4. Grassland usage (December)

We tried to complete these questionnaires using the farmer's data



Gewasbescherming
Akkerbouw
Erwten (groen te oogsten)

jet1
jet2jet3jet4

Controleer of retourcode in het venster zichtbaar is

Periode 1e kwartaal 2016
Retourdatum 7 april 2016
Correspondentienummer 123456789

A Algemeen

A1 Heeft uw bedrijf in het 1e kwartaal 2016 Erwten (groen te oogsten) geteeld?
☐ Ja --> ga naar vraag A2
☐ Nee, de teelt is wel gepland voor later dit jaar --> ga naar vraag F
☐ Nee, de teelt vindt dit jaar geheel niet plaats --> ga naar vraag F

A2 Hoeveel bedraagt de oppervlakte voor dit gewas op uw bedrijf in 2016? ⓘ
Alle tot dit gewas behorende rassen en variëteiten meetellen tot het totale fysieke areaal. Opperviakte altijd invullen, ook als dit al in een eerdere periode is opgegeven
☐☐☐☐☐☐ ha

A3 Heeft uw bedrijf gewasbescherming toegepast in het 1e kwartaal 2016 bij de teelt van Erwten (groen te oogsten)?
☐ Ja, chemische bestrijding (op perceel en/of in opslagruimte, inclusief microbiologische gewasbeschermingsmiddelen)
☐ Ja, biologische bestrijding (zoals inzet roofmijten, aaltjes en/of insecten (b.v. gaasvliegen), vlaspeperpot, natuurlijke vijand niet meerdelen)
☐ Ja, mechanische bestrijding en andere technieken (zoals aanaarden en verwijderen aangetast materiaal)
Bij minimaal 1x "Ja" --> ga naar vraag A4
☐ Nee --> ga naar vraag F

A4 Beschikt uw bedrijf over een digitale teeltregistratie? zoals Connexes, Crop, GlobalGap, Ita-teelt, Master Mik, Optimod, Teeltplus, Unitip of WAK
☐ Ja, en ik zal de daarin vastgelegde bestrijdingsgegevens met betrekking tot Erwten (groen te oogsten) per e-mail opsturen --> ga naar vraag F
☐ Ja, maar ik e-mail de vastgelegde bestrijdingsgegevens niet naar CBS --> ga verder met de voor u van toepassing zijnde vragen B t/m D en F
☐ Nee/niet van toepassing --> ga verder met de voor u van toepassing zijnde vragen B t/m D en F

Rijksdienst voor Ondernemend Nederland

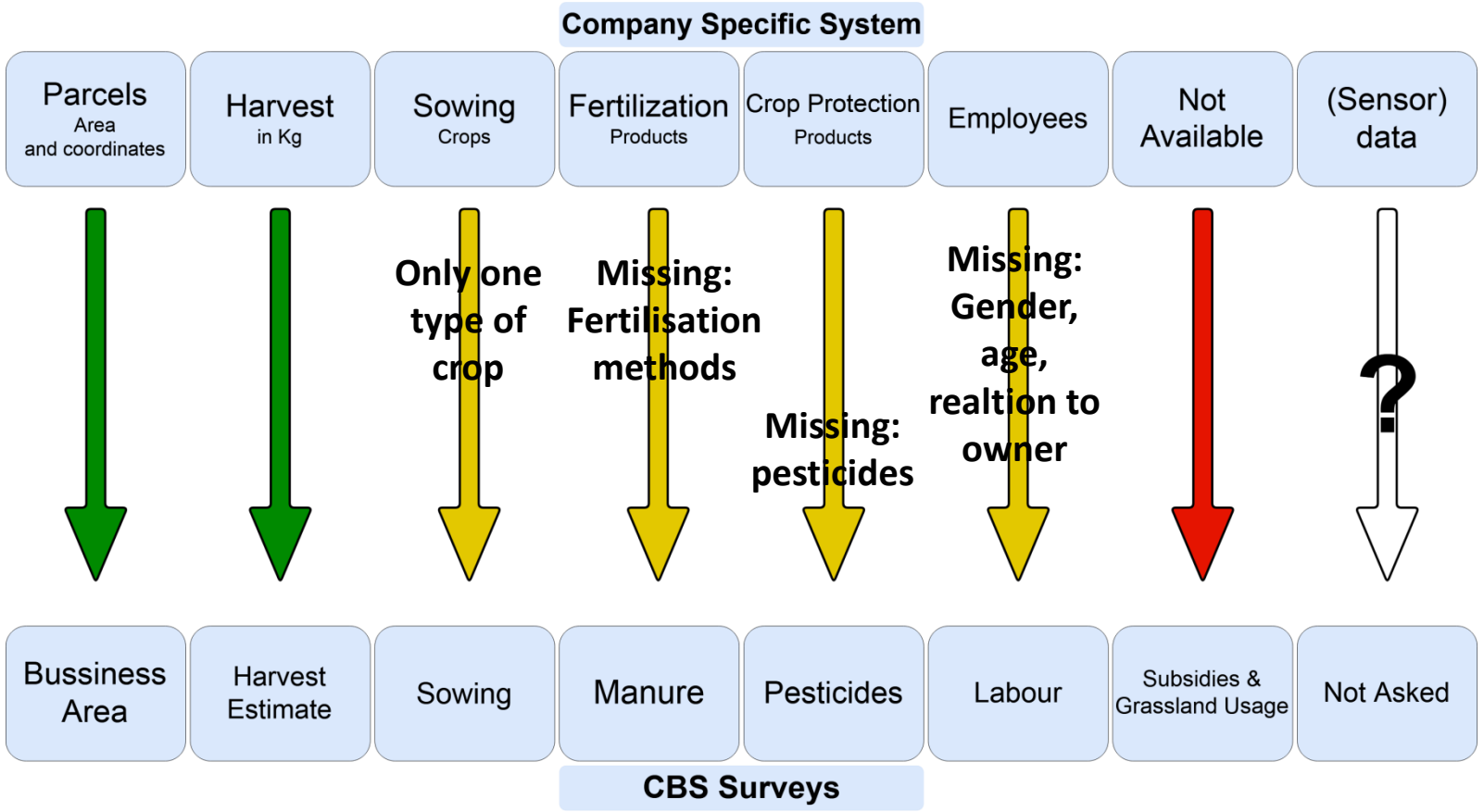
Gecombineerde opgave 2015

- Met de Gecombineerde opgave doet u opgave voor de Landbouwtelling en mestwetgeving.
- Met dit formulier kunt u ook toekenning en uitbetaling van betalingsrechten aanvragen en een aanvraag doen voor subsidies.
- U kunt de opgave ook doen op mijn.rvo.nl. U krijgt dan alleen de vragen die voor u van toepassing zijn en door controles heeft u minder kans op een onvolledige opgave.
- Zorg ervoor dat de Gecombineerde opgave uiterlijk 15 mei 2015 door ons is ontvangen.
- Meer informatie vindt u in de toelichting en op mijn.rvo.nl.
- Of neem telefonisch contact met ons op: 088 042 42 42 (lokaal tarief).

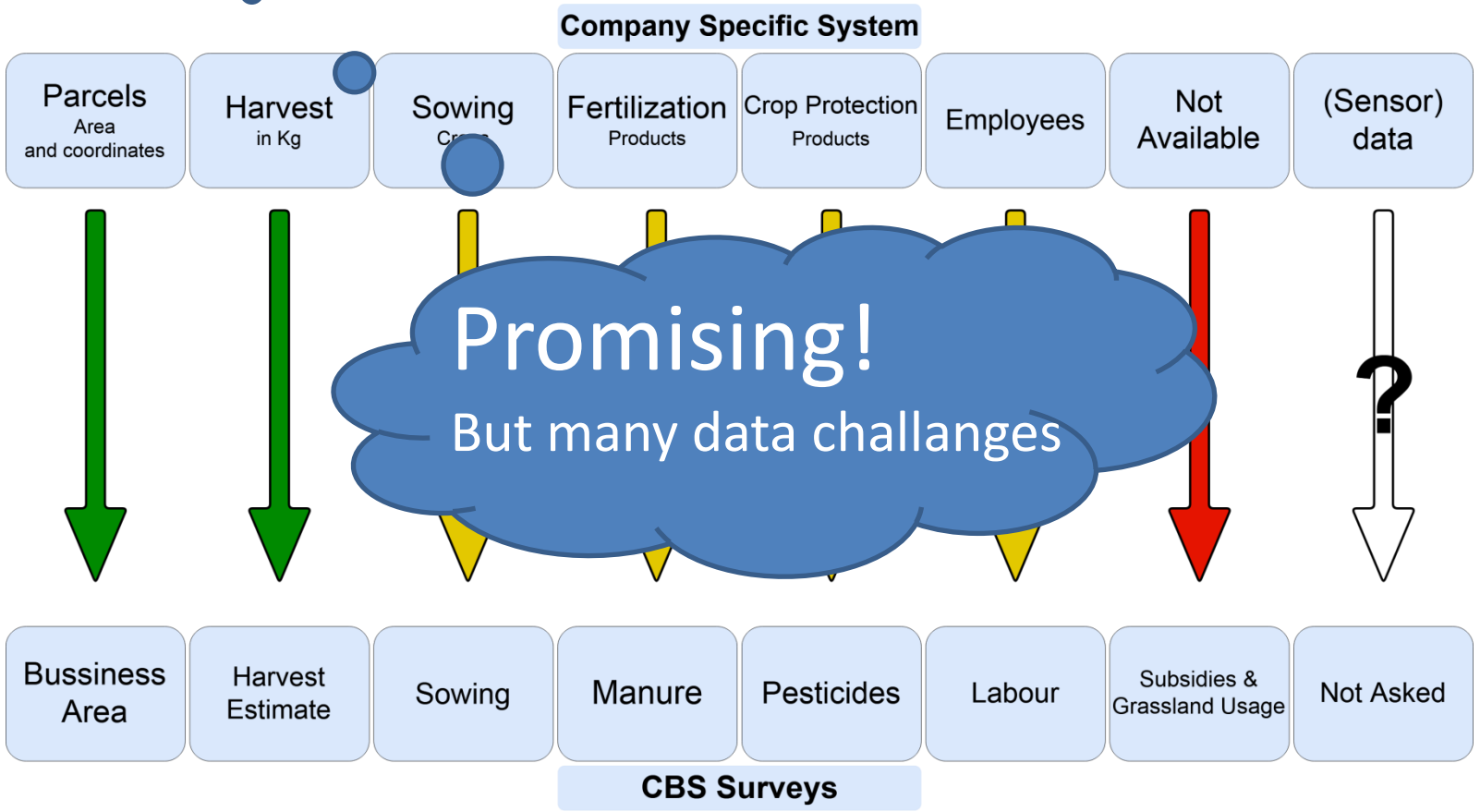
Business area	Harvest (estimate) in kg and ha	Sowing (of winter crops)	Manure	Pesticides	Labour	Subsidies and Grassland

CBS Surveys

Overlap precision farming data / questionnaires



Overlap precision farming data / questionnaires



Data challenges for this database

- Lack of metadata
  - Data definitions not always clear
  - Units of measurement are missing (e.g. Kg, ha, Kg/ha)
  - Limited insight on data generation process
- Different data formats
  - Datum, variable names etc.
- Wrong values
  - Freezing temperatures in Augustus
  - Fields in Kazakhstan
- Outliers
- Missings

Metadata is important: code/data book!

Data inspection and data cleaning

Data challenges as input for official statistics

‘Fitness for use’ issues:

- Privacy, security, data ownership, data sharing:
  - Trust!
  - Getting access to the data: Who owns the data? Data collection method?
- Quality issues:
  - Sensors as measurement instrument: valid measurements, variance
  - Relevance of the data: correlation with statistical concepts?
  - Unit issue: are the data about the correct unit (fields in Belgium)?
- Ubiquity & standardisation of systems (interoperability):
  - Market penetration: Is the data widespread available in the sector?
  - Interoperability: interface standardisation between systems
- Data Harmonisation:
  - Join data from multiple farmers/sensors into one coherent database?
- Stability of (meta)data delivery in the future

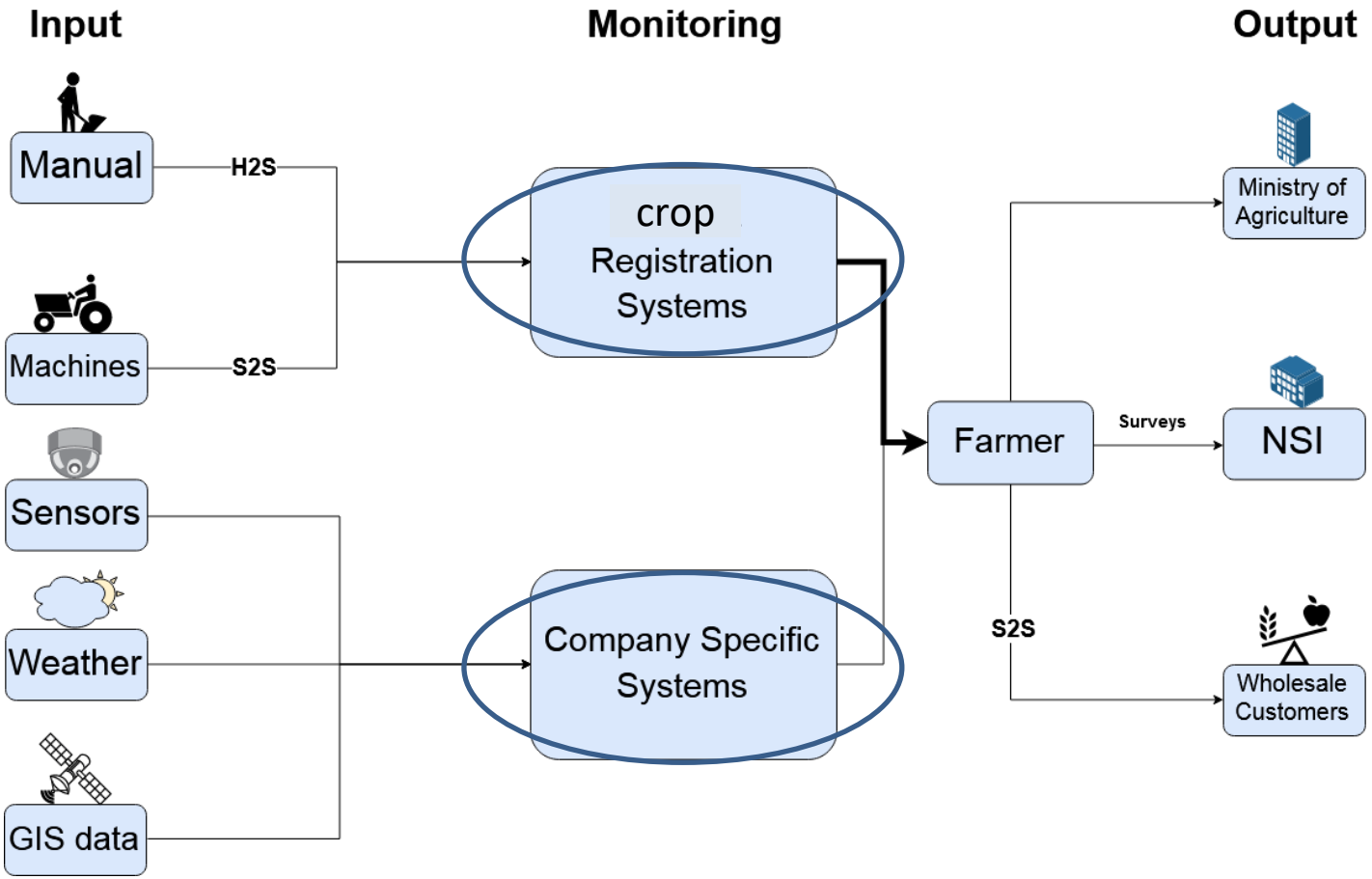
Conclusion:
Are (these) sensor data a valuable new source?

Yes, valuable and promising, but still a long way to go …

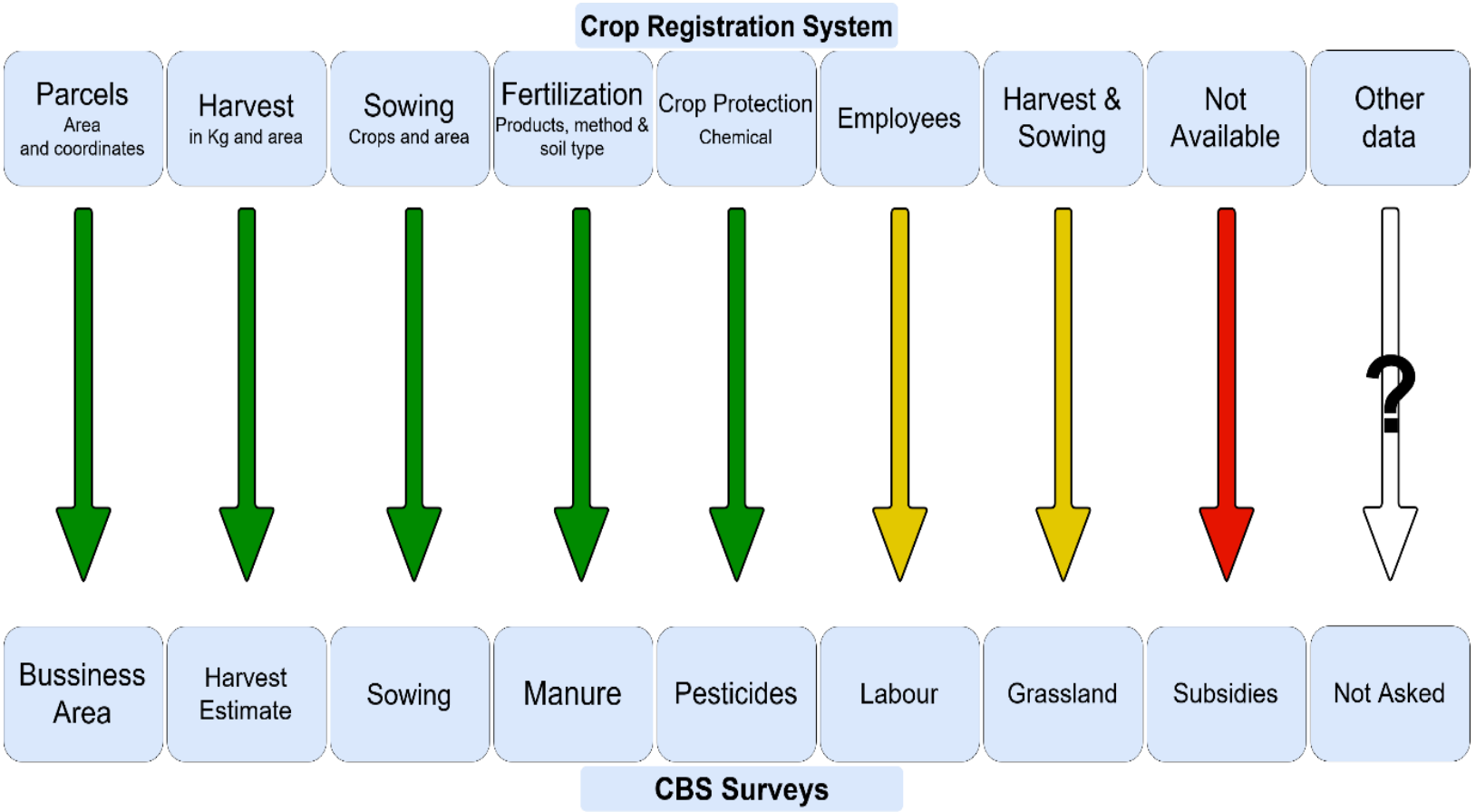
- 'Fitness for use' issues:
  Combination of primary data and secondary data characteristics:
  - NSIs are not in control of the data: found data vs. designed data
  - Similarities with admin data
  - Market penetration and accessing the data
- Developments are going quickly:
  - We need to be involved now!
  - More studies are needed
- Short term: crop registration systems

Developments and Experiences in other countries?

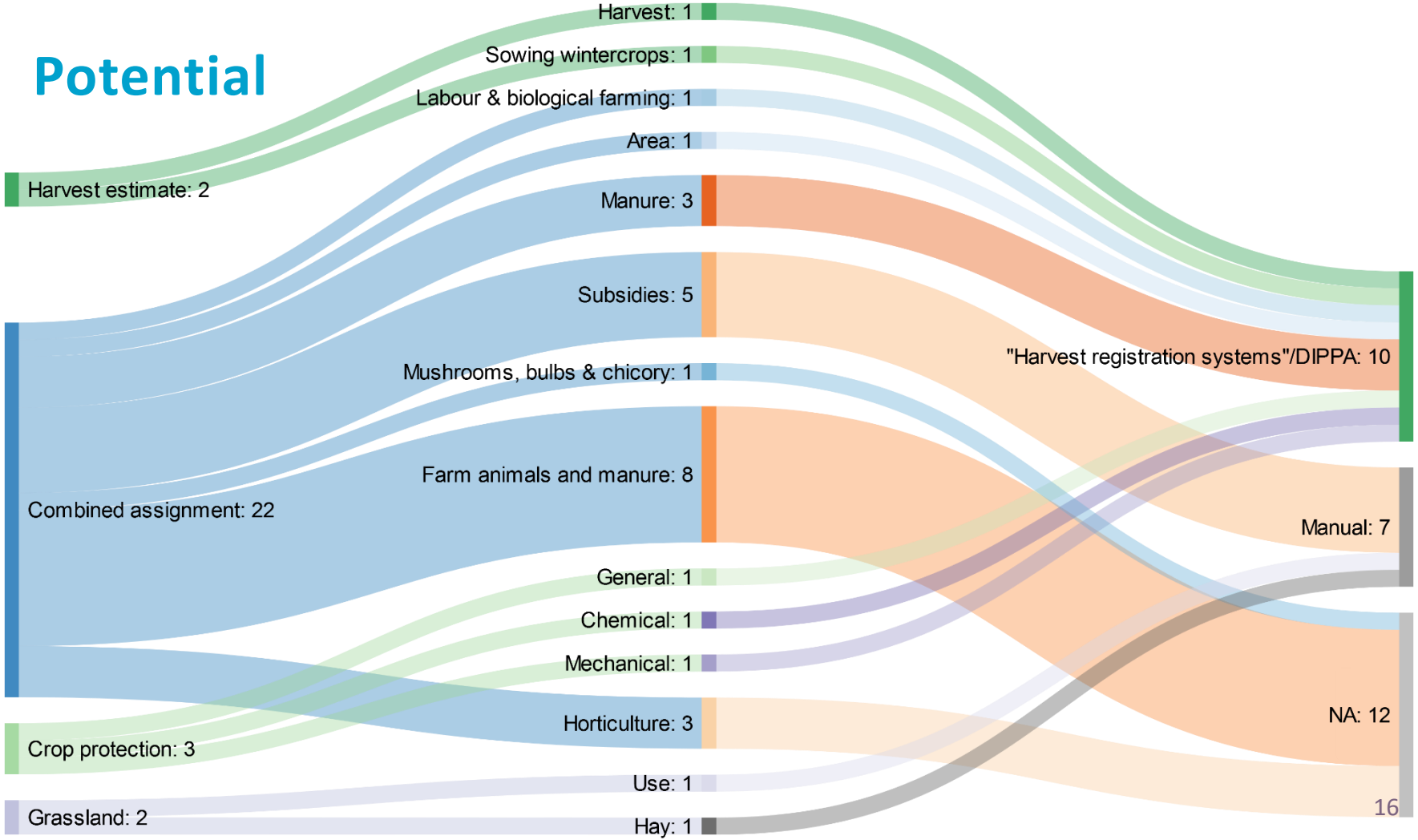
Farmer's data systems



Overlap crop registration system / questionnaires



Potential


Harvest: 1
Sowing wintercrops: 1
Labour & biological farming: 1
Area: 1
Harvest estimate: 2
Manure: 3
Subsidies: 5
"Harvest registration systems"/DIPPA: 10
Mushrooms, bulbs & chicory: 1
Farm animals and manure: 8
Combined assignment: 22
Manual: 7
General: 1
Chemical: 1
Mechanical: 1
NA: 12
Horticulture: 3
Crop protection: 3
Use: 1
Grassland: 2
Hay: 1

рахмат
danke
謝謝
ngiyabonga
teşekkür ederim
Баярлалаа
спасибо
faafetai lava
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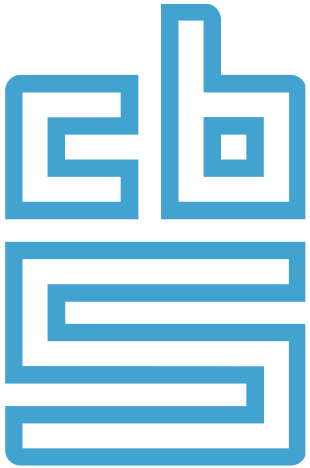
merci

ARE THERE ANY QUESTIONS? FEEL FREE TO ASK ANY-THING AT ALL.



Facts that matter