CGIAR

ICARDA
Science for resilient livelihoods in dry areas

Building resilient agroecosystems for sustainable future

Delivery FAIR Impact in agricultural and Food Security

C. Biradar and E. Bonaiuti

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CGIAR Platform for Big Data in Agriculture

CGIAR CSI Consortium for Spatial Information

IGAD P11, Mar 19-20, 2018
Berlin, Germany

ICARDA
Science for resilient livelihoods in dry areas

Geospatial Opportunities in Inclusive Agroecosystems for Sustainable Foods and Future

Sustainable Food and Future

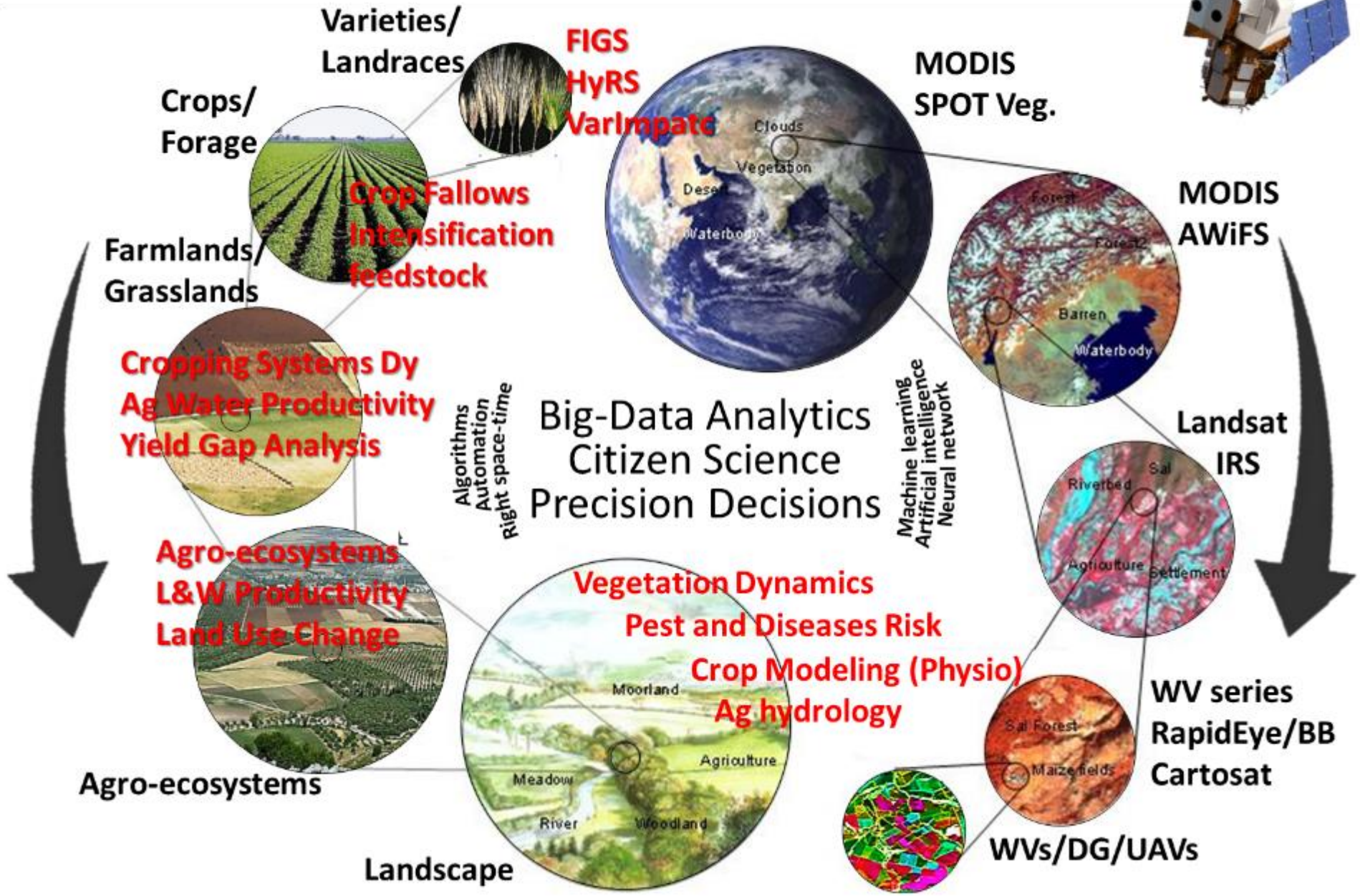
Increased land, water and system productivity while safe guarding the environmental flows and ecosystem services

- more **crop** per **drop** -water focus
- in a **inch of land** and a **bunch of crop** -multi dimensions -integrated systems

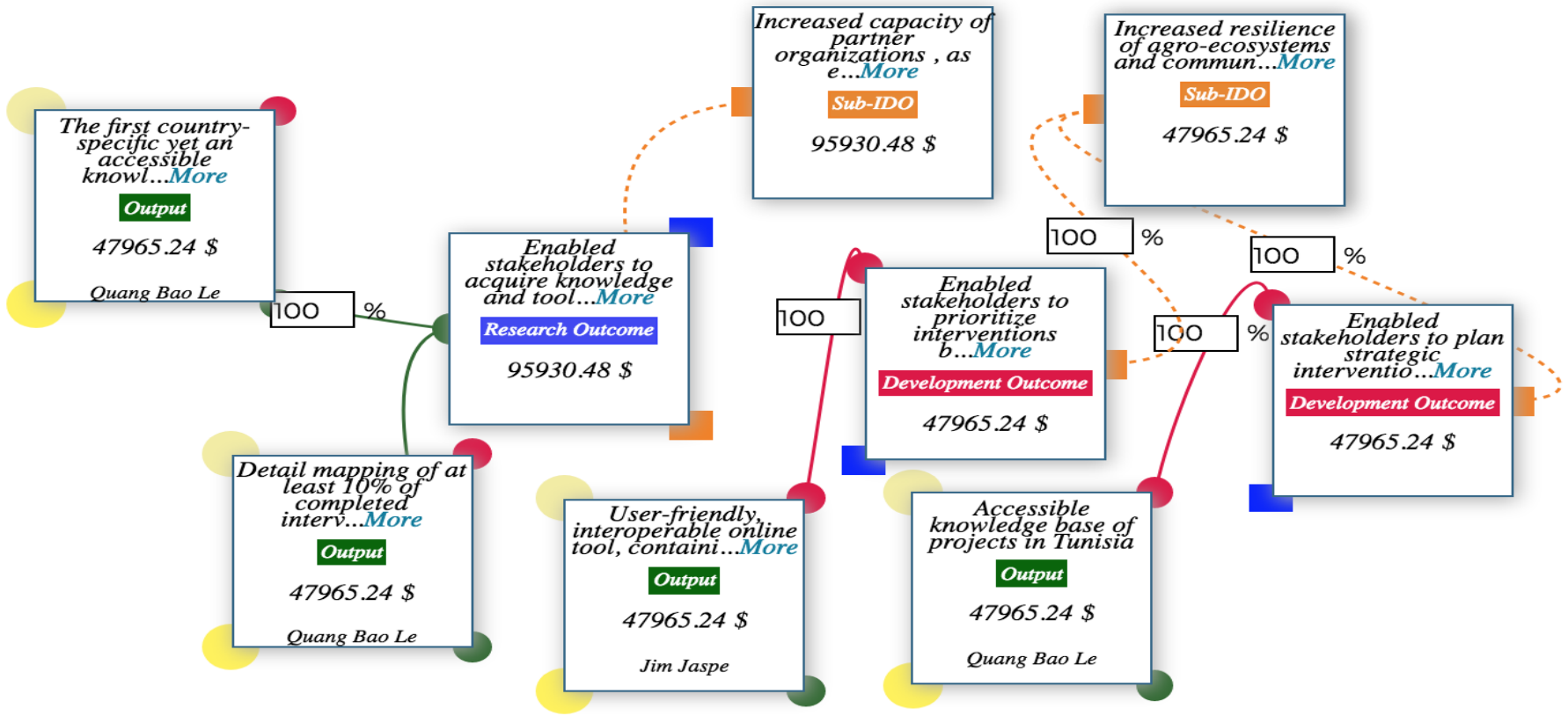
Knowledge based prioritization (space & time) for better strategy for investment, intervention, implementation and impact

Ecological intensification
Target specific interventions
Bridging the gaps
Inputs use efficiency
Agricultural policy
Halt degradation
Technology scaling

- food and nutritional security
- resilience and risk reduction
- agro-ecosystem sustainability
- adaption and mitigation
- citizen science and collective actions
- trade, social security and stability


Varieties/
Landraces
FIGS
HyRS
VarImpatc
Crops/
Forage
Crop Fallows
Intensification
feedstock
Farmlands/
Grasslands
MODIS
SPOT Veg.
MODIS
AWiFS
Cropping Systems Dy
Ag Water Productivity
Yield Gap Analysis
Algorithms
Automation
Right space-time
Big-Data Analytics
Citizen Science
Precision Decisions
Machine learning
Artificial intelligence
Neural network
Landsat
IRS
Agro-ecosystems
L&W Productivity
Land Use Change
Vegetation Dynamics
Pest and Diseases Risk
Crop Modeling (Physio)
Ag hydrology
WV series
RapidEye/BB
Cartosat
Agro-ecosystems
Landscape
WVs/DG/UAVs

Impact Pathways: Frameworks for Accountability



SDG(s)

Keyword(s) *

drylands soil wheat

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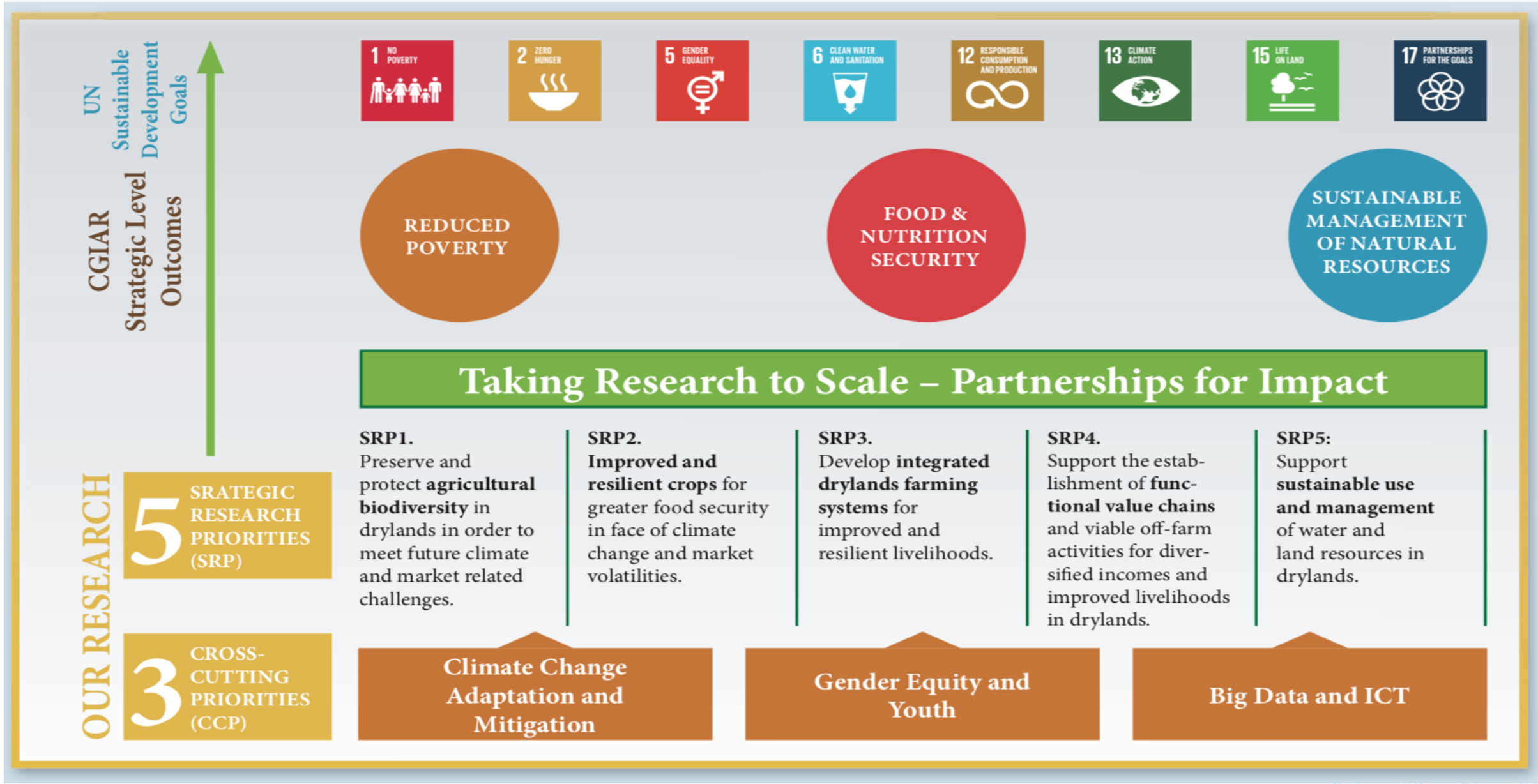
BigData: a Priority at Institutional Level



Interoperability Network: Sustainability through Partners

GitHub

HIGHCHARTS

D SPACE

twitter

Atlassian JIRA

MEL monitoring evaluation and learning

The Dataverse Project

esri ArcGIS®

United Nations Statistics Division

YouTube

ORCID Connecting Research and Researchers

AIMS

FAO FIAT PANIS

ISO

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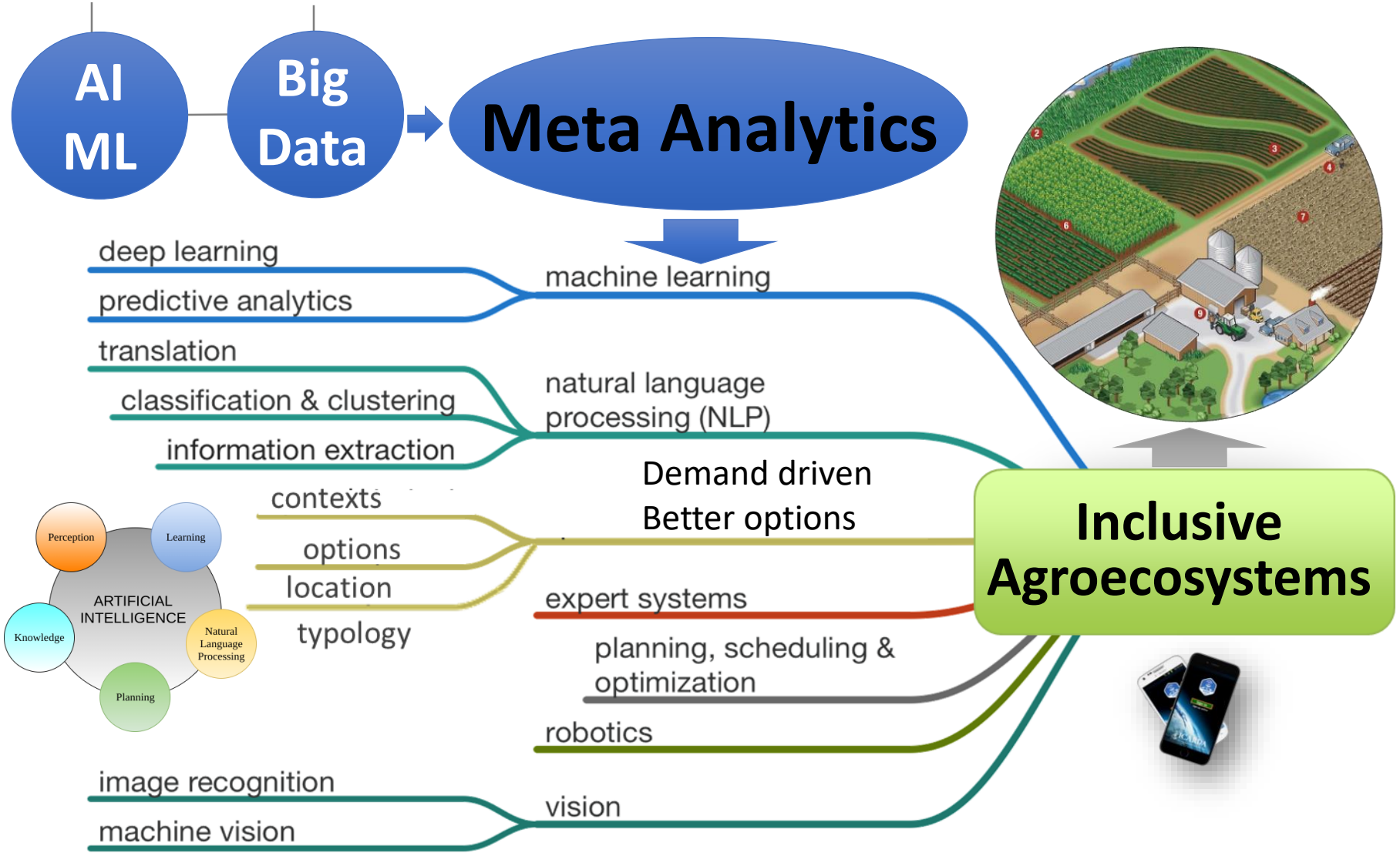
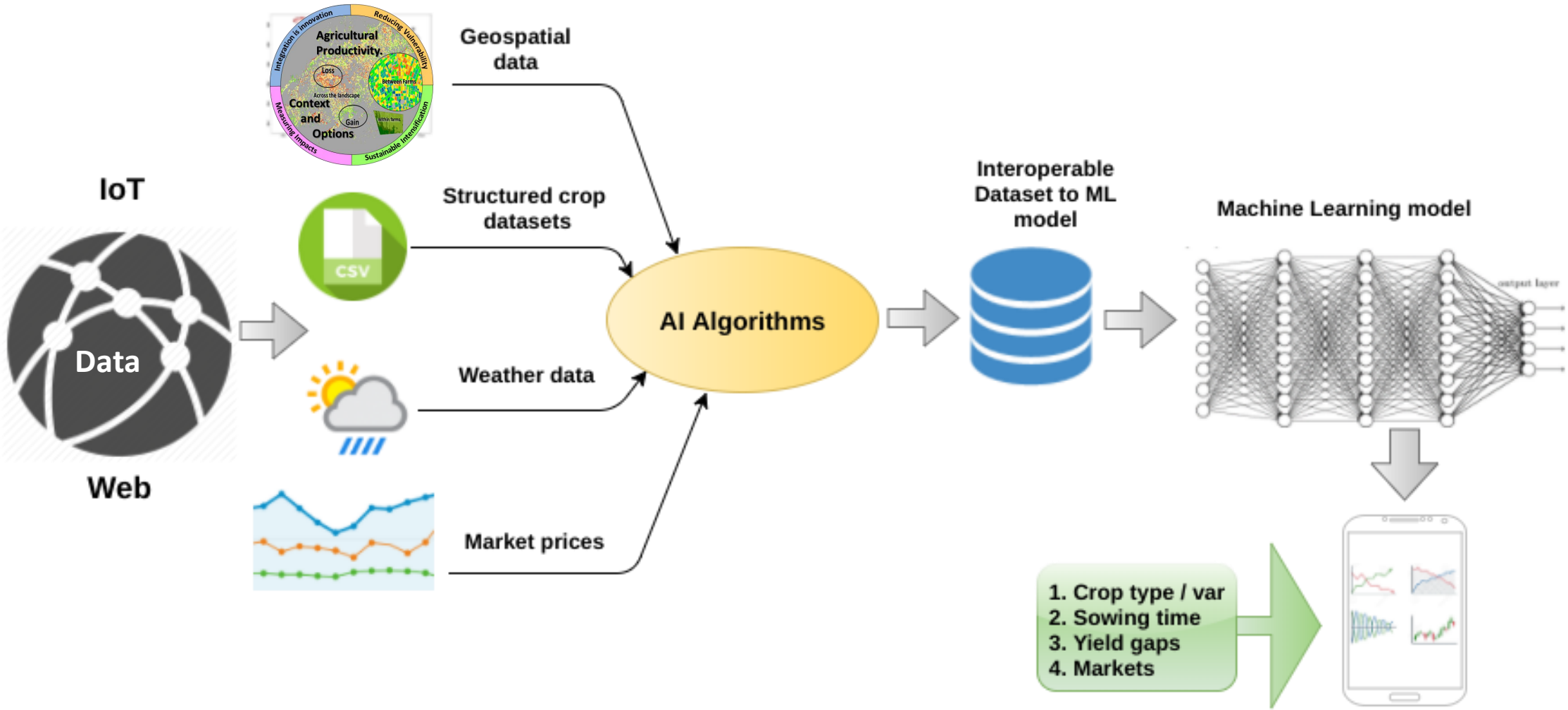
SHERPA RoMEO

Interoperability of Data for Better Decisions

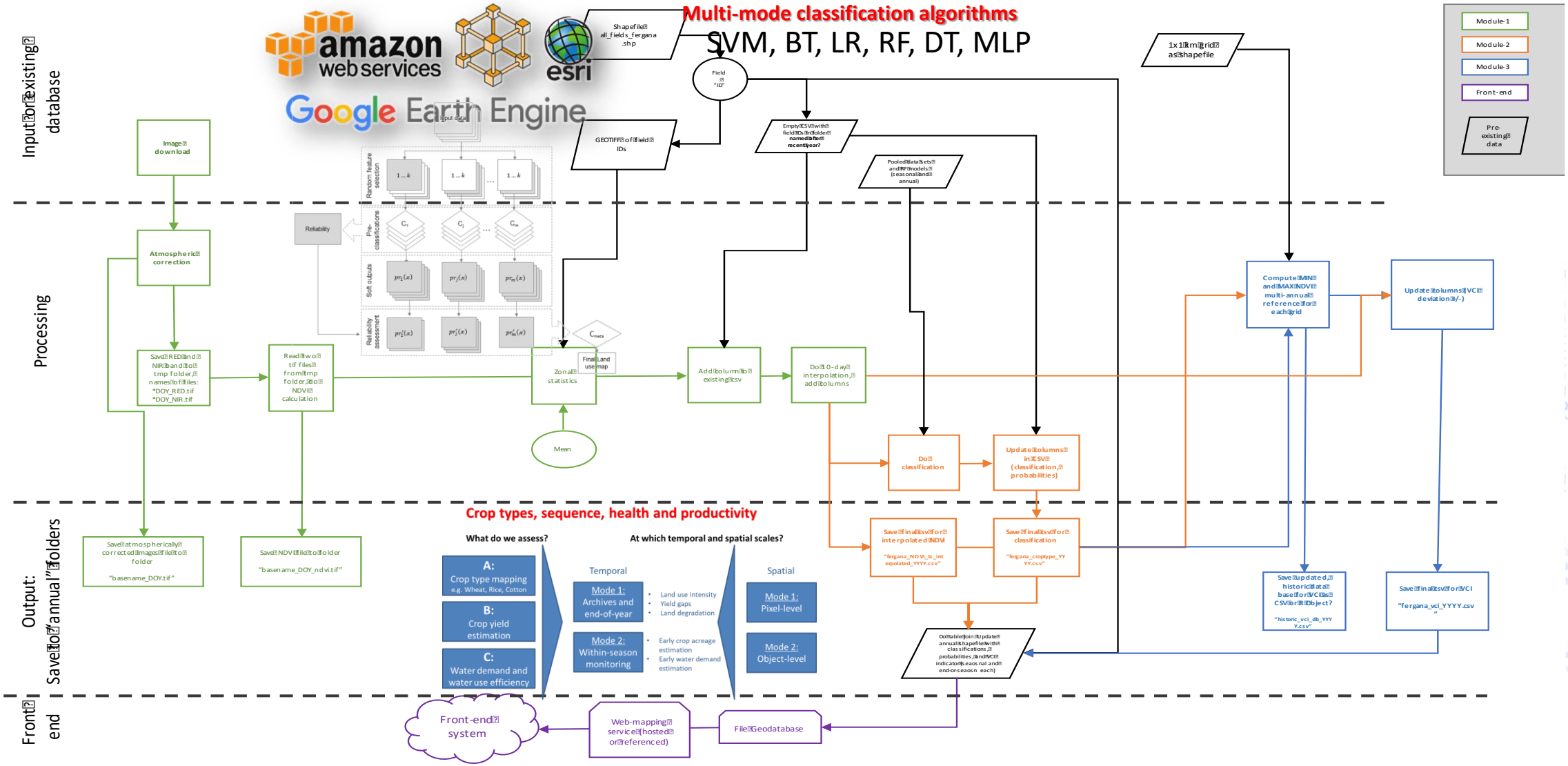
AI-ML-BigData @ genetics, chemistry, weather, agronomies, trade…



Big-data, Machine Learning and AI algorithms



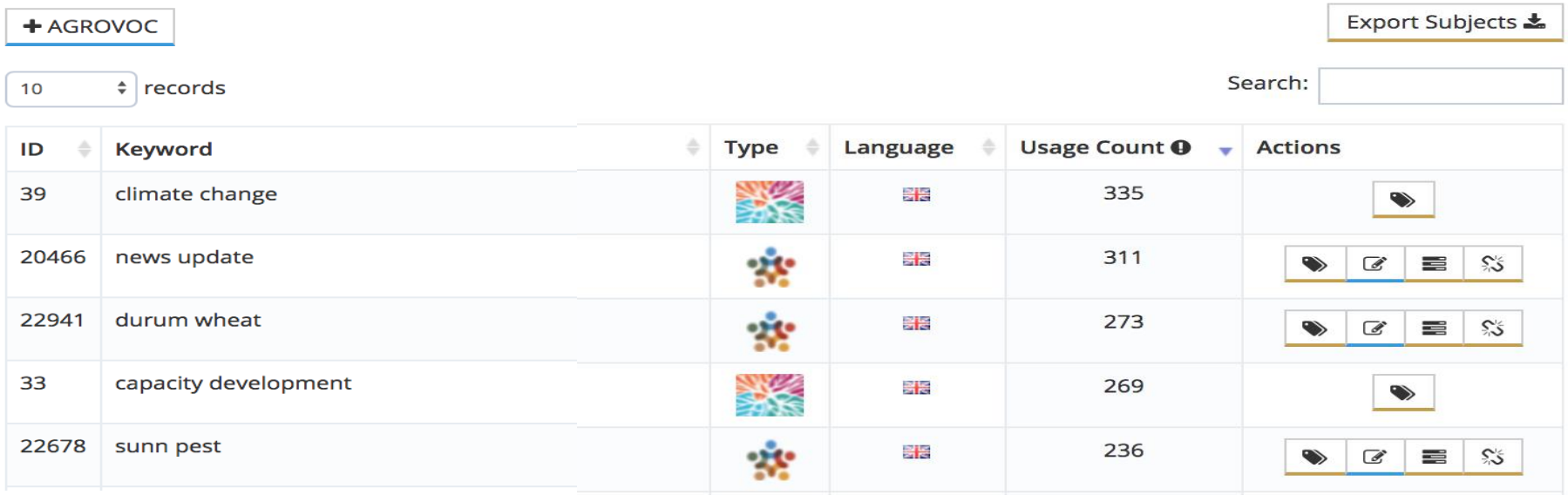
Big-data, Machine Learning and AI algorithms



Monitoring, Evaluation and Learning (MEL) Platform – Case 1

MEL is an online platform for integrated management, monitoring, and reporting of projects, from planning to budgeting, risks assessment, knowledge sharing. https://mel.cgiar.org

Keywords maintenance and intelligence



1. Harvesting
2. Editing
3. AGROVOC Matching
4. Assigning
5. Splitting
6. Frequency and use analysis
7. Synchronizing
8. Depositing

Network Analysis for Impacts

SDG(s)

Keyword(s) *

drylands soil wheat

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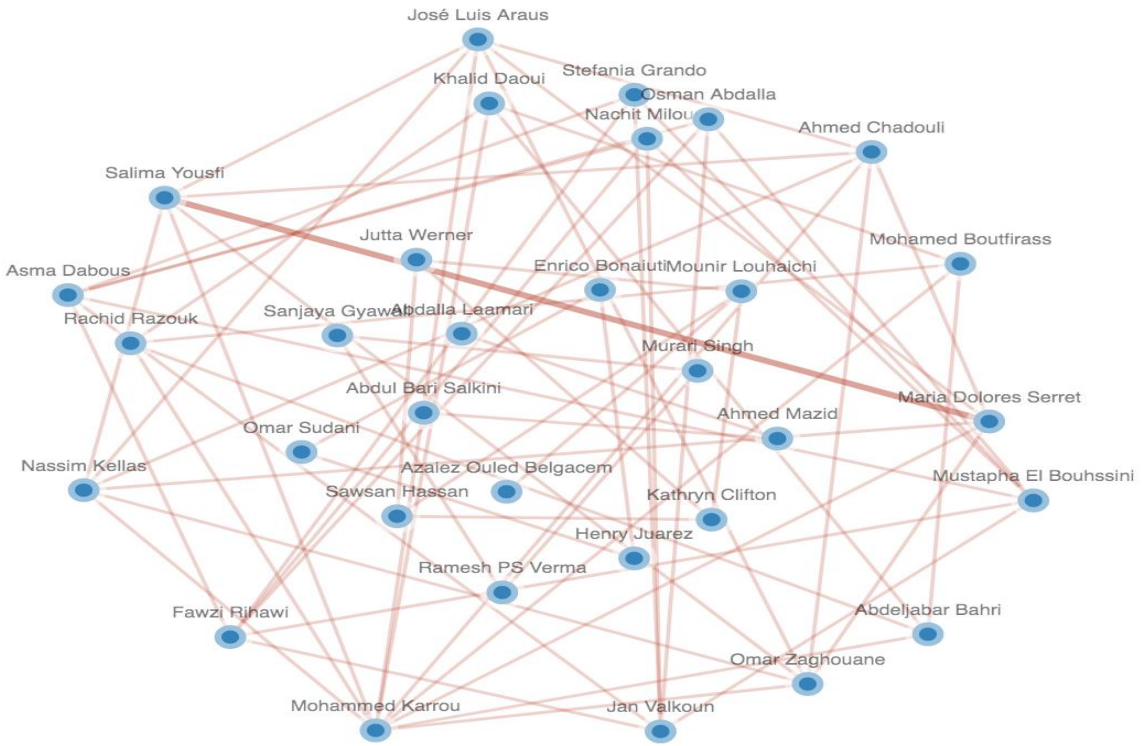
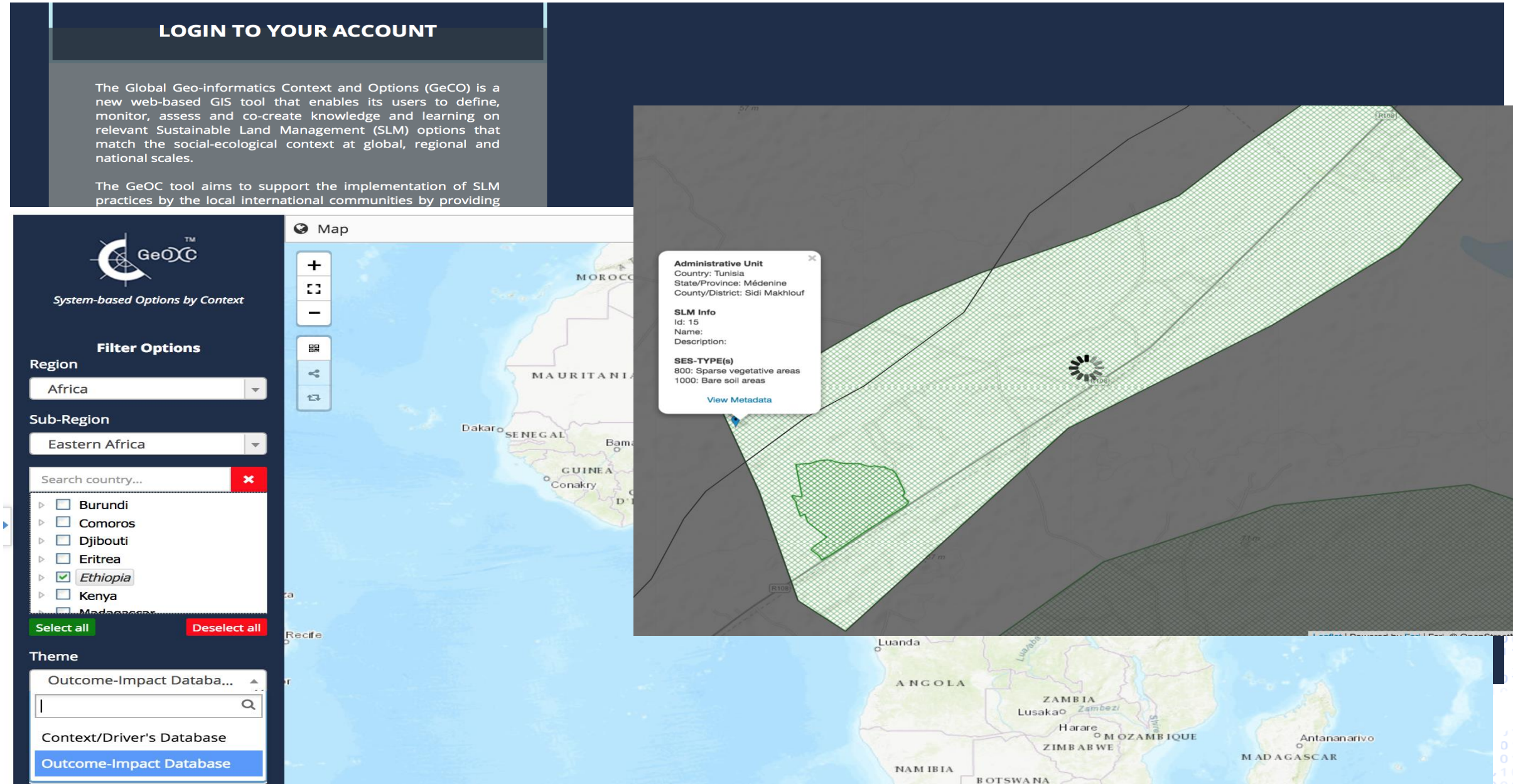


Authors: 3172,3675

Number of publications for Salima Yousfi and Maria Dolores Serret together : 1

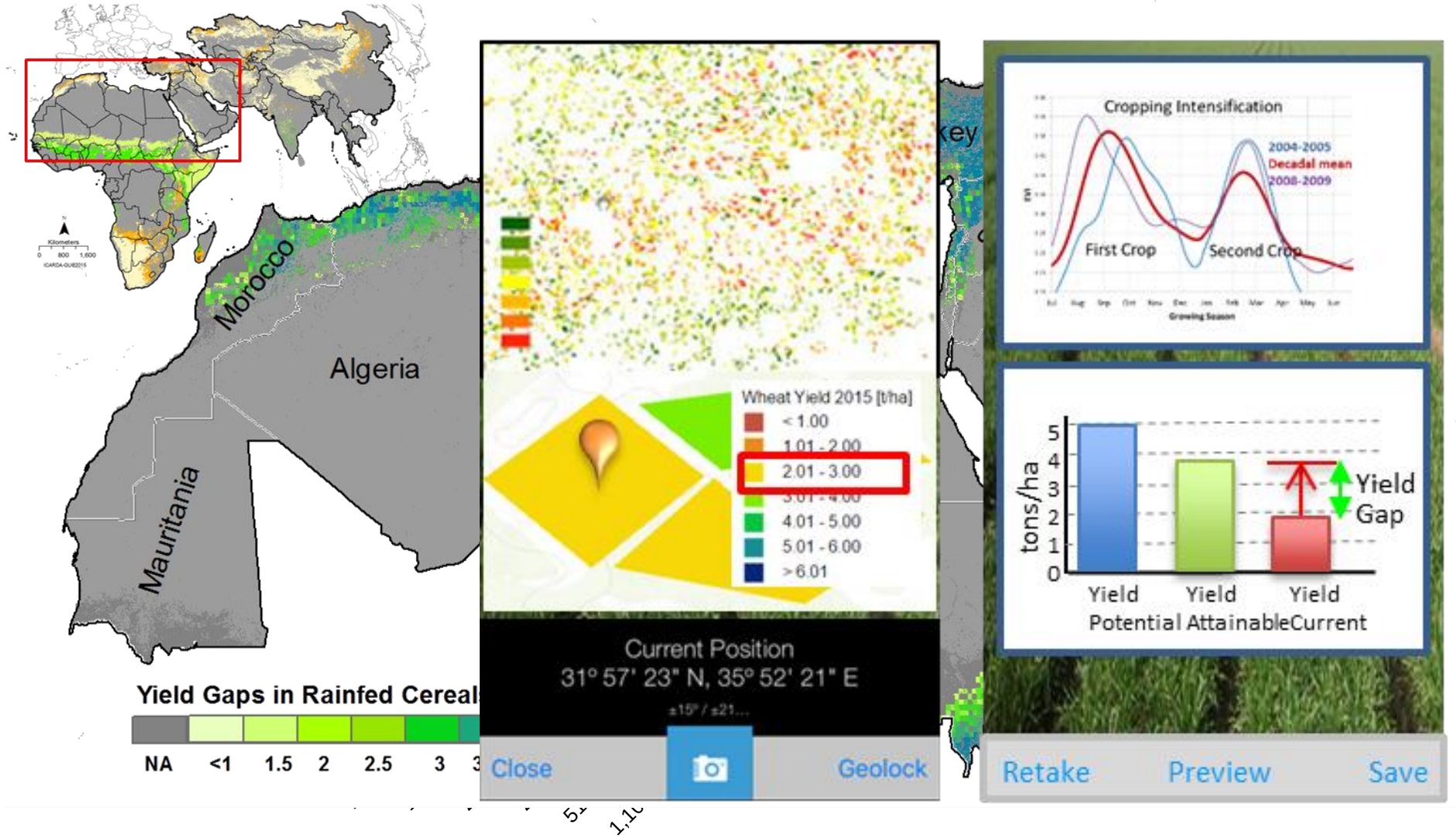
- http://hdl.handle.net/20.500.11766/3565

Geo-Informatics Option by Context (GEOC) – Case 2



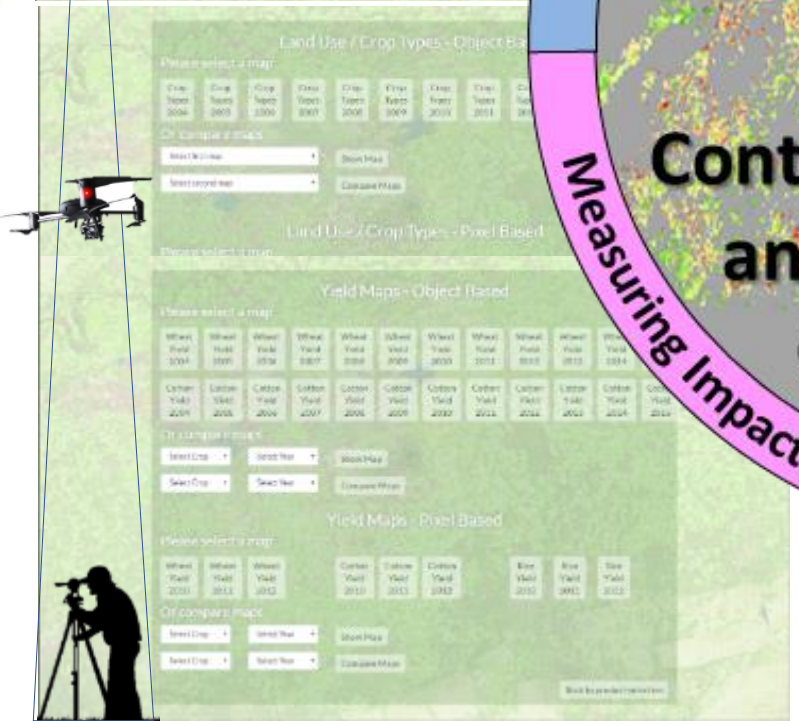
Bridging the Gaps @ multiple-scales – Case 3

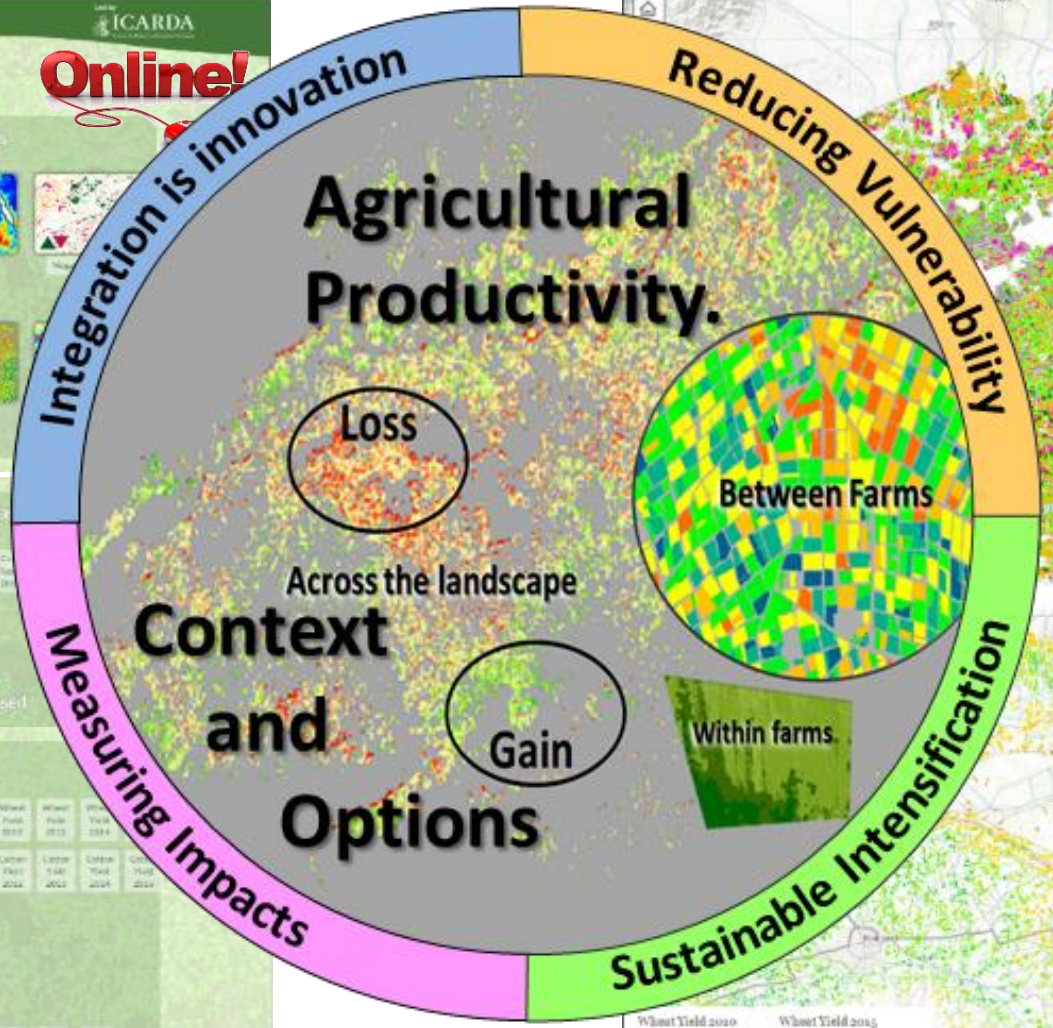
data, knowledge, productivity, resilience

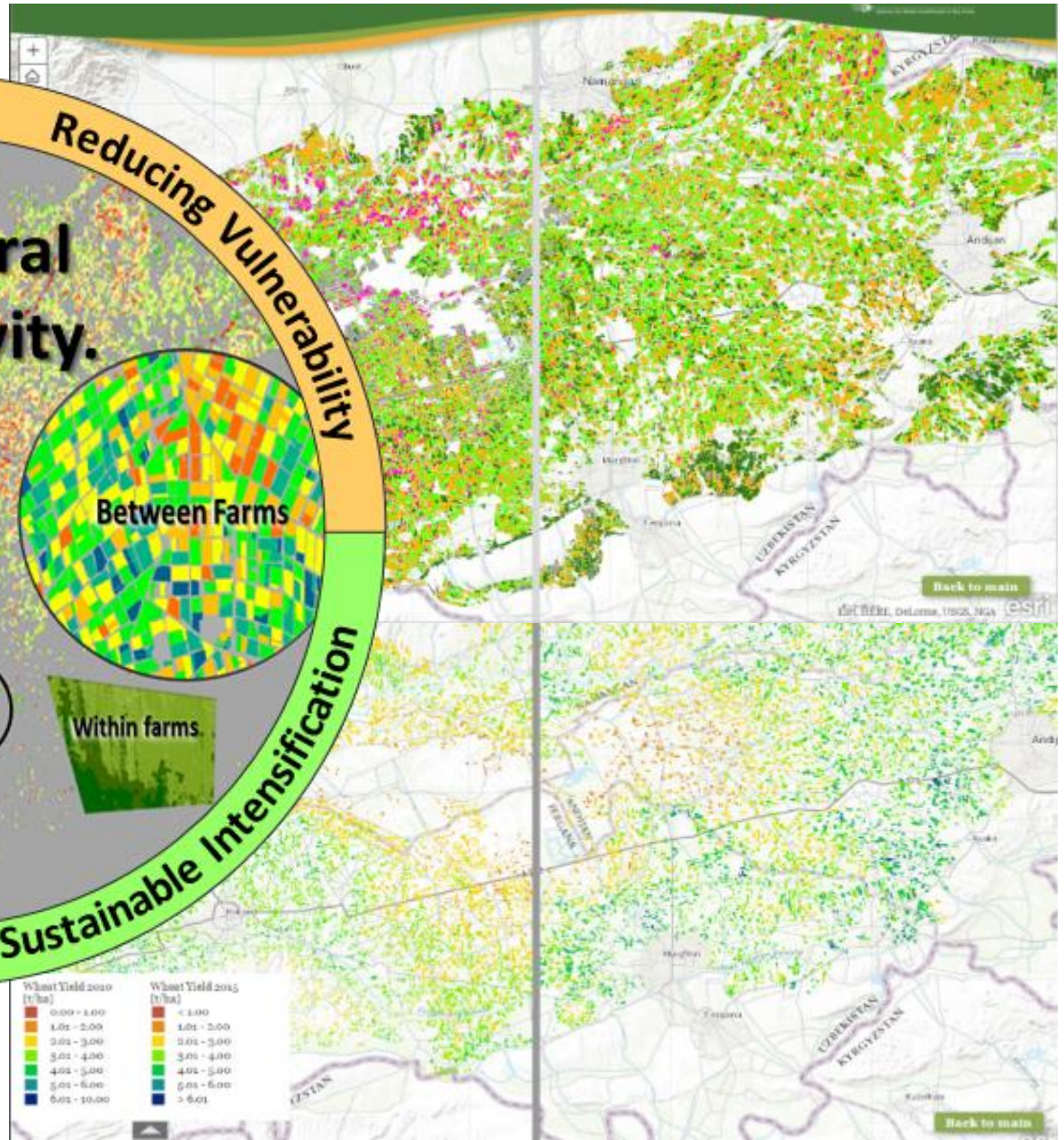


Quantification of Farming Systems @ multiple-scales

Digital Ag Platform

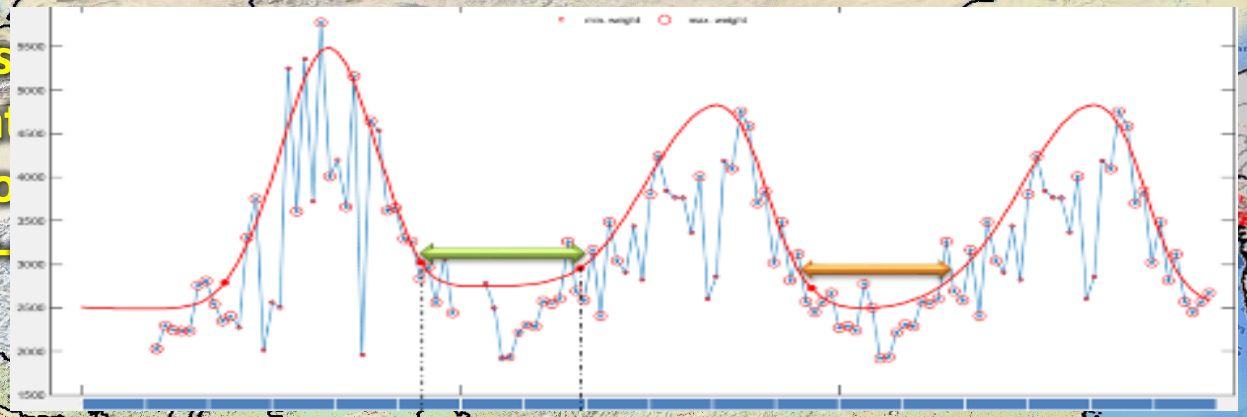




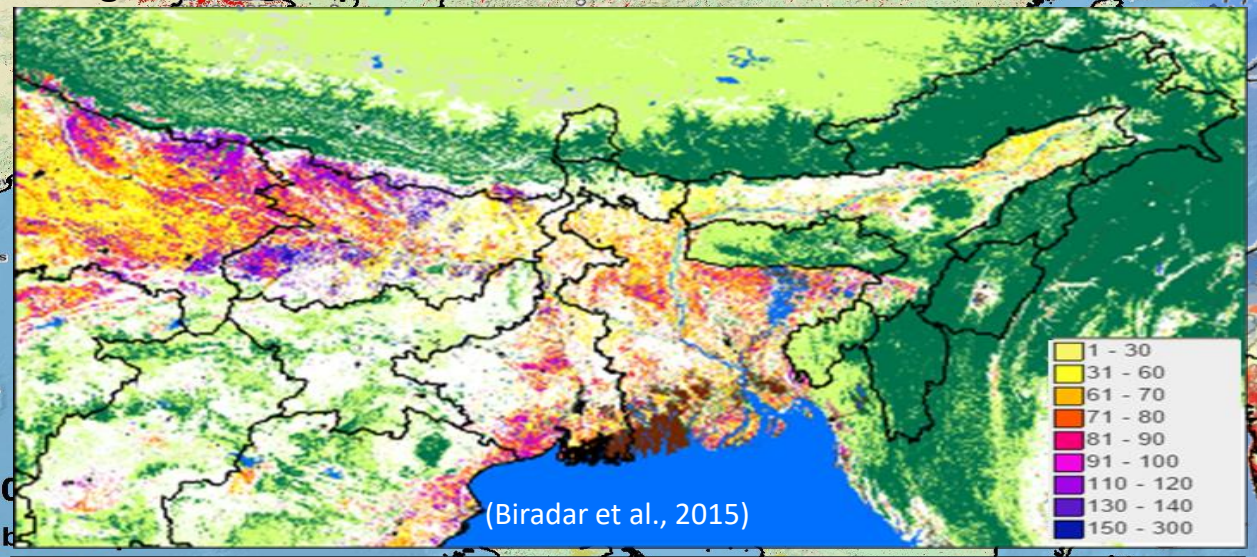


Dynamics of Cropping Systems

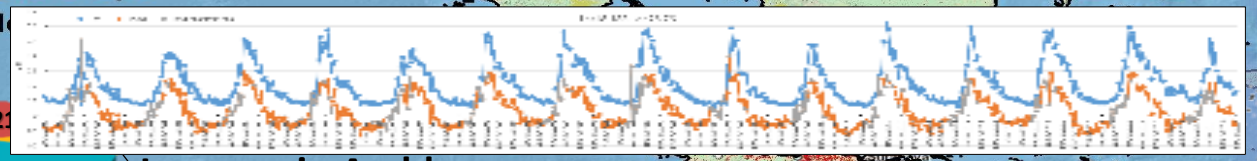
- Integrated Agro-Ecosys
- Sustainable Intensificat
- Input Use Efficiency-Co
- Thematic Land-Water-



Length of the crop fallows, start-date, end-date



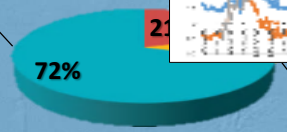
(Biradar et al., 2015)



Year 200

Doub

Tripl



Agricultural Intensification

Increase in Arable Land

Cropping Intensity

Double crops

Triple crops

Population Density

< 0.135

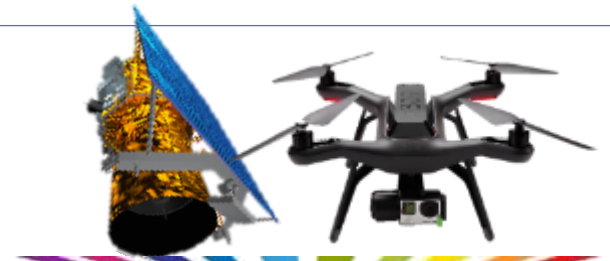
#/km²

>54916

Biradar and Xiao, 2009

Platform for Inclusive Agroecosystems

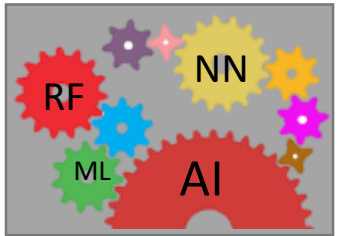
EOS based , target specific, open source precision decisions at farm scales



Multi-Scale EOS

Smart Extension/Citizen Science

Community of Practices



Cadastral, Object & Pixel based

Biophysical and socio-ecological

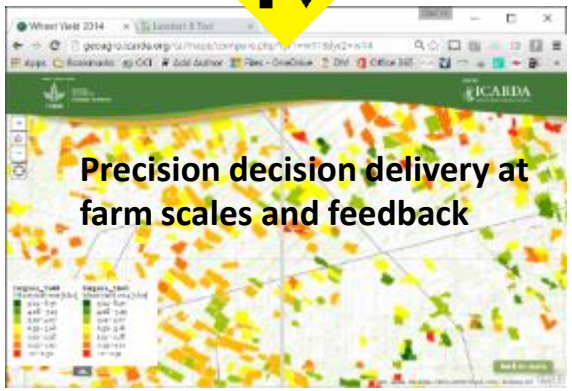
Machine Learning
Crop types, crop intensity, rotation, fallows, crop stress, AET-l8, soil moisture-SMAP

Citizen-Science Smart Extension feedback

Direct Access and Markets/Business

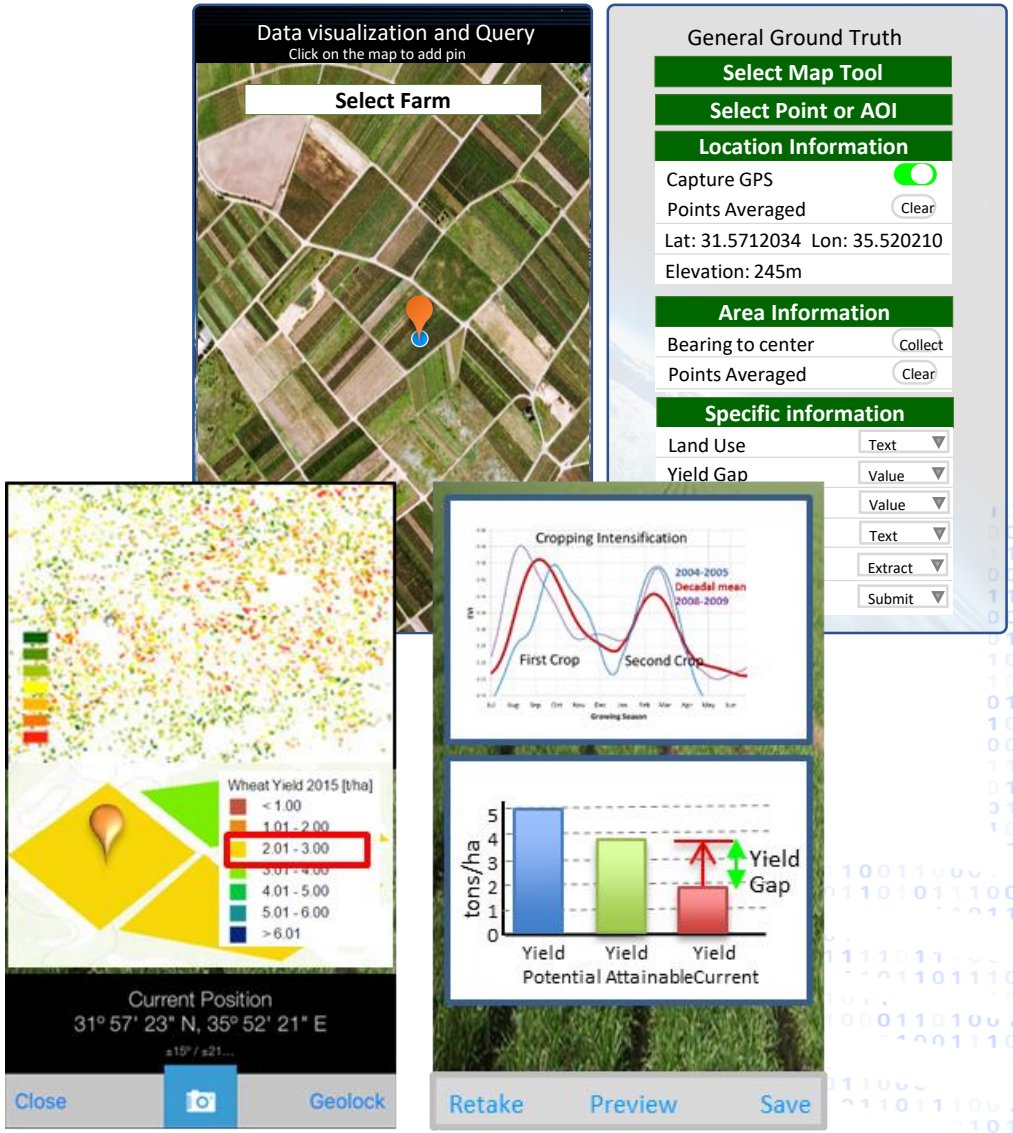
Precision-Decision

Location Specific Interventions



Right Time Right Place

Citizen Science, Field Data Collection and Feedback

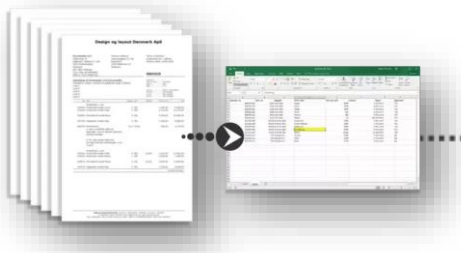


In Beta Testing

- Citizen Science
- Crop Type
- Crop Suitability
- Yield Forecasting
- Pest Risk
- Real-time Advisory

- Field Data
- Yield Gaps
- Droughts/floods
- Crop Stress
- Water use
- Real-time AET

Open Data Kits (ODK)



Survey Design

1. Design the survey template in the office

2. Upload survey template to the ODK cloud server

3. Download survey template to mobile device

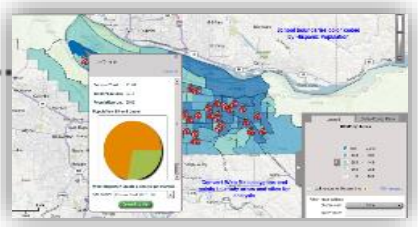
ODK Cloud Server

4. Undertake survey data collection in the field

5. Send completed survey data to the ODK cloud server

6. Download and analyse the data sets

Survey Collection



in an inch of land and bunch of crop

Thank You

c.biradar@cgiar.org
e.bonaiuti@cgiar.org

Delivery FAIR Impact in agricultural and Food Security

In recent years research and development organizations have aligned with donors and own frameworks for accountability. Such frameworks have embedded indicators to ensure the measurement of impacts. However, the availability of impact information on different repositories has not been informed by FAIR principles. Learning from available information is becoming more challenging, while knowledge of existing data is in the hands of few individuals in each Organization. Machine learning and artificial intelligence initiatives are trying to address such gaps and limitations. In the last five years, The International Center for Agricultural Research in the Dry Areas (ICARDA) has worked to interoperate internally available resources under the umbrella of the BIGDATA and ICT context, which is defined in its 2017-2026 strategy. As main pillar, the process has involved the analysis of existing metadata elements both as direct and indirect sources. The identified schemas and lists have allowed the team to design internal interoperable protocols in order to share information among different departments and units. The process to ensure findability and accessibility of historical information is hard to achieve when resources are allocated to deliver new products rather than curating and adding value to existing data. Nevertheless, ICARDA is committed to ensure that historical information in its mandated regions and agro-ecological zones is re-used to ensure better modeling, projecting and targeting of interventions related to agriculture and food security. One immediate solution would be to rely on Geo-informatics science and Monitoring, Evaluation and Learning (MEL) system, which may enable the gathering and processing of historical data to inform decision makers on targeted investments. This approach goes beyond basic productivity indicators, while embedding dynamic metrics in the areas of socio-economics and environment. Alignment with the SDG process along with defined indicators will ensure the delivery of FAIR impacts.

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Author
Biradar, Chandrashekhar
0000-0002-9532-9452
0000-0002-4010-4141
ORCID
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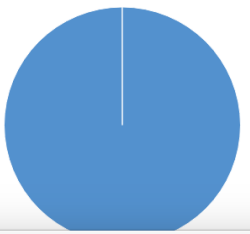

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