



GEOAGRI

The connected farm

Introduction GEOAGRI -session

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Scope

In relation to crop farming and livestock farming, the term “agriculture” may be defined as:

the art and science of growing plants and other crops and the raising of animals for food, other human needs, or economic gain

Focus on:

- **Growing** plants and other crops (including pasture),
- **Transportation** of agricultural produce to the market,
- Derived products and services related to agriculture with a distinctive geospatial component, such as (re-) **insurance**, monitoring of compliance with agricultural **policies** and regulations and other forms of (risk) **management**.

GEOAGRI *Dimensions to characterize farmers' operations*

- 1. Type of agriculture:** *crops, livestock, fishery/aquaculture, forestry.*
- 2. Purpose / goal of agricultural activity,** *such as subsistence farming, market- oriented farming or a mixture of subsistence and market-oriented farming.*
- 3. Property structure and means for engagement in agricultural activities:** *human, financial and social/cultural capital employed, such as ownership of and access land and means, tenancy arrangements, credit facilities, government policy and subsidies (e.g. sharecropping, cooperative farming, communal lands, etc.).*
- 4. Technology level:** *low, medium, high (e.g. precision agriculture is part of high level technology).*

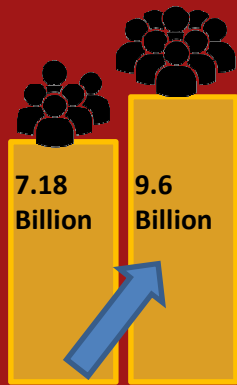
Issues & trends in Agriculture

- **Food security and increased production and productivity;**
- Adaptation to and mitigation of the effects of **climate change;**
- **Empowering local communities,** bridging the rural digital divide;
- **Food prices and markets;**
- **Risk management** (including insurance).

Drivers

- The increasing world population,
- Environmental factors (including climate change),
- The availability of water resources,
- Increasing urbanization and growing middle class population -> increased consumption and changing consumption patterns
- Land management (land as a scarce resource).

AGRICULTURAL IMPERATIVE



World Population to increase one-third by 2050

People in urban areas will increase from 54% to 66% by 2050



66%

54%

70%

50%



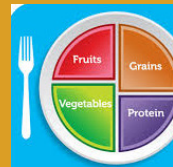
Rising Income. Middle class to grow from 50% to 70% of Population by 2050

Economic Growth is Fuelling Protein Revolution

Increased demand for livestock, poultry and fish .



Grains and oilseeds as a major part of animal diets and accordingly, demand for them will also grow substantially



Doubling agriculture output will increase pressure on already stressed resources, requiring greater efficiency in agriculture



2x



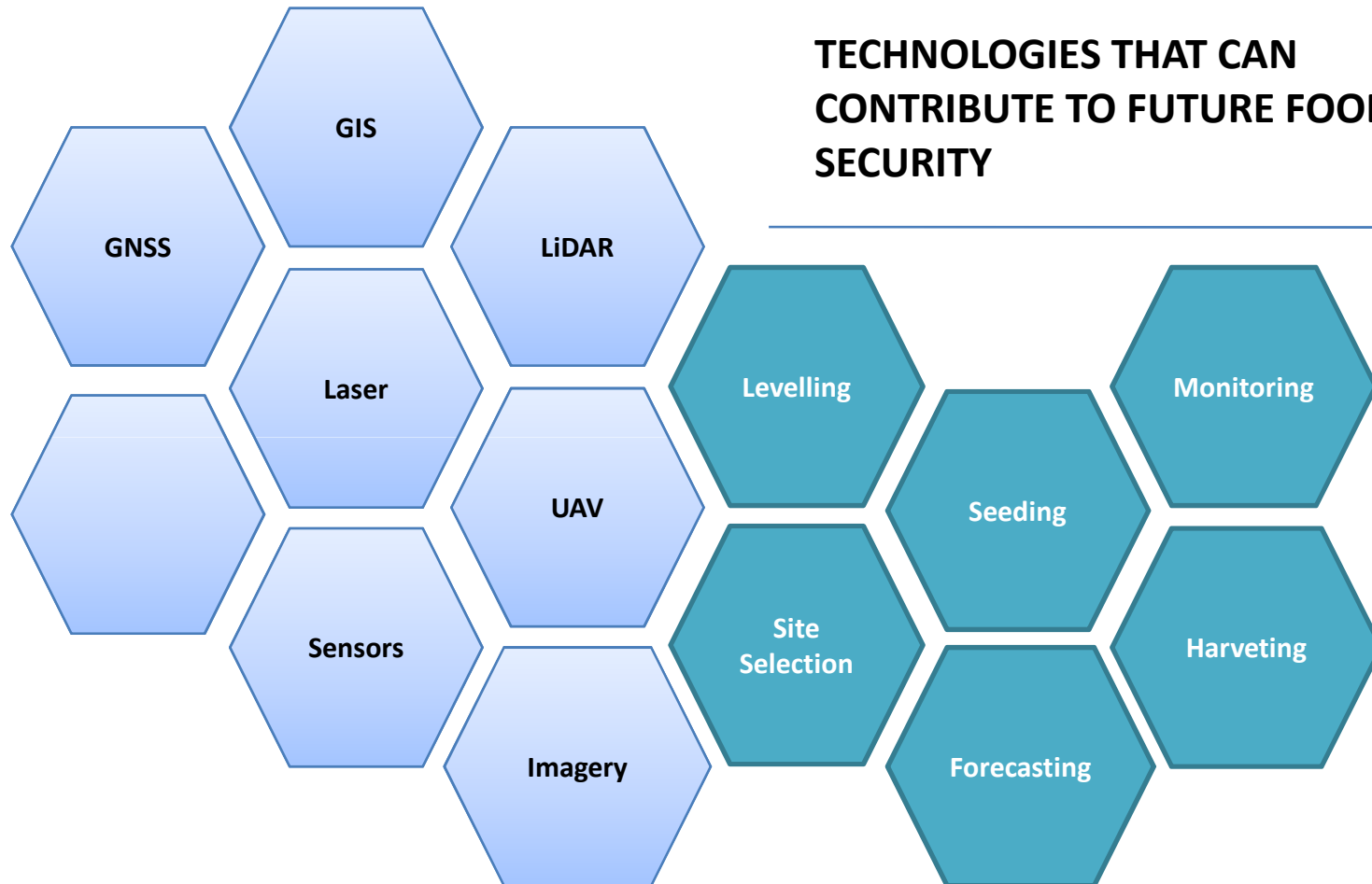
70%
of
water
consumption



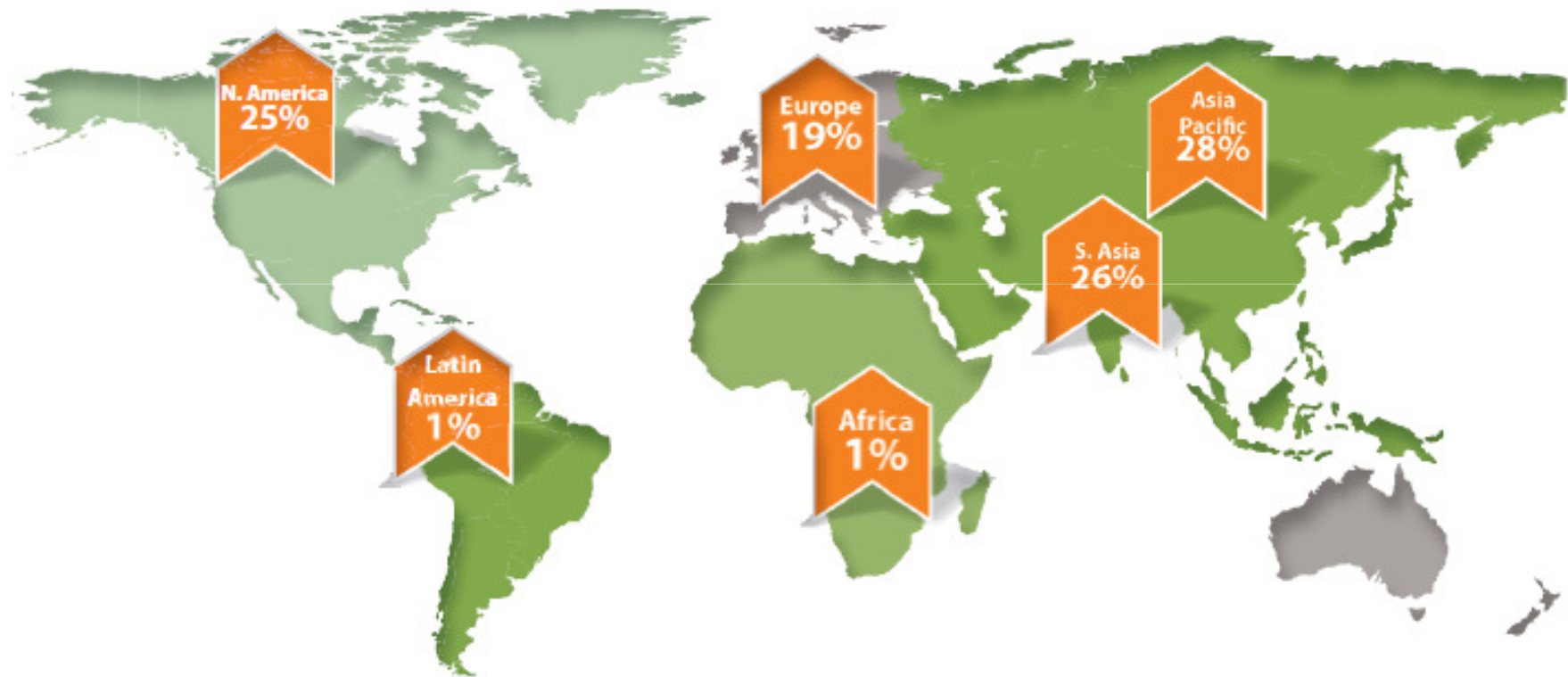
34%
of
Land area



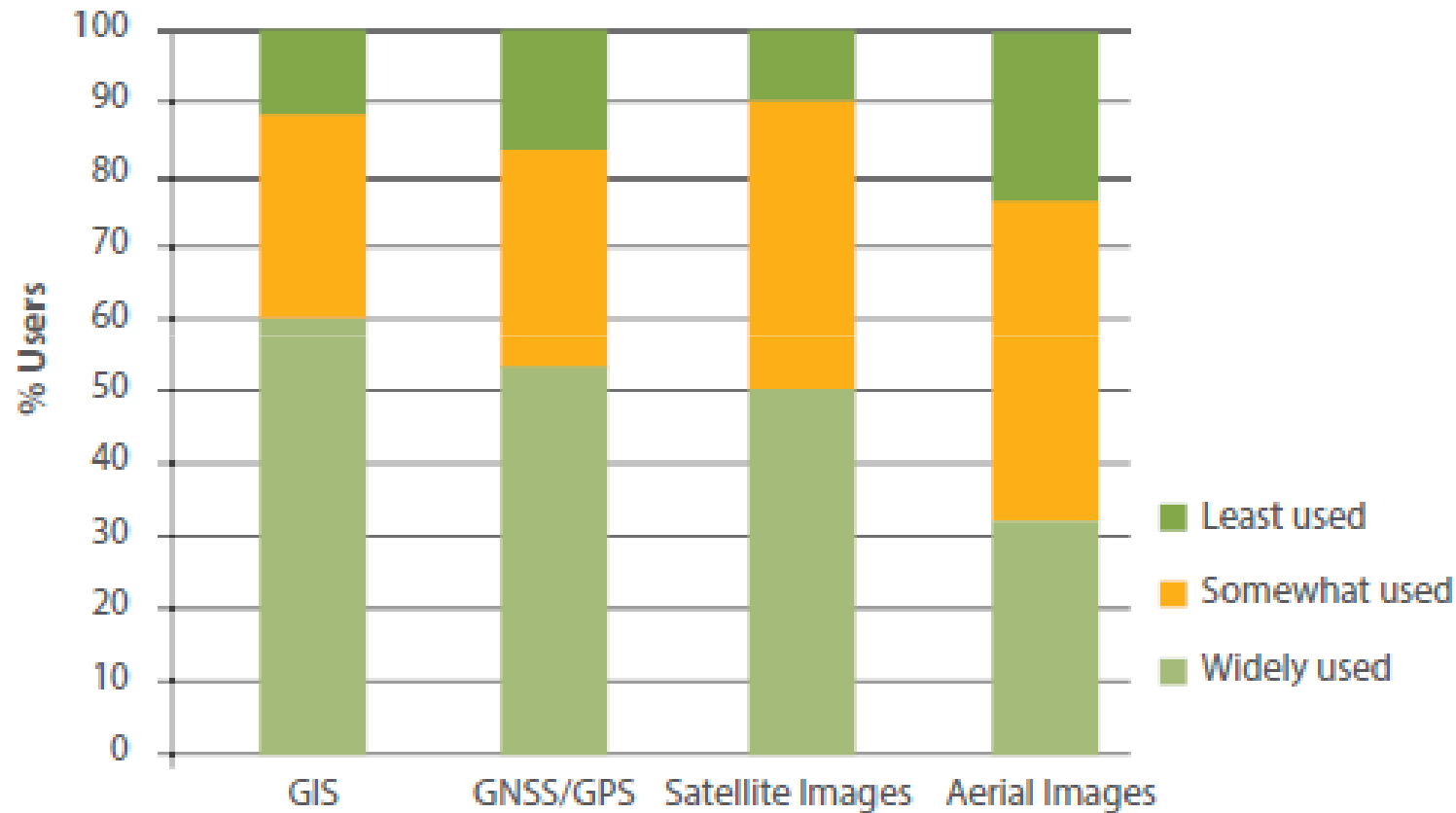
3/4
Agri
output
waste post
harvest



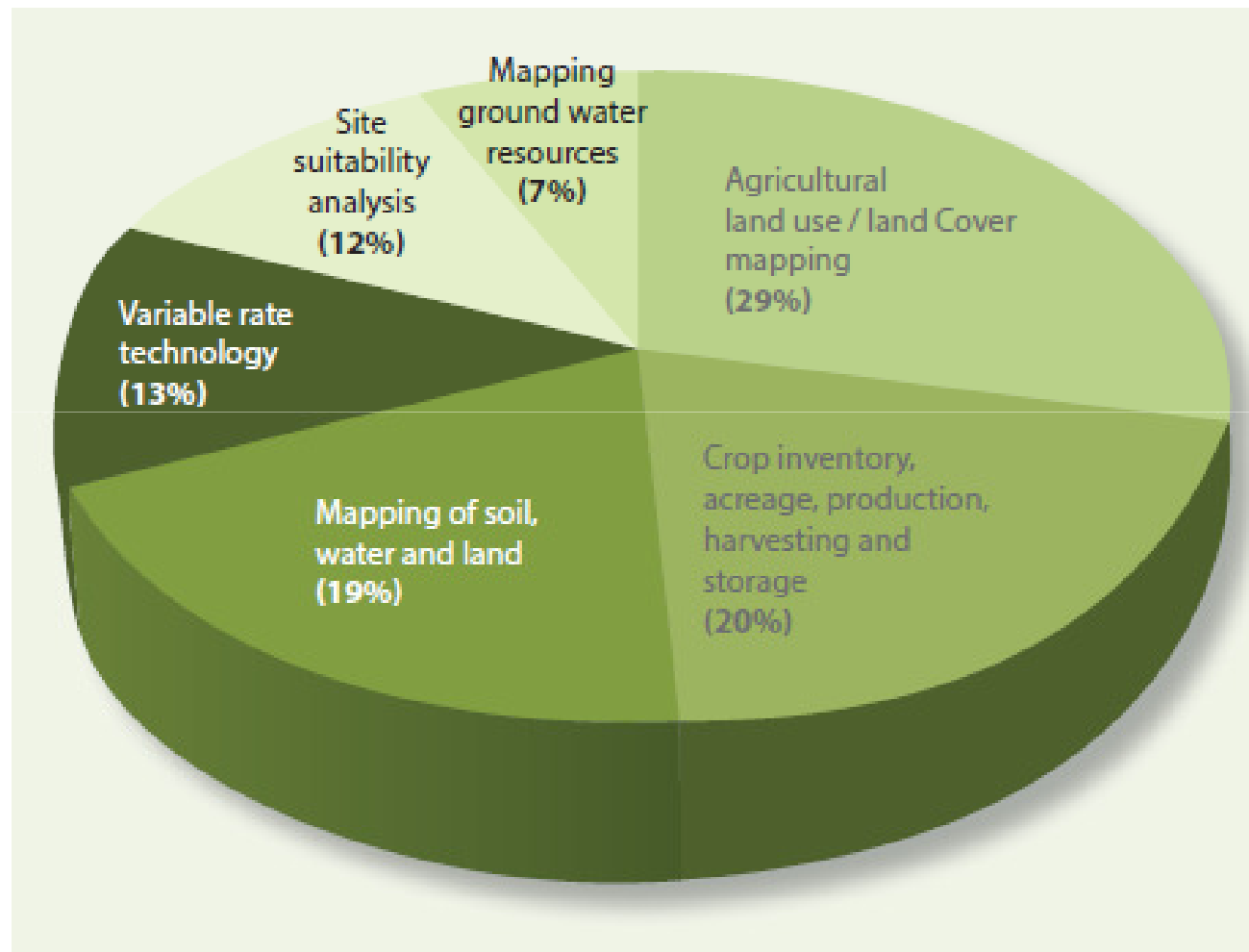
Respondents of the Survey



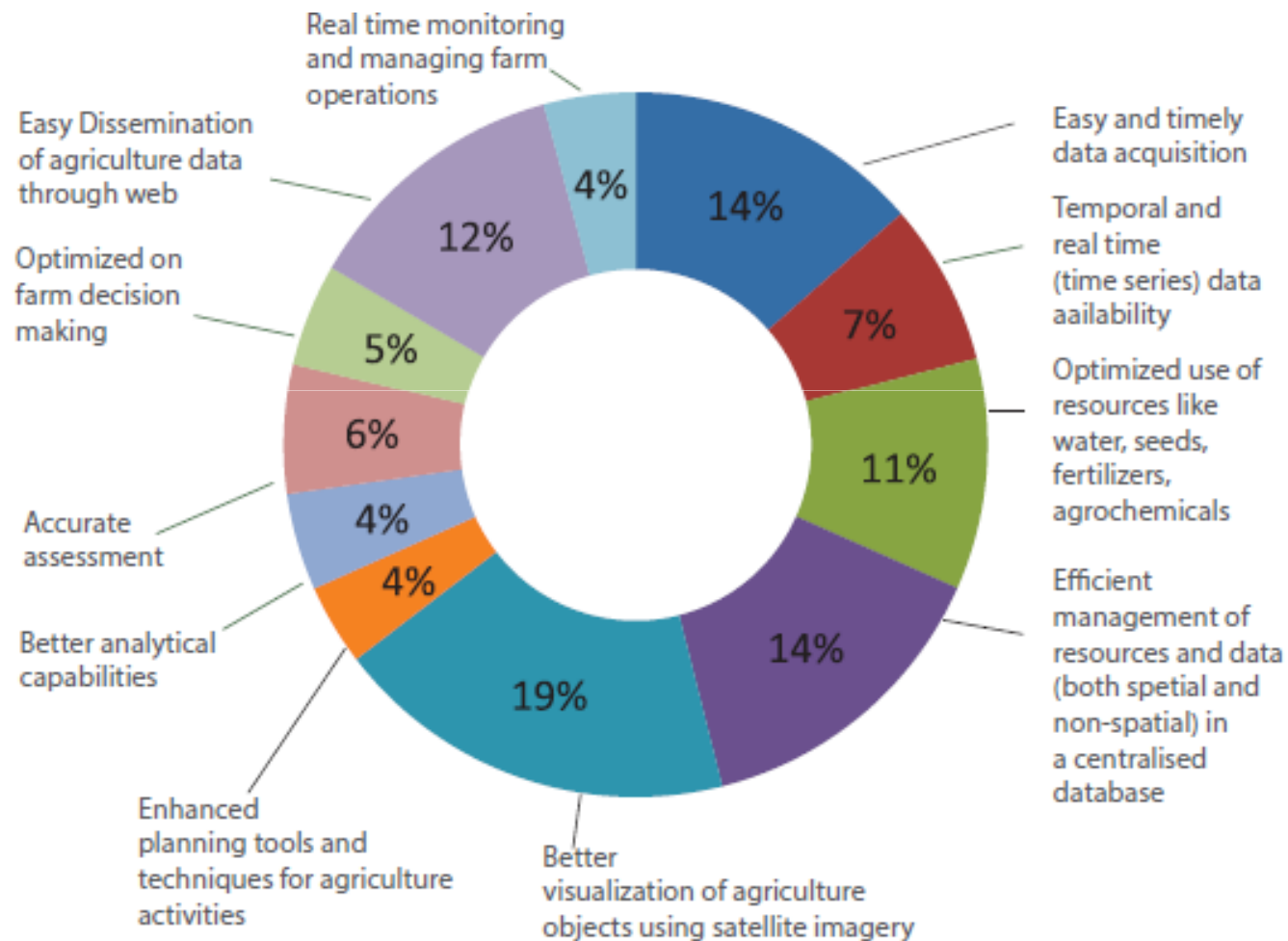
Worldwide Extent of Usage of Geospatial Technology



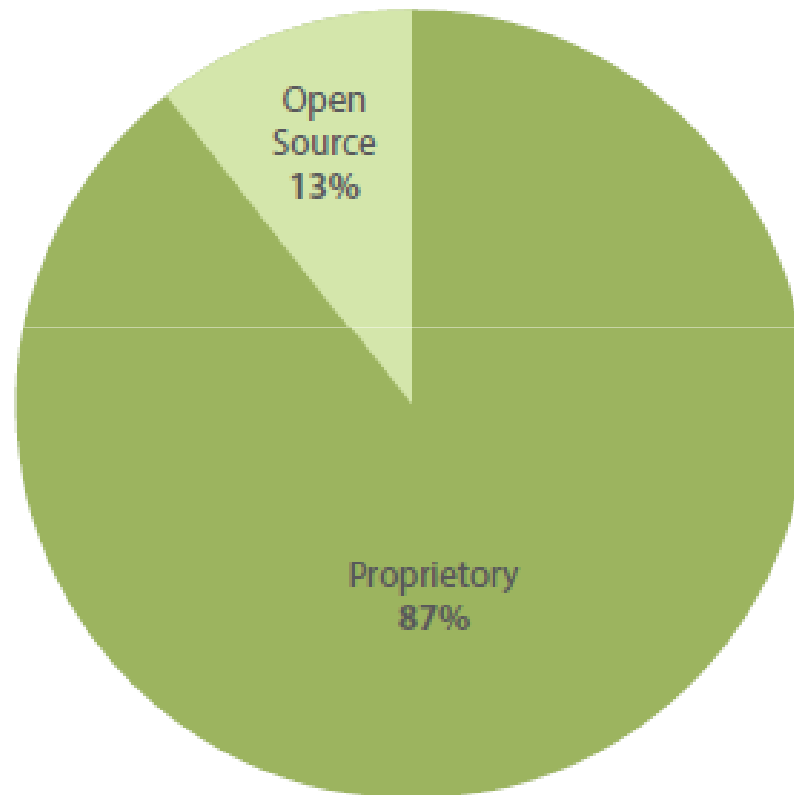
Usage of Geospatial Technology



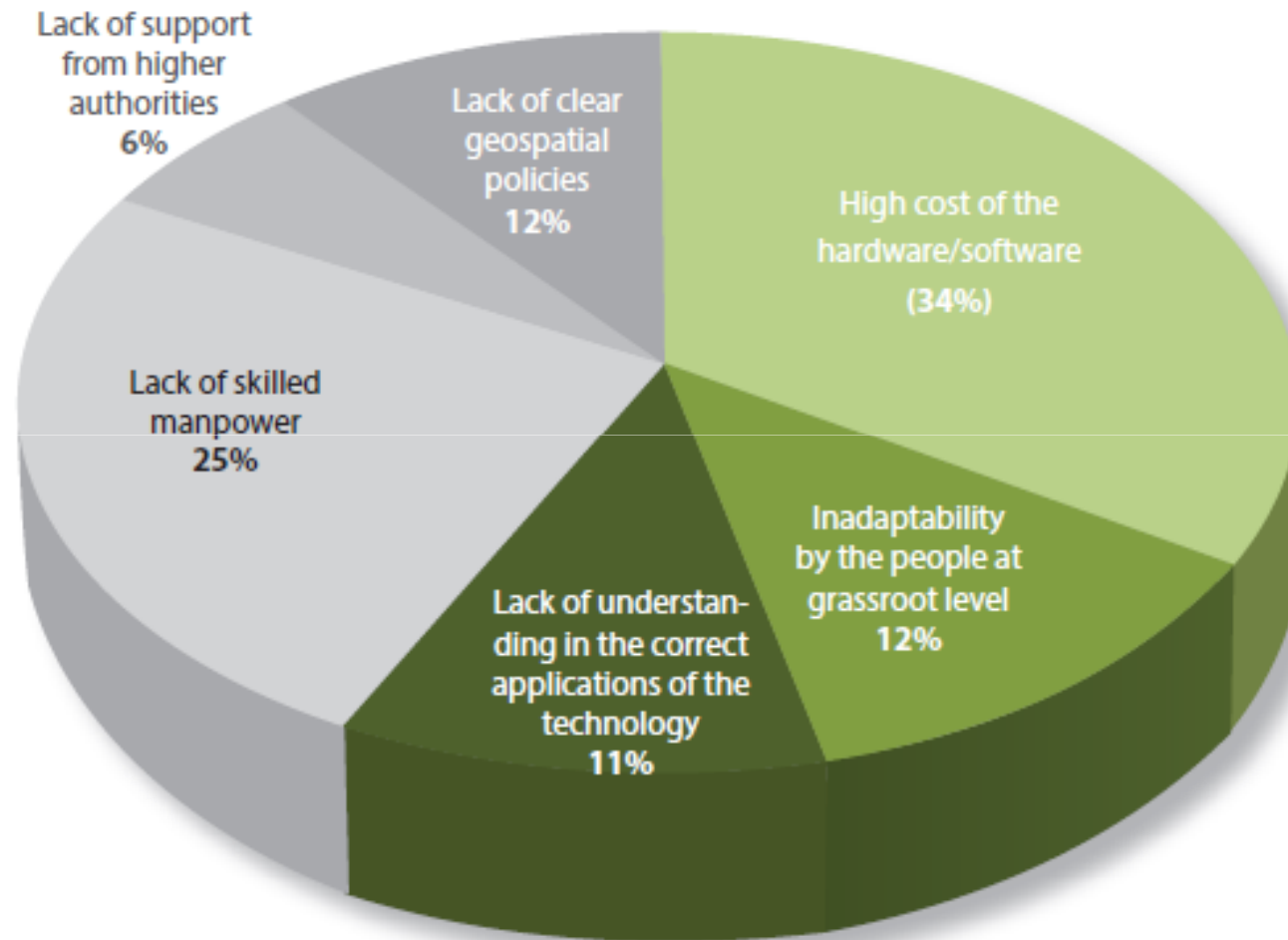
Value Proposition....



Software Used: Open Source vs Proprietary



Challenges of Geospatial Technology Usage



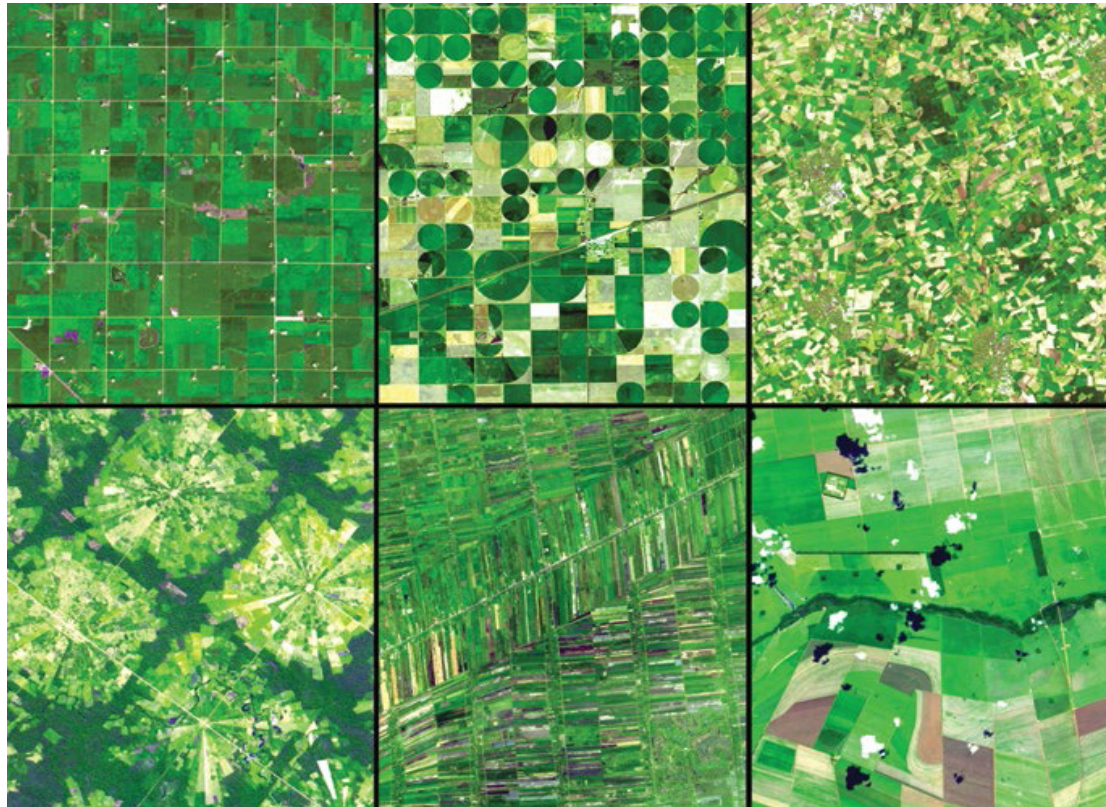
Technology trends

- Automated machinery
- Plant specific information
- Geo-tracking & tracing (including reduction of post-harvest loss)
- Increased sophistication of agricultural information systems
- Improved and refined market information
- More open data, access to data and capability of handling of big data
- Compatibility of systems

Three levels of interaction within a country:

- **Country level**
focusing on policy, research and innovation;
- **Agro-ecological zone or watershed level**
focusing on extension services and management of regional resources;
- **Farm level**
focusing on advice and income optimization.

Geospatial technology for agriculture



Remote sensing images showing agriculture patterns (Geospatial World)

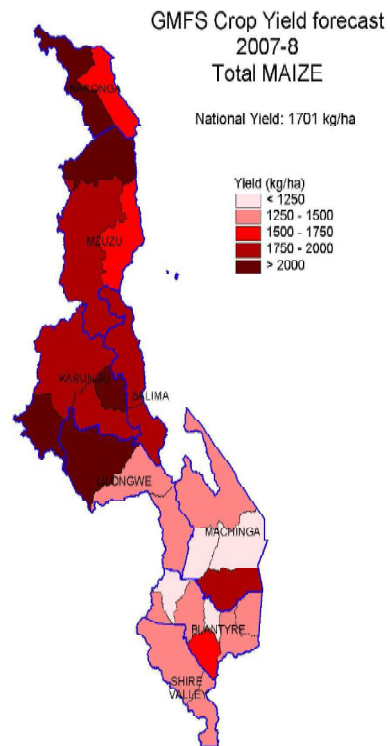
Geospatial technology at country level

- **Agricultural knowledge and information systems**
parcel identification and measurement, geo-statistics and crop identification, field survey, subsidy and policy monitoring and control,
- **National crop and yield monitoring,**
- **Transport infrastructure and transport to market**
(food chain management),
- **Land rights,**
- **Market information.**

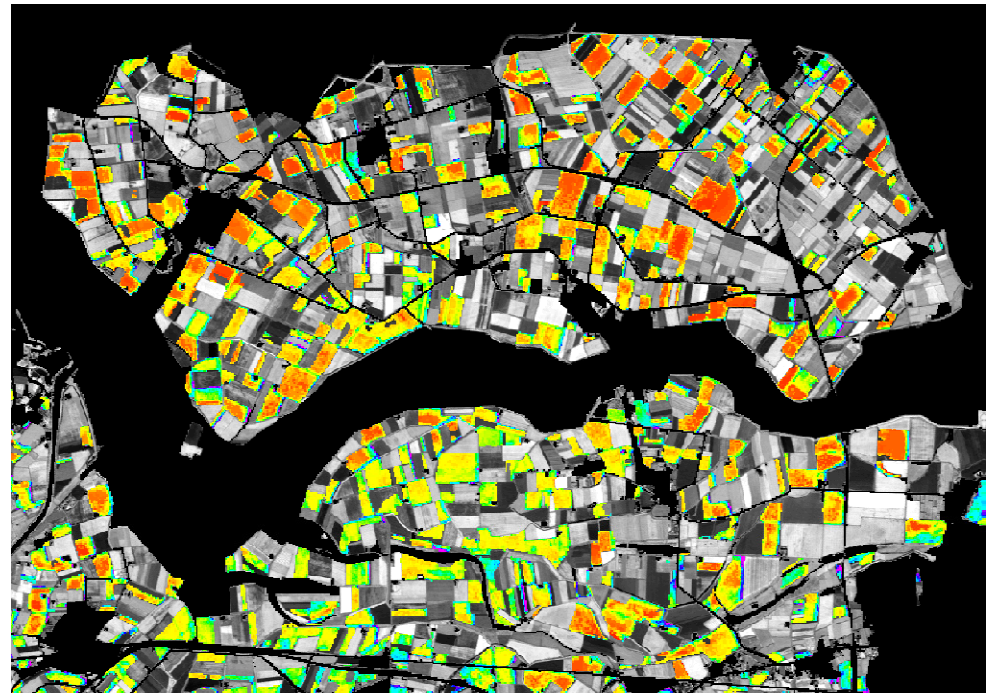


*Agricultural parcel (blue) one single crop group from a single farmer;
farmers' block/plot (red) one single or several crop groups from a single farmer;
and physical block (yellow) one single or several crop groups from one or several farmers.
(GeoCAP, JRC)*

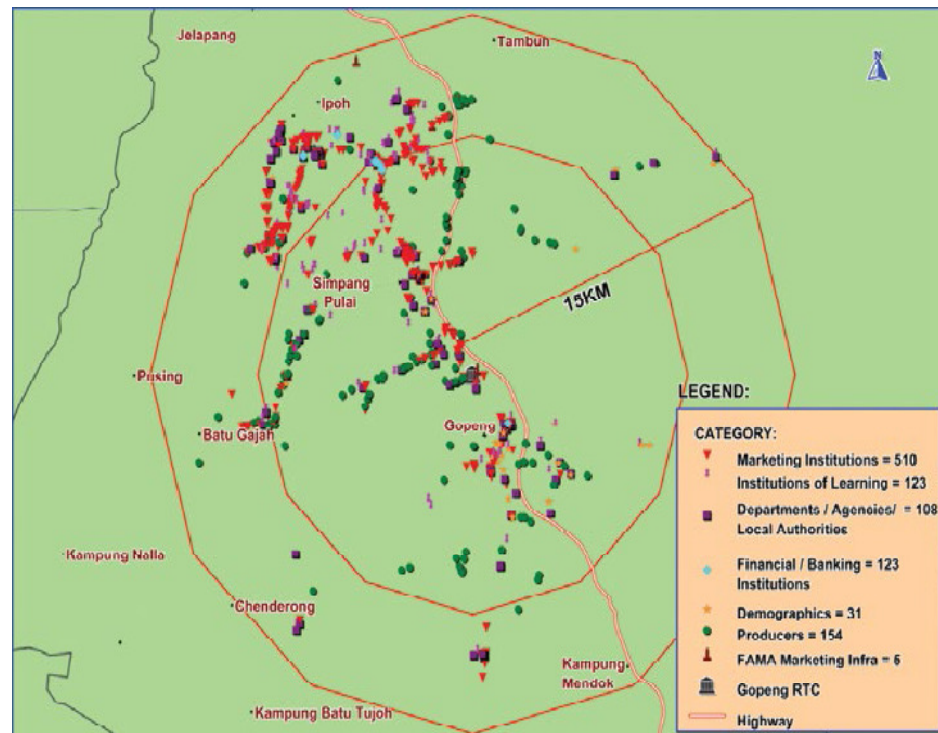
Crop and yield monitoring

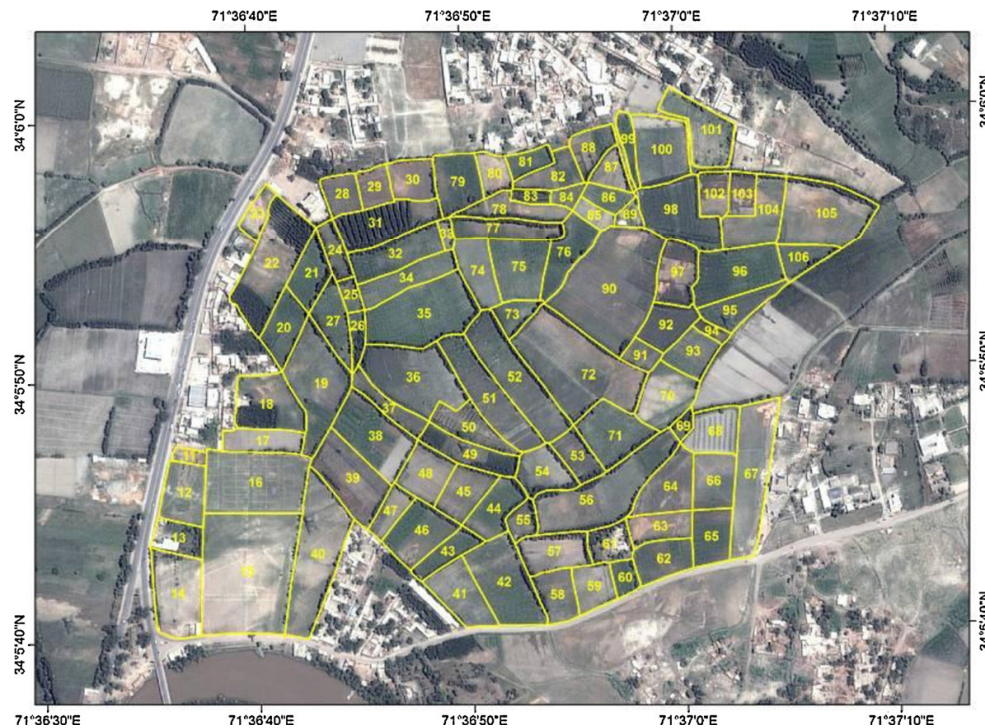


*Maize crop yield forecast 2007
Source: Service operations report
Malawi 2007 – 2008 (GMFS, 2008)*



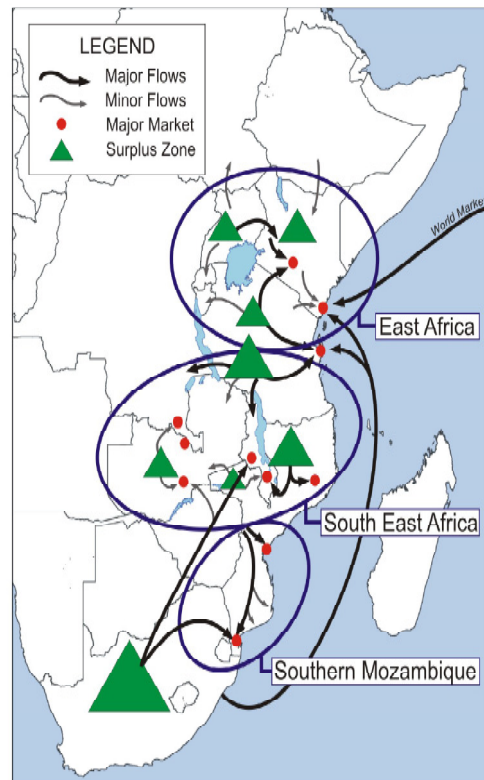
*Field scale wheat yield in the Netherlands
(blue: 9 ton/ha, green: 8 ton/ha;
yellow: 6 ton/ha, red 4 ton/ha)
Source: eLeaf*





*Digitised parcel boundaries
on QuickBird HRSI in
Zormandi area*

*(Source: First experiences
using high-resolution
imagery-based adjudication
approach in Ethiopia (WB))*



Maize Market Sheds in Eastern and Southern Africa

Source: Unscrambling Africa: Regional Requirements for Achieving Food Security (MSU, 2010)

Suitability for Delivering Content: ●●● High ●● Low

	In Person (Face-to-Face)	Voice			USSD	SMS
		Call Center	IVR	Voice Message		
Weather	●●●	●●●	●●●	●●●	●●●	●●●
Crop / Livestock Advice	●●●	●●●	●●●	●●●	●●●	●●●
Market Data	●●●	●●●	●●●	●●●	●●●	●●●
Financial Information	●●●	●●●	●●●	●●●	●●●	●●●

Flexibility of Content
(Customisation, Quality) High ← Low

Scalability Low → High

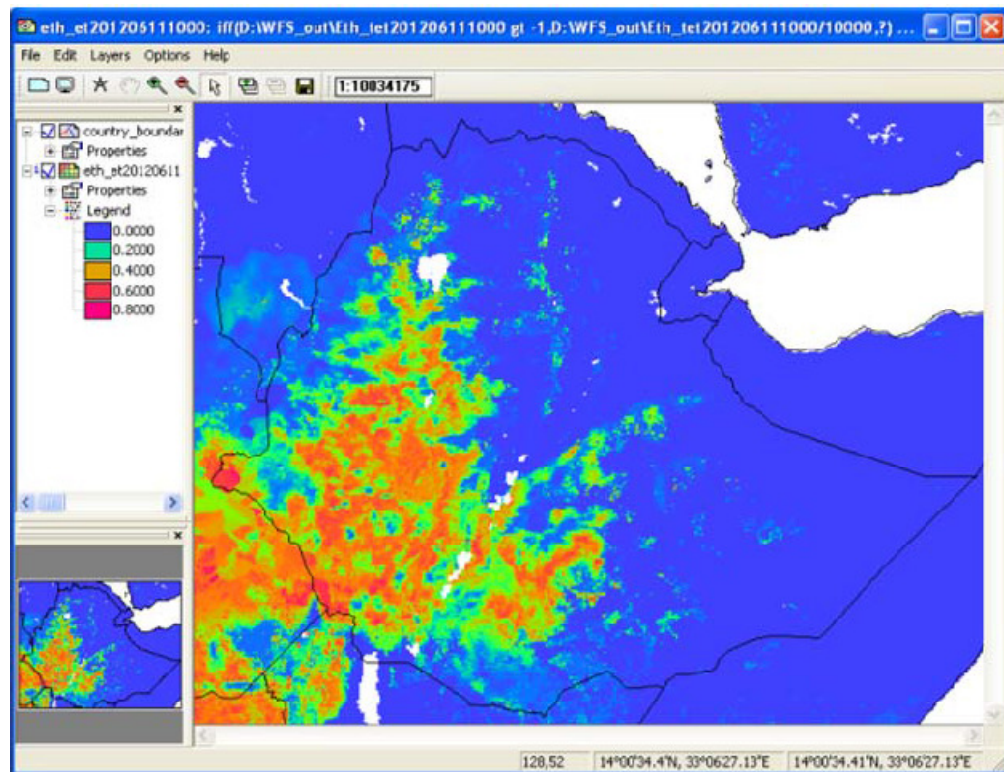
Suitability for delivering content
Source: AgriVAS market entry toolkit

Geospatial technology at agro-ecological zone / watershed level

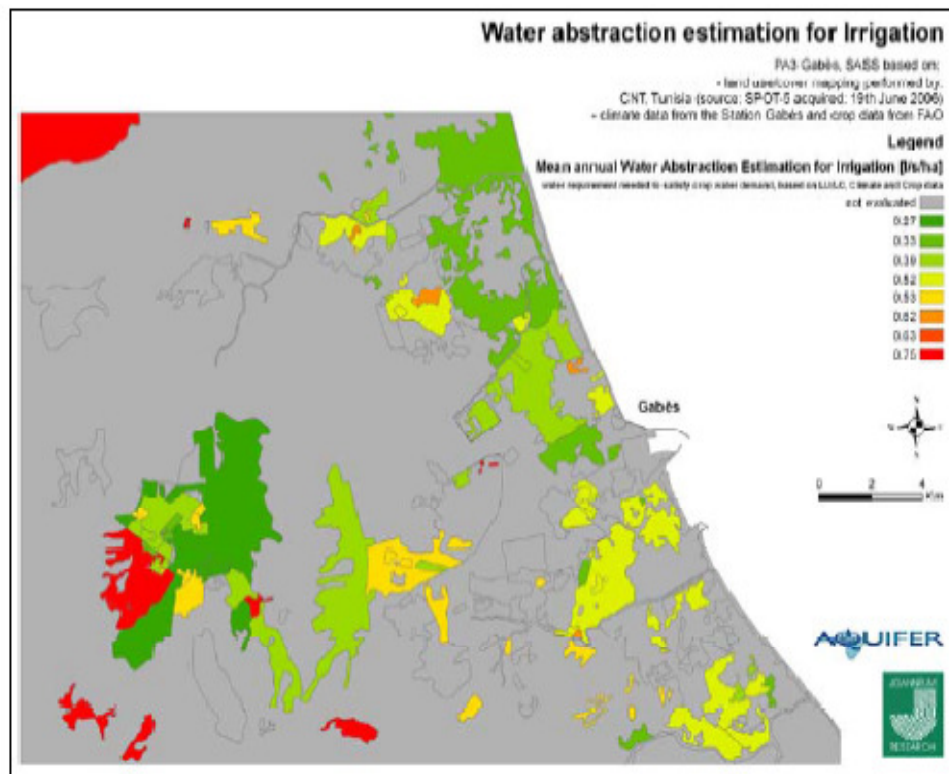
- Site evaluation
(sustainable land use, suitability analysis),
- Regional crop and yield monitoring,
- Water management,
- Weather prediction.

*Examples of reference parcels
super-imposed on aerial
orthoimagery
(colours correspond to
different land cover types)
(GeoCAP, JRC)*



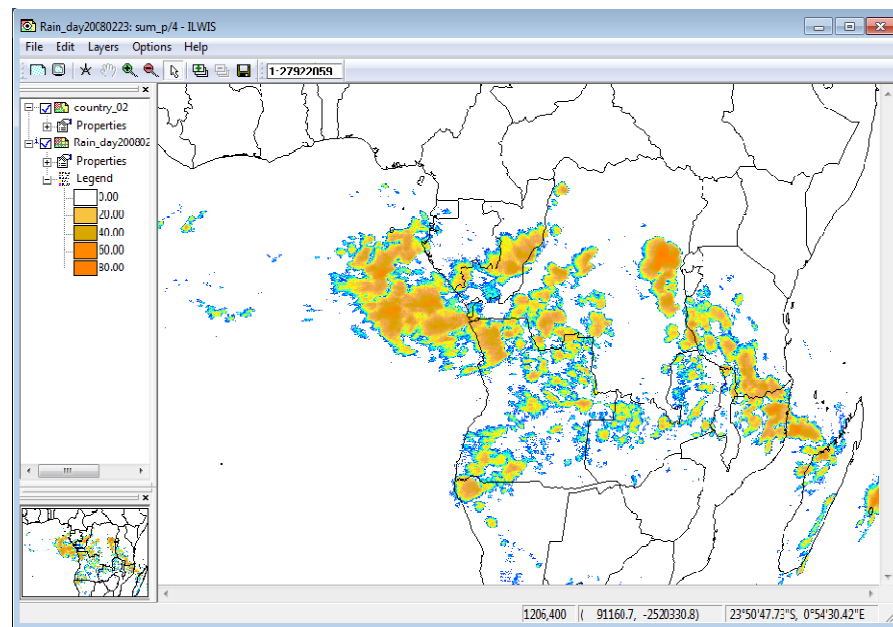


*Example evapotranspiration
Ethiopia
Source: GEONETCast
presentation (ITC, 2012)*



Mean annual water abstraction estimation for irrigation as amount of water needed to satisfy crop demand, Gabes area, Tunisia, 2006.

Source: Application of satellite remote sensing to support water resources management in Africa (TIGER, 2010)



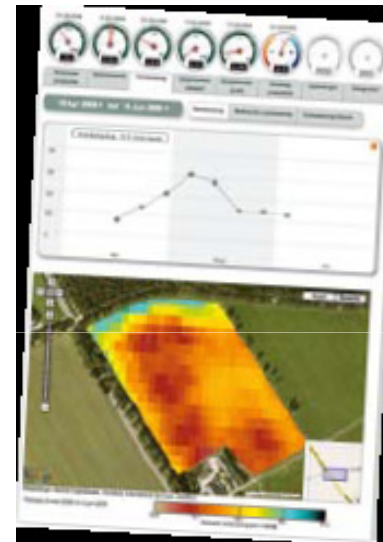
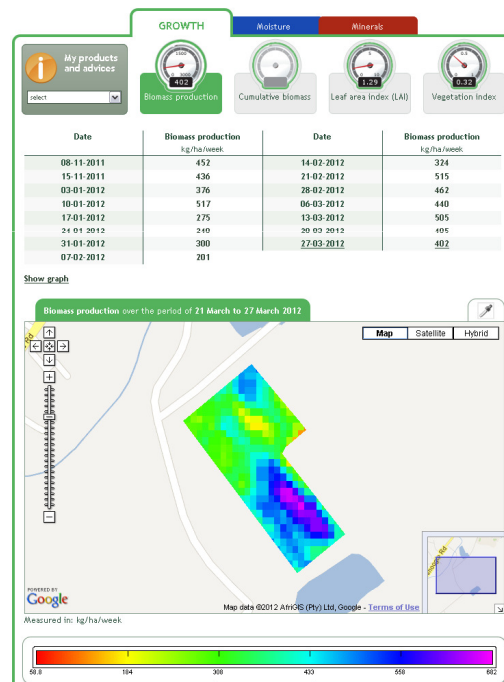
*Precipitation calculated over
Central Africa for 23-02-2008
Source: GEONETCast - DevCoCast application
manual (ITC, 2012)*



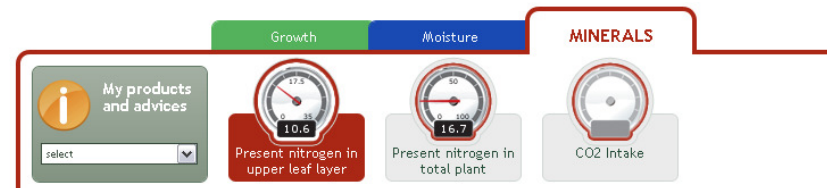
*Satellite dish installed at
National University of Rwanda
Source: GEONETCast presentation
(ITC, 2012)*

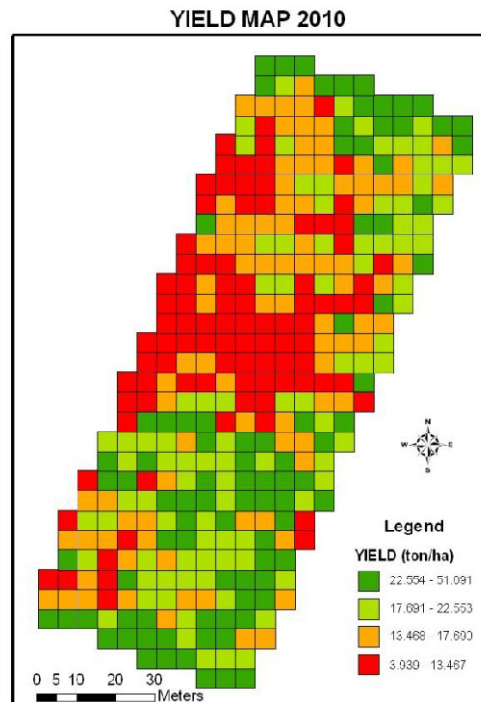
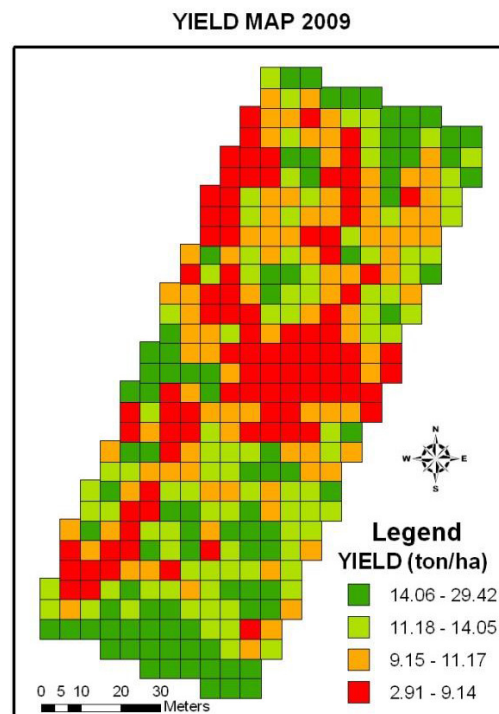
Geospatial technology at farm level:

- **Farm site evaluation,**
- **Precision agriculture:** machine guidance, precise planting and harvesting, fertilization advice, yield monitoring, water management advice,
- **Pest management,**
- **Weather prediction:** temperature, rainfall (amount, geographical distribution, intensity, timing), extremes (rainfall, drought, wind, hail, etc.).



Source:
MijnAkker, Netherlands
&
FieldLook, Ethiopia
(eLeaf 2012 & 2013)



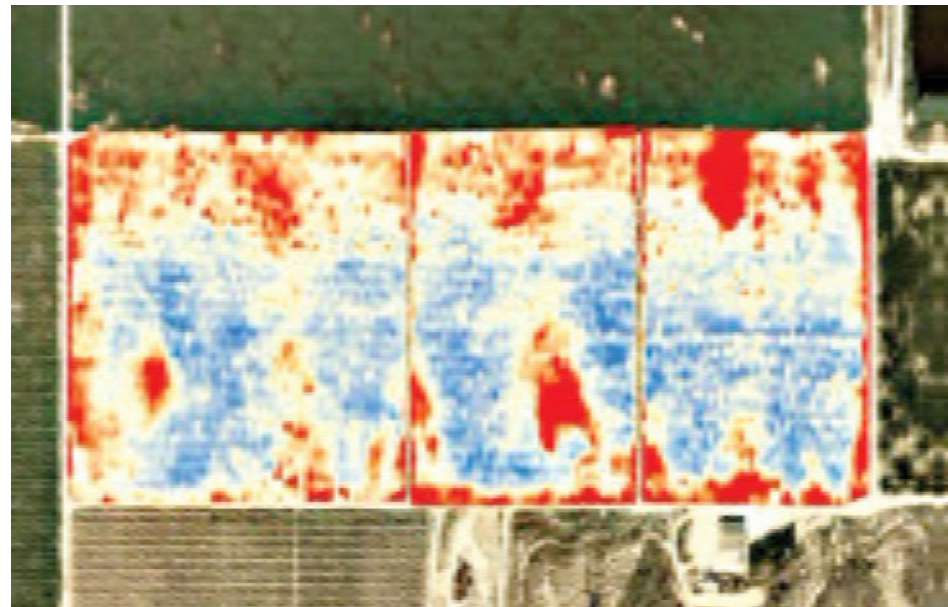


Vineyard yield map and comparison 2010 and 2009

Source: Fountas



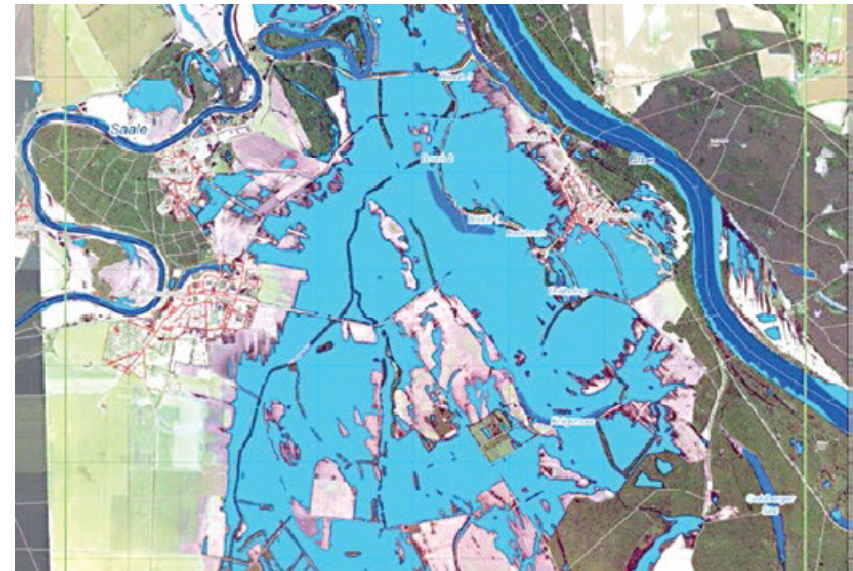
*"FieldCopter" used to monitor
crop health
(AeroVision, sponsor: EC/ Galileo)*



Water stress in a vineyard in Spain (AeroVision)



Pre-flood situation in the agricultural area around Breitenhagen, Germany (source: Munich Re)



Flood on the River Elbe in the agricultural area around Breitenhagen in Germany in June 2013. The flooded area is shown in light blue, and the reference water level in dark blue (source: Munich Re)

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Thank You !!