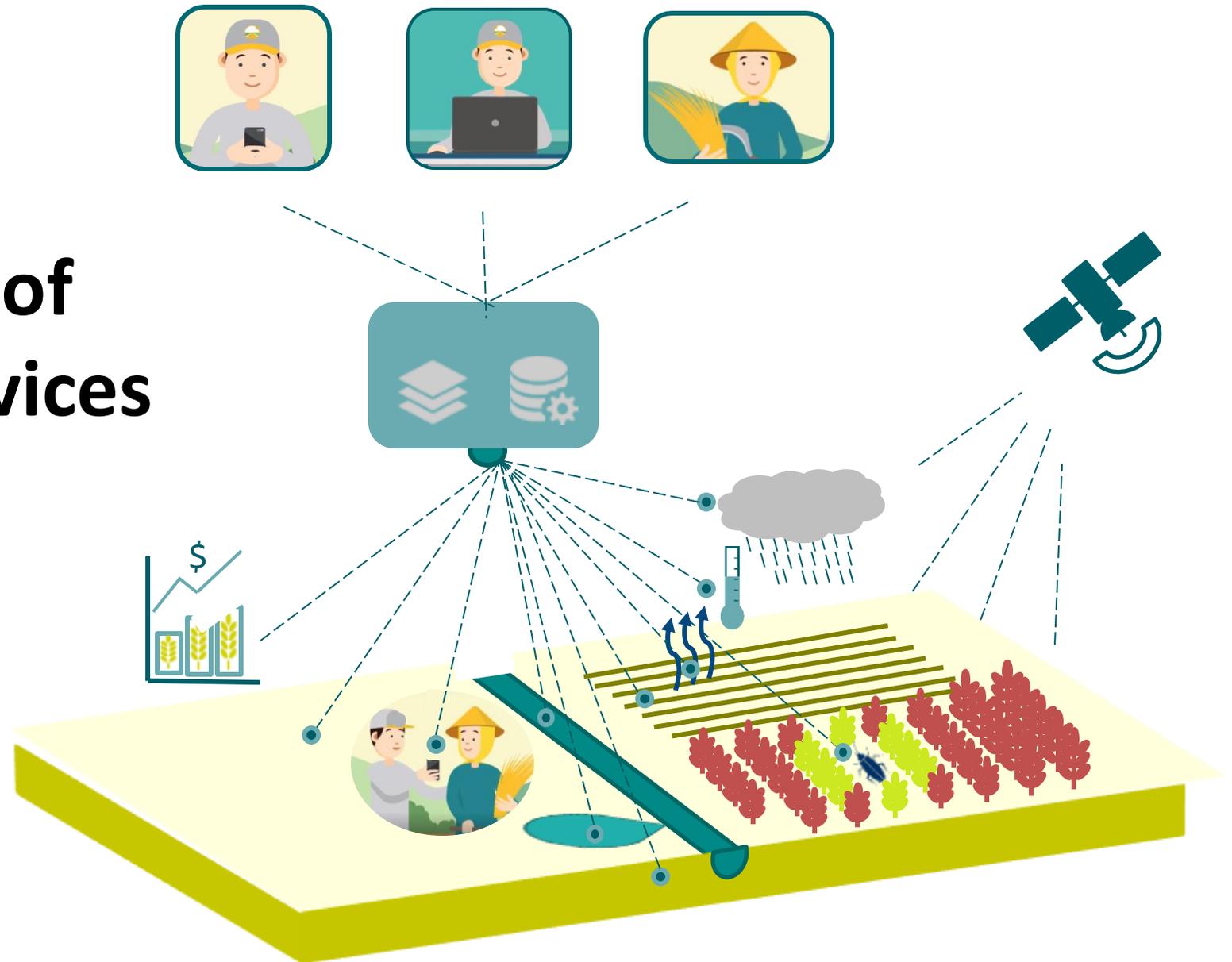


# The role and use of IT and digital services for agriculture

Fons Nelen

Nelen & Schuurmans





# The end-user wants support, to make the right decision (1)

***Farmer: What action can I take ? (at this moment on my farm)***



- › What is the best time to seed and to harvest?
- › How to choose the right crops?
- › How to reduce inputs (chemicals, seeds)?
- › How to reduce operational costs? (energy, manpower, equipment)
- › How to save water?
- › How to improve agricultural practices?
- › How to increase profits?
- › When and where to sell the products?
- › How to get a good loan?
- › What are the present market prices  
etc.





## The end-user wants support, to make the right decision (2)

***Agribusiness Firms: How to improve business?***

***(using geodata, field data, monitoring data, farmer information, etc)***



- › How to optimize logistics?
  - › How to improve sales?
  - › How to reduce operational costs? (energy, manpower, equipment)
  - › What yields are expected?
  - › What are the needs of my suppliers (the farmers)
  - › How to save water? How to reduce waste?
  - › When and where to sell the products?
  - › How to increase profits?
- etc.





# All users of information services want “Actionable App’s”



For this, insight is required in:

- User needs  
*Why and What ?*
- User engagement  
*How is it used ?*
- Added value of the service  
or application  
*How is it paid?*





# It's all about informed decision making (using IT)



It is not easy, because we are dealing with:

- various users / user groups (with different needs)
- many data sources
- different types of data
- use of different models (forecasts)
- large amounts of data, that needs to be processed very fast (in real time)
- various systems that need to communicate
- etc

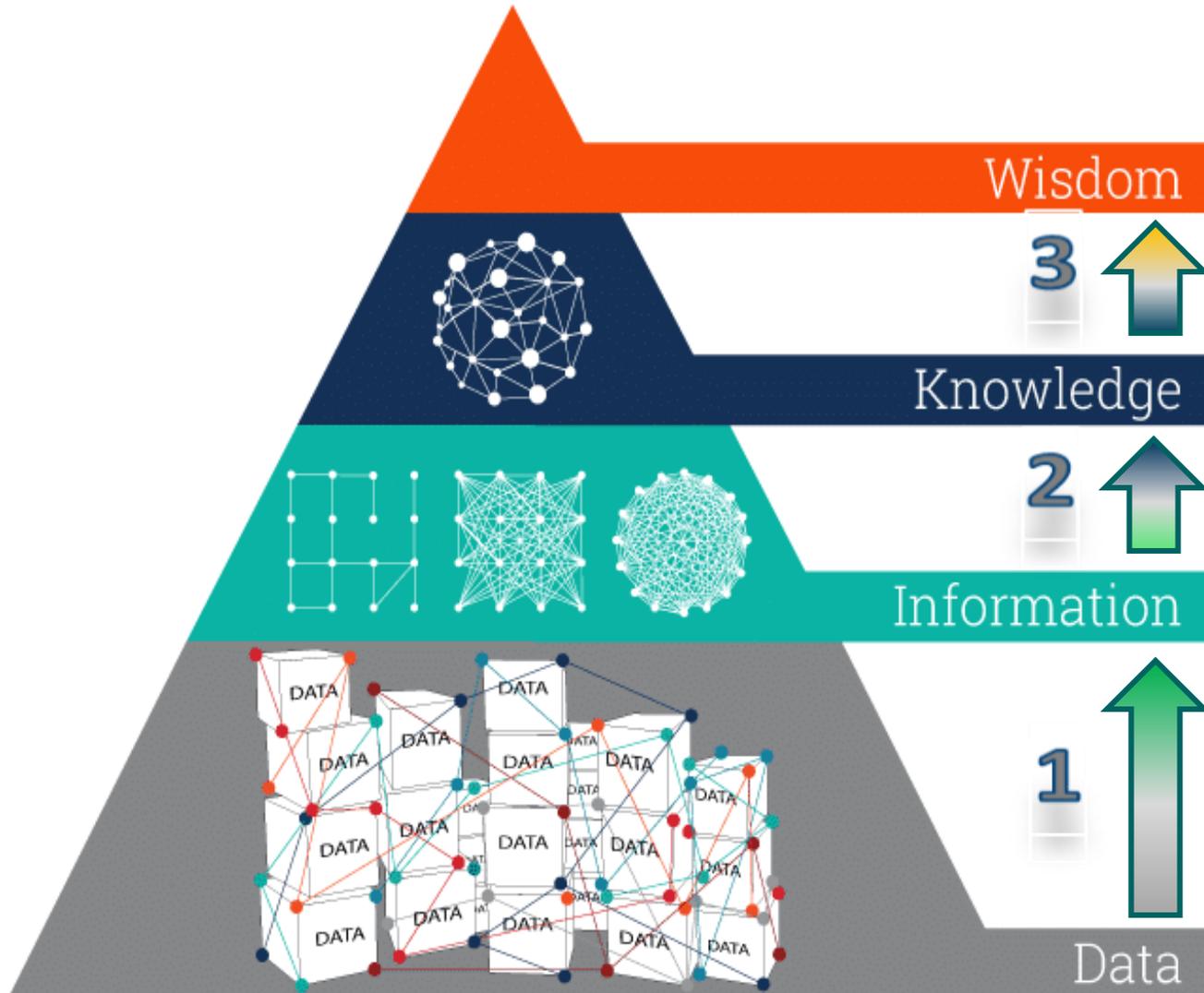
## How to organize this?





# From data to wise decisions

## 3 interrelated processes



### Insight (“wise decisions”)

*Eg.: This is the best moment to harvest  
This level also requires domain knowledge*

### Understanding (= information in context)

*Eg.: we can expect flooding; droughts; risks for pest and diseases; prices will raise; etc.*

### Interpretation

*Eg. precipitation, evaporation, land use, soil moisture, DEM, assets, crops, change detection, deformation, vegetation-index, water levels, flows, salinity, market prices, etc*

*facts, figures, observations  
numbers, bites, colours, dollars, etc*





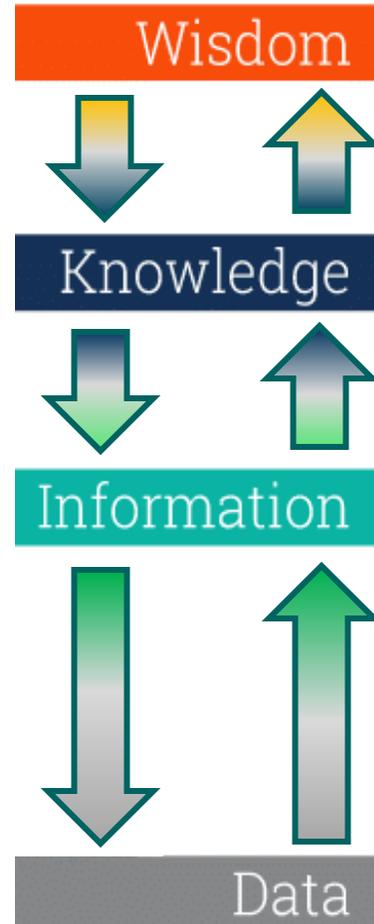
# From data to wise decisions

# iterative process

What decisions would we like make, and what knowledge and information is necessary ?



What data do we need?



What decisions can be made, based on the available knowledge and information ?



What data do we have?





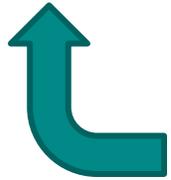


# Information Chain: 3 different types of IT companies

user needs



data



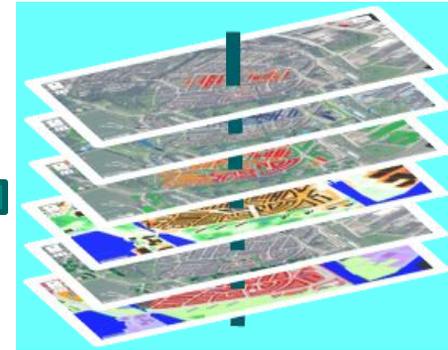
3 application



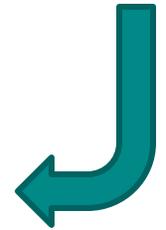
insight & understanding



organized information



useful information



1 processing





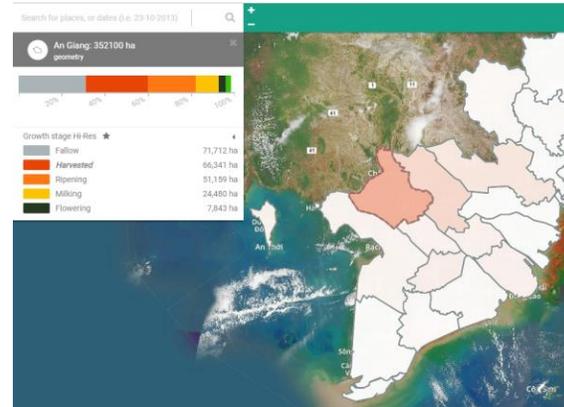
# Different IT partners are involved



3. Application Developers;  
Agricultural and Financial Experts

2. System Integration;  
Data Science;  
Modellers;

1. EO experts, Data Providers;  
Monitoring Systems;  
Information products



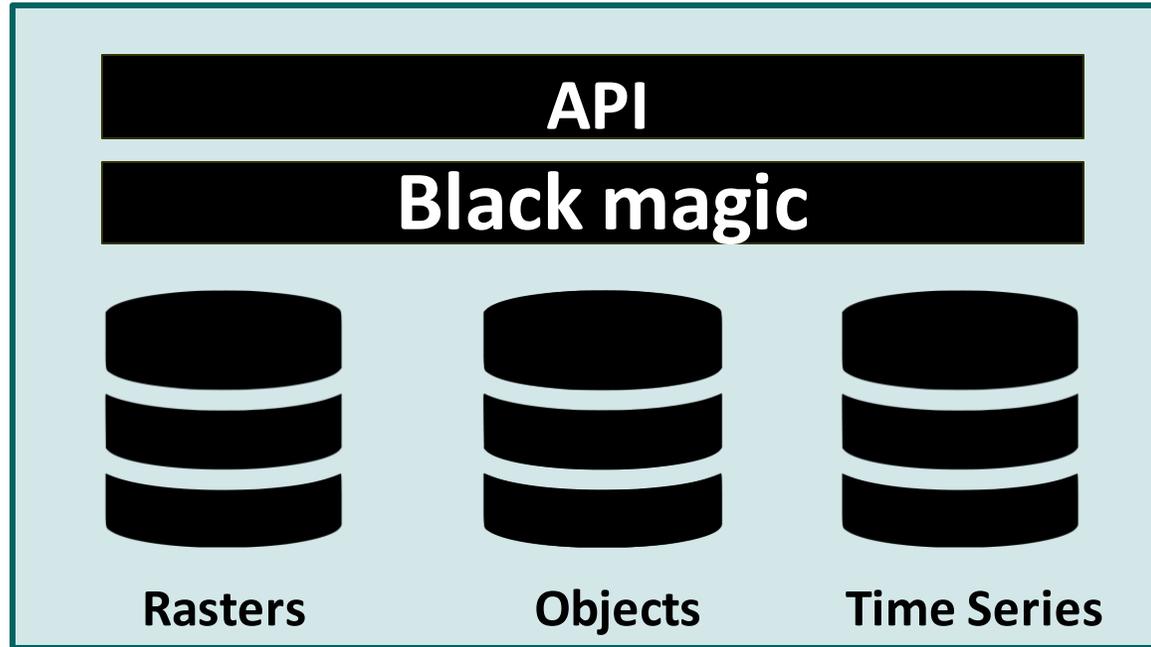
Rainfall  
Evaporation  
Terrain data  
Elevation (DEM)  
Vegetation  
Biomass  
Objects  
Soil moisture  
Groundwater  
Sea (tide)

Water levels  
Water availability  
Water quality par.  
Flows  
Agricultural inputs  
Production figures  
Market Prices  
etc.  
etc.





# System Integration



Data  
Analyst



Data  
Analyst



Data  
Analyst



Data  
provider

Data  
provider

Data  
provider

Data  
provider





## Some technical challenges

- › Collaboration between the IT partners  
(partnership agreement; project management; different business models)
- › System Architecture (various separate components)
- › Operation and maintenance (hosting, updates, bug fixing, 1<sup>st</sup> line support)
- › New releases of various components of the service; updates
- › Data quality, data ownership, data sharing ! (willingness is not great)
- › In G4AW, only one or two data providers ?
- › Number of users





## Other challenges

- › User needs and user demands (extra features)
- › User engagement (how and how often is the service used)
- › Training and capacity building
- › Implementation of the service (local expertise; legal restrictions; confidentiality)
- › Marketing
- › Operational costs (IT is considered expensive)
- › Return on investment (who pays for the service ?)
  
- › **Added value of the service and a good business case !  
(which user is able and willing to pay ?)**





## Example: Rice Production in the Mekong Delta

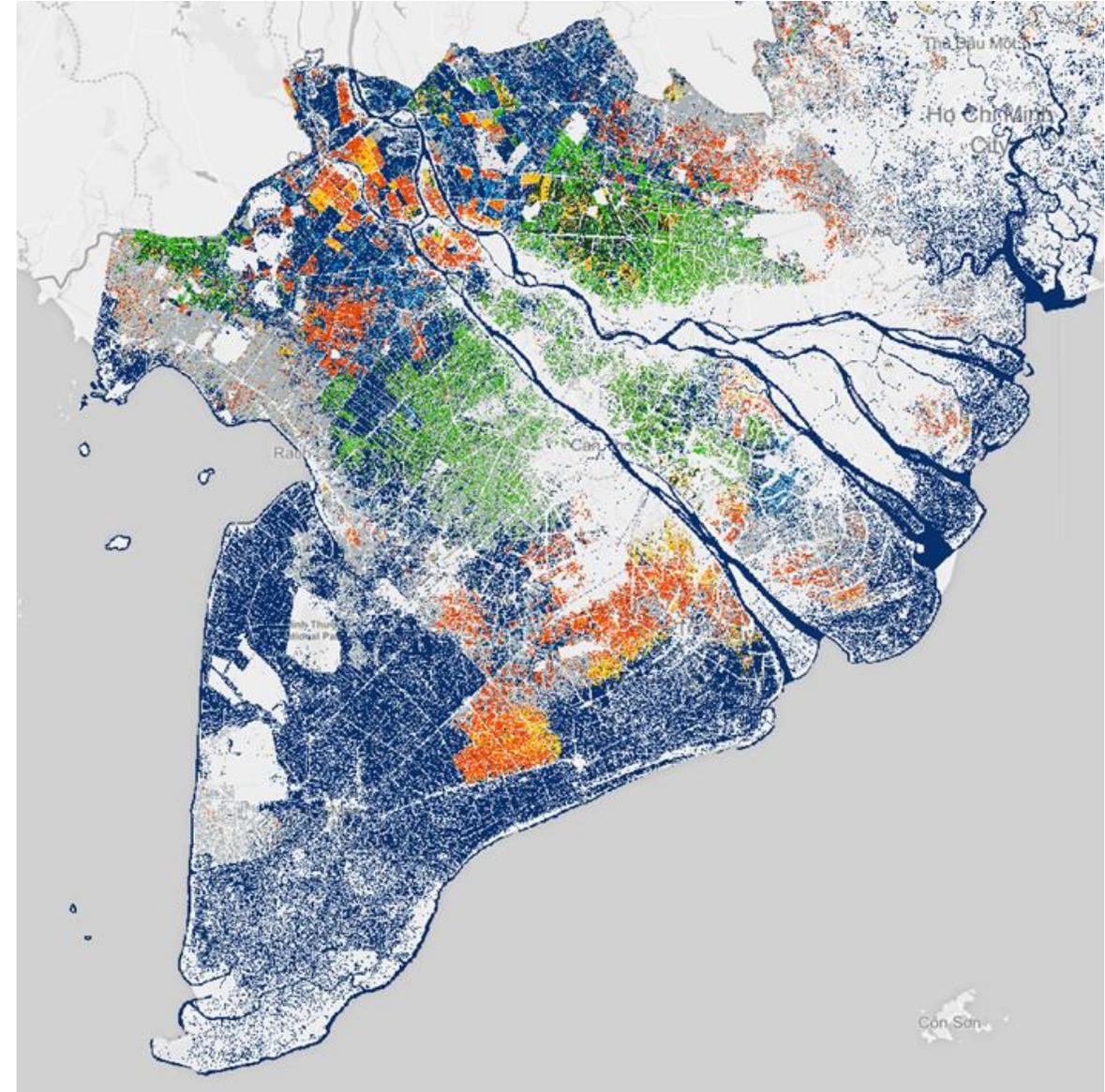
- › Needs of the farmers:
  - › Increase yields
  - › GAP, sustainable production
  - › Less inputs (chemicals)
  - › Less operational costs (equipment)
  - › Less damage (flood warning)
- › Need of Agri Firm (Loc Troi)
  - › Sustainable production (increase market)
  - › Less operational costs
  - › Less damage
  - › Improve logistics (optimize rice mills)
  - › Farmer profiling (field data collection)





## Various data sources

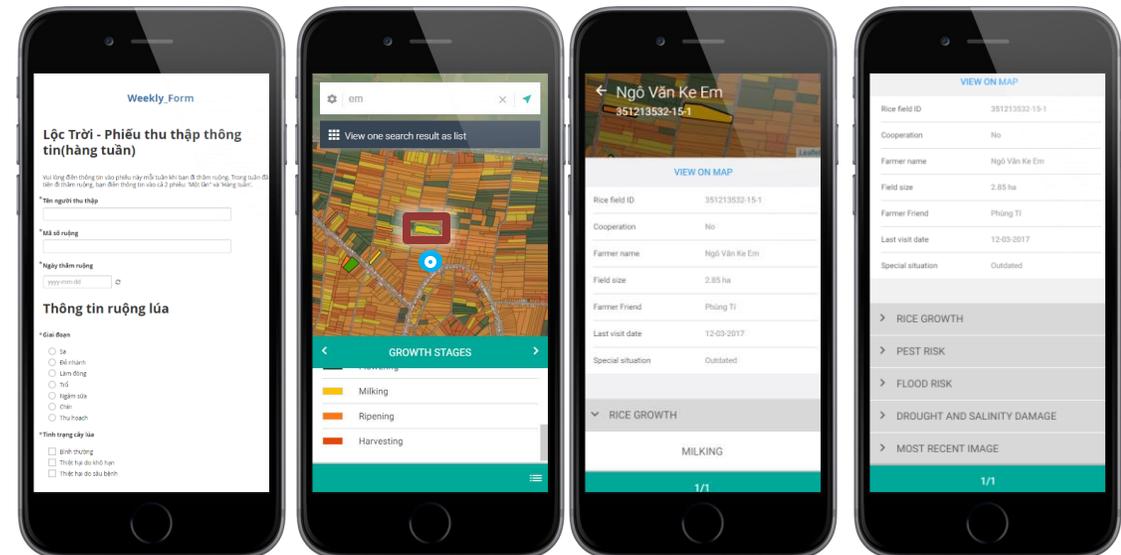
- › E.O. data
  - High resolution (15m) rice growth maps
  - inundated fields
- › Field measurements
- › Administrative data
- › Location of all farmers





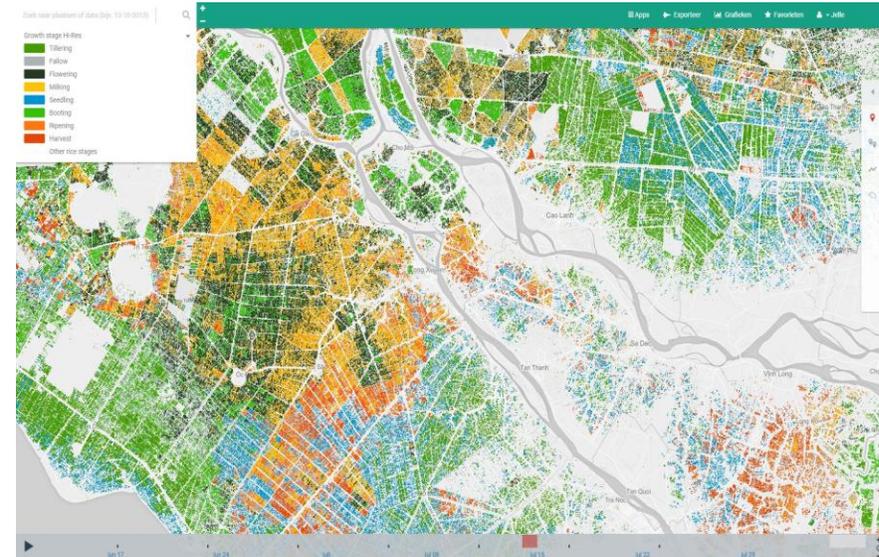
# Combine EO data with field data

- › Calibration of EO data
- › Monitor fertilizer and pesticide use during the season
- › Locate nearby pest to take measures in advance
- › Farmers inform each other
- › Smartphone to collect and receive information from farmers (more reliable and cost-effective sampling of farmer and field data)

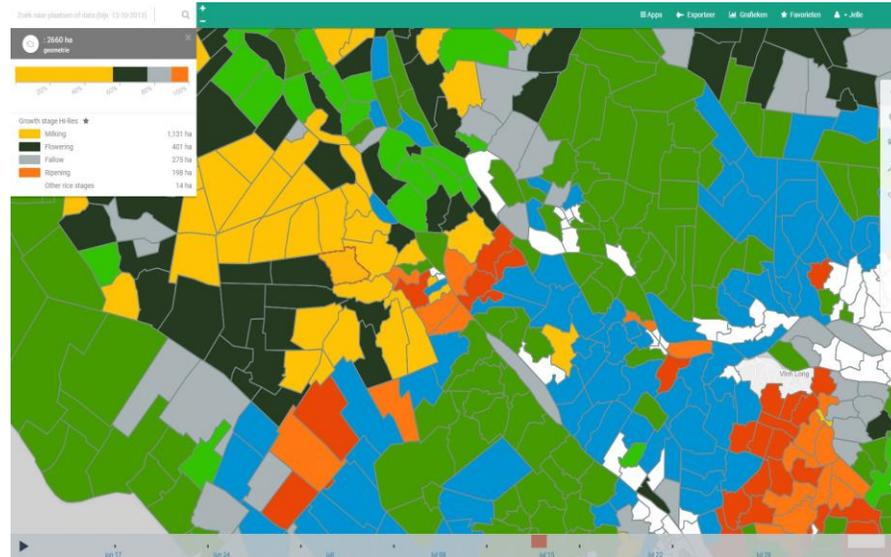




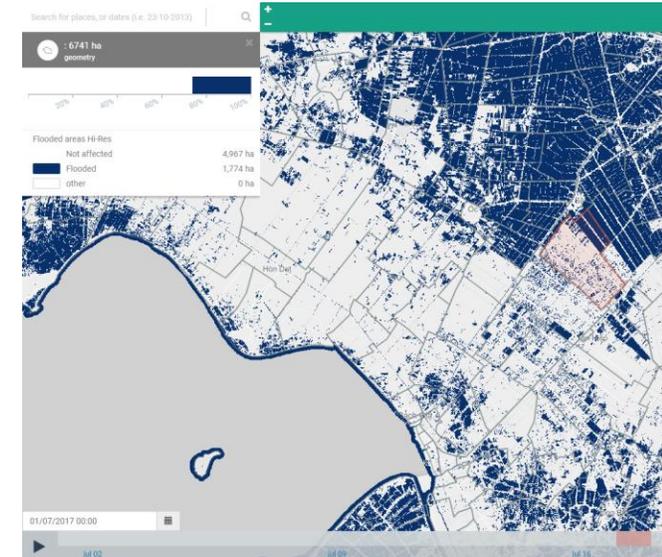
# Rice growth stages (aggregated information)



Rice growth stage  
(15m resolution)



Regional aggregation:  
dominant growth stage



Flooded area  
(15 m)

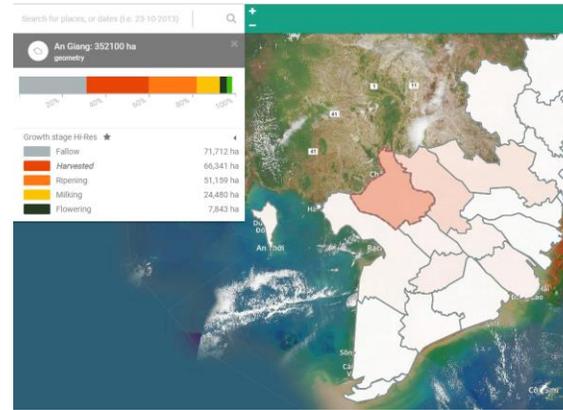




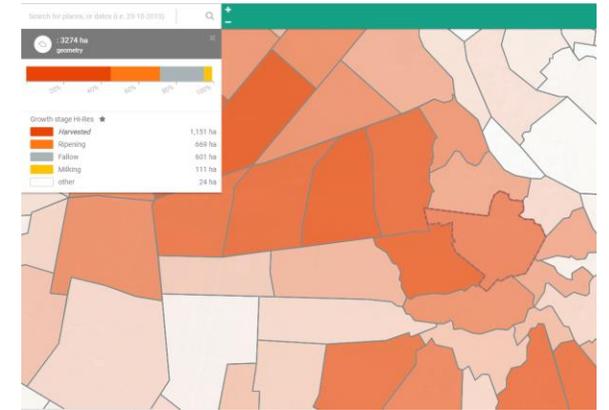
# Insight in rice grow at different spatial scales

- › Where and when will the rice be harvested
- › Allocate resources
- › Regional overview combined with detailed field information

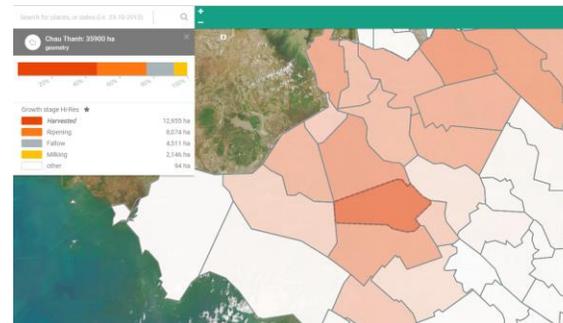
Province



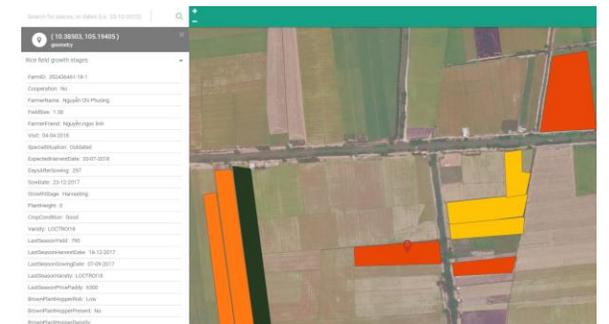
Commune



District



Field

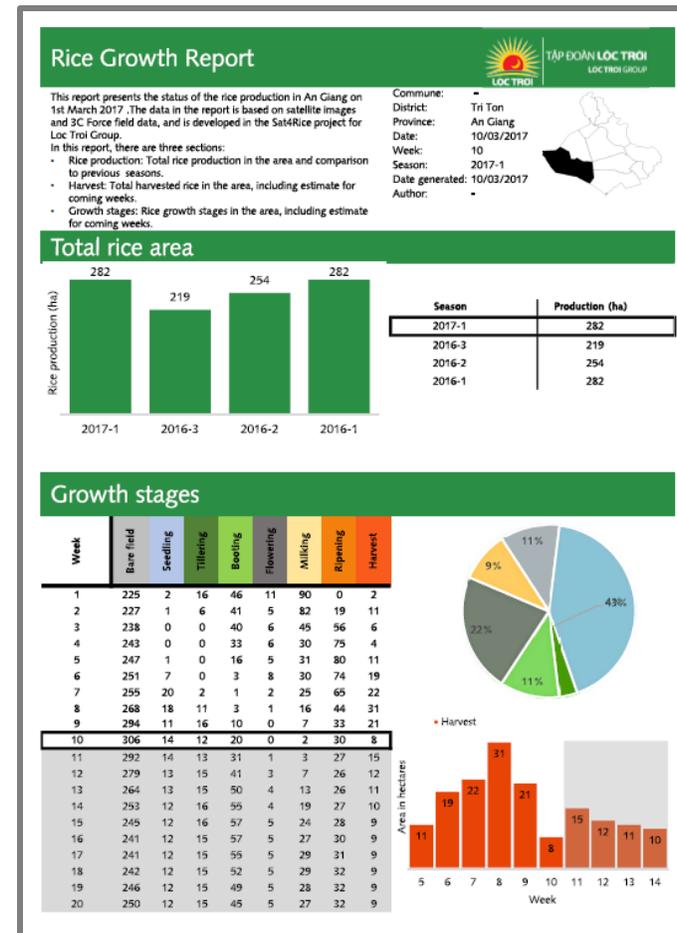




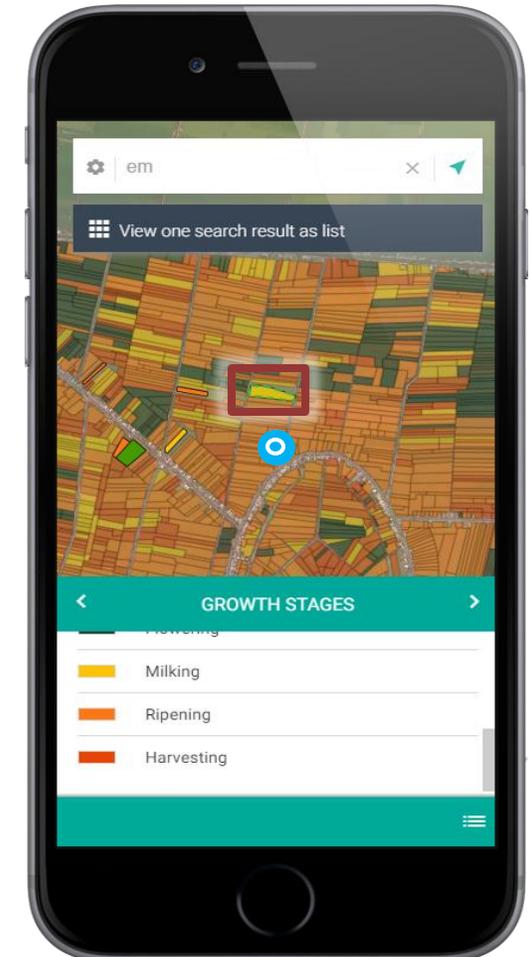
# Automated reports

- › Automated reports and dashboard provide direct overview of key indicators
- › Up to date information on field level is directly available (from any place)

## Automated reports Dashboards



## Most recent data in the field





# The business case (?)

Use cases have been formulated on the use of various information services

- › Rice Grow stages
- › Harvest prediction
- › Flood risks
- › Allocate resources
- › Optimize logistics
- › Reduce inputs
- › Automated reports and dashboards
- › etc





## Some lessons learned

- › System is operational.
- › Much effort has been put into
  - › Data collection
  - › Validation of the information services
  - › Training of the field workers
  - › Convincing the management that the service really works
  - › Marketing
  - › Desk research to formulate use cases and business cases
- › Discussion on added value of the possible services with the decision makers appears to be very difficult, making the business case difficult to formulate.
- › Working processes within the company are still not always clear. Company does not want to share relevant data.
- › The farmers and field workers use both the application and their paper forms. It is difficult to change a habit, especially if the company continues to use both systems





# Building an advanced IT system, with information services, and applications for the farmers is challenging, but ....

