"Precision Farming – Concepts and Efficient Technologies"

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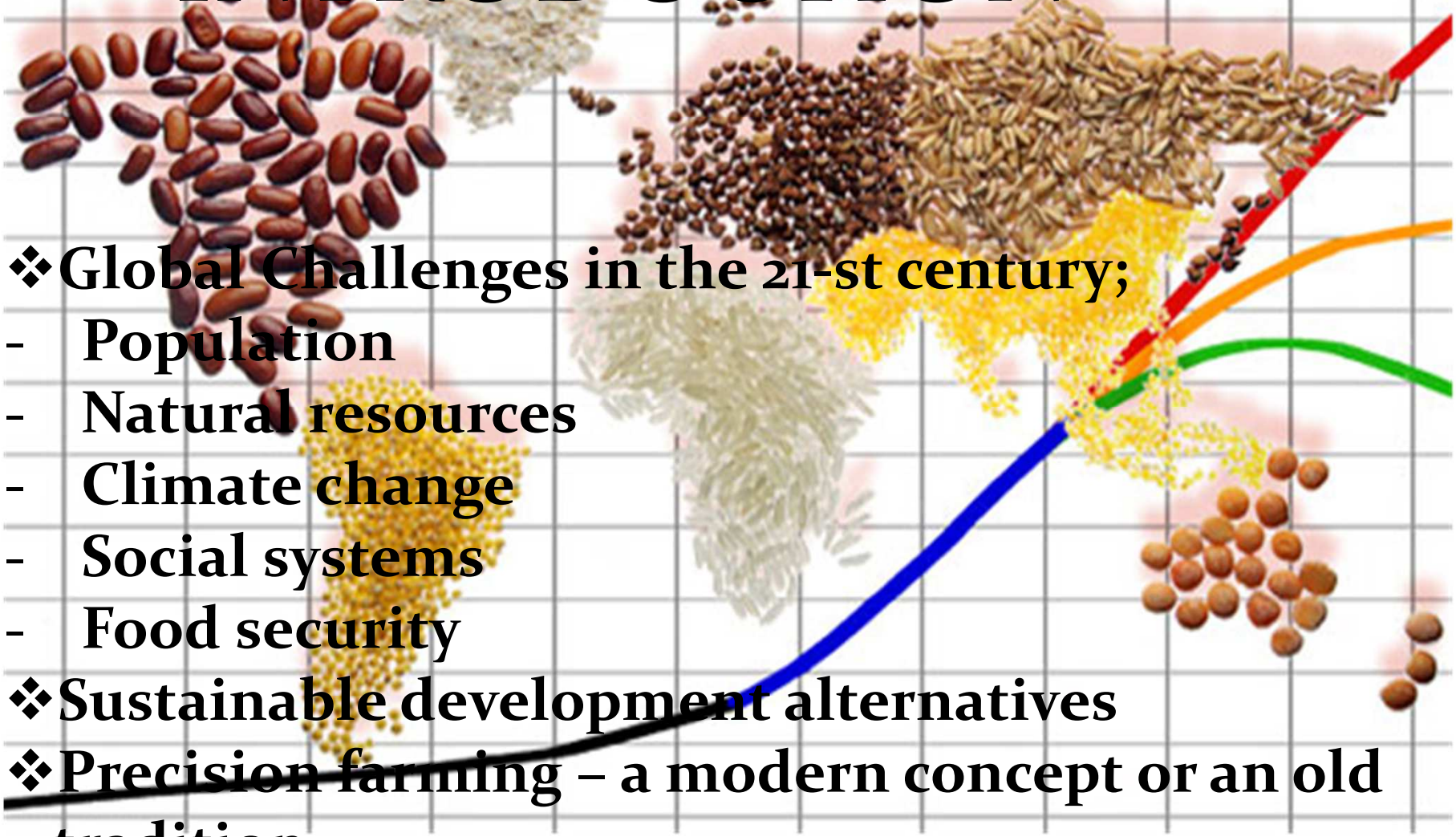
INTRODUCTION



- **Global Challenges in the 21-st century;**
  - **Population**
  - **Natural resources**
  - **Climate change**
  - **Social systems**
  - **Food security**
- **Sustainable development alternatives**
- **Precision farming – a modern concept or an old tradition**

RESEARCH OBJECTIVES

Main objective of this research is to investigate the popular concepts of precision farming, to analyze its development during the years, and to find the most appropriate technologies in the Europe's production and institutional environment.

WHAT IS PRECISION AGRICULTURE?

DEFINITIONS

"an integrated information- and production-based farming system that is designed to increase long term, site-specific and whole farm production efficiency, productivity and profitability while minimizing unintended impacts on wildlife and the environment"

US House of Representatives (1997)

apply the right treatment in the right place at the right time

Gebbers & Adamchuk (2010):

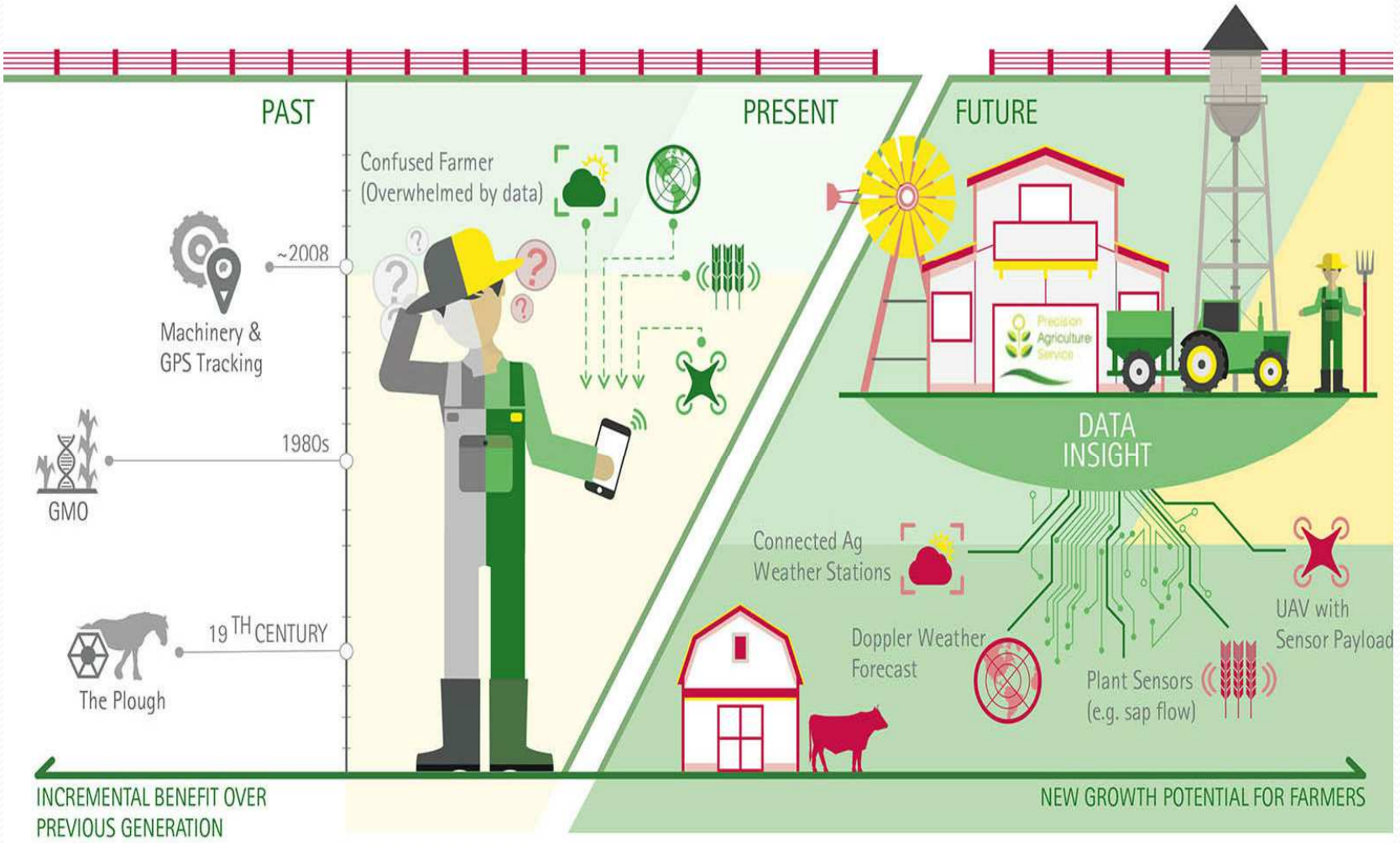
information technology applied to agriculture

Lowenberg-DeBoer and Boehlje (1996)

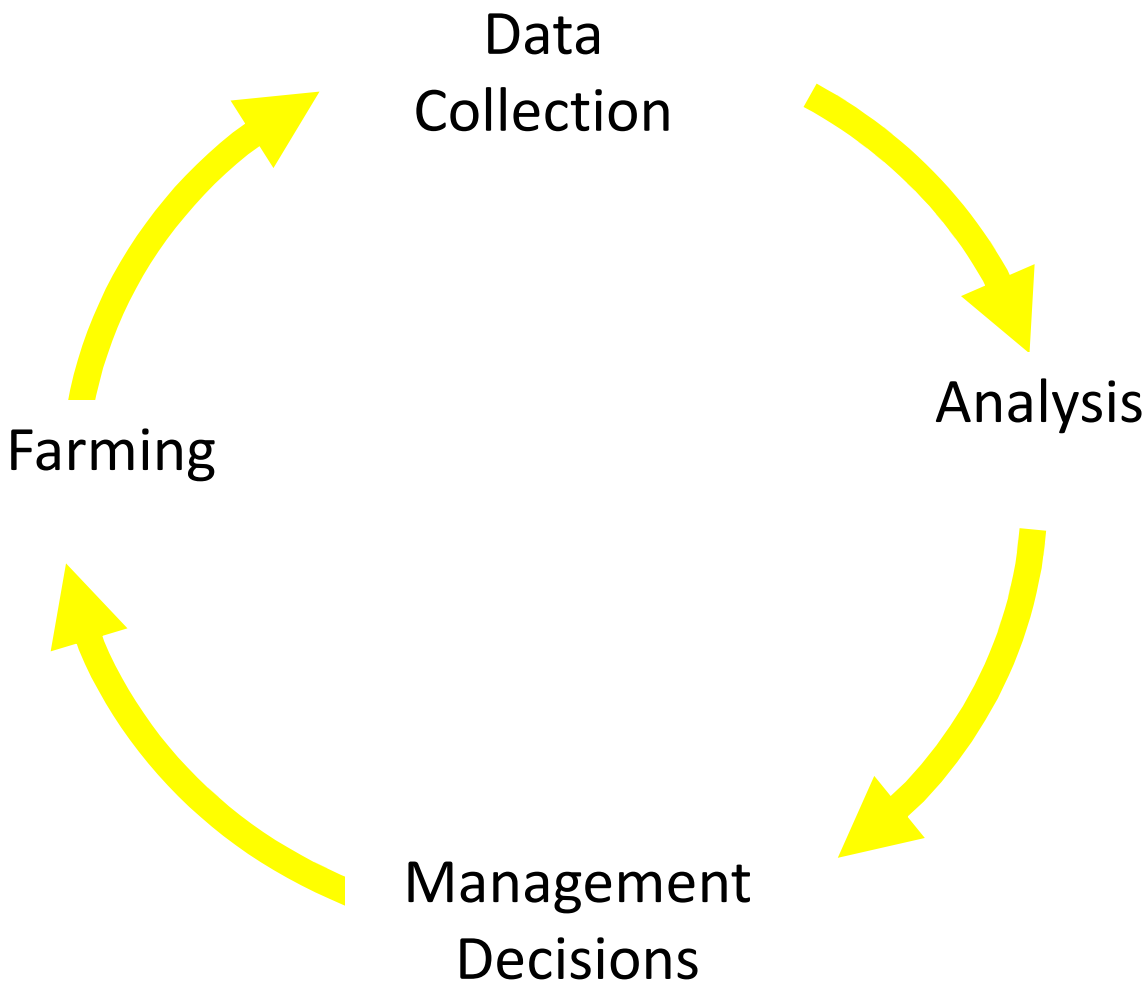
"environment friendly system solution that optimizes product quality and quantity while minimizing cost, human intervention and the variation caused by unpredictable nature".

Gebbers & Adamchuk (2010):

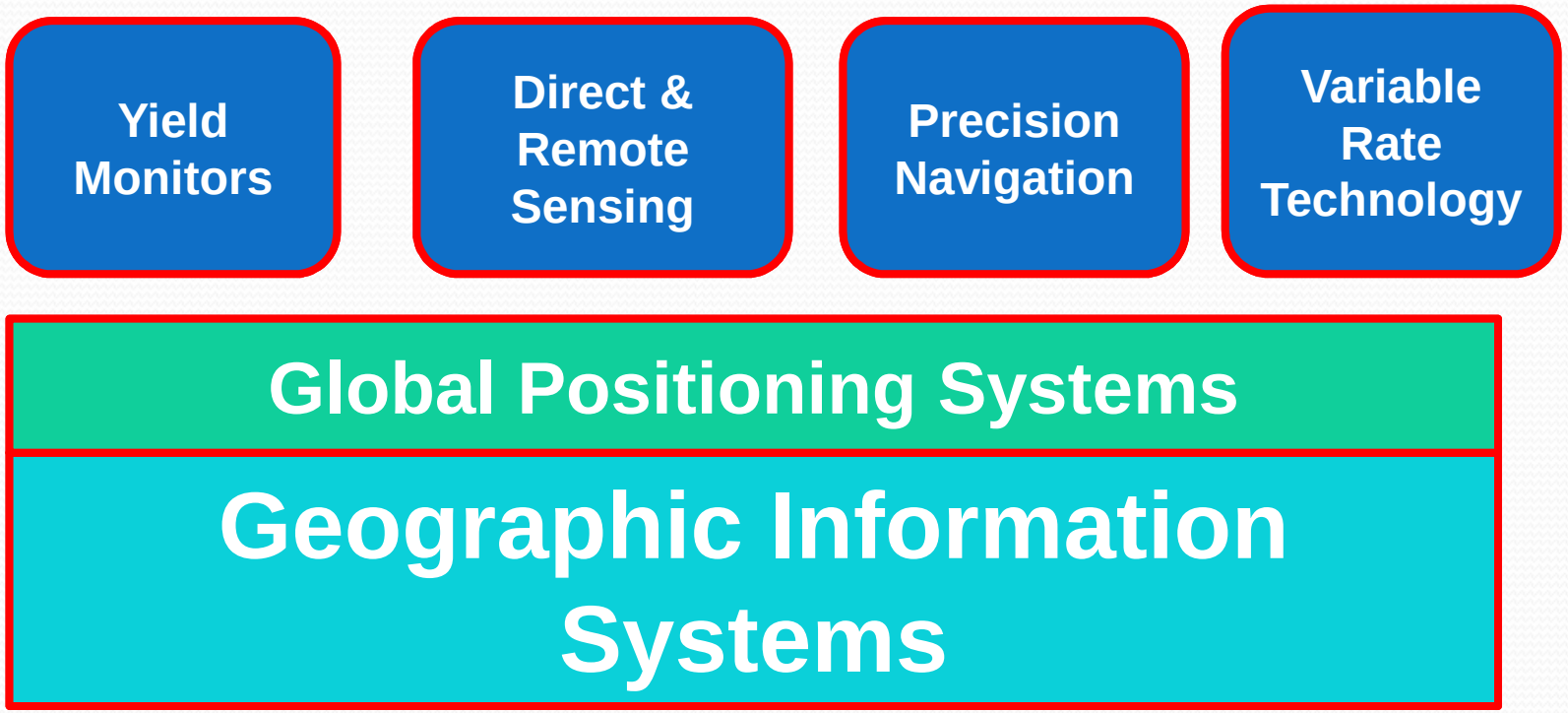
THE EVOLUTION OF PRECISION FARMING



Precision Agriculture



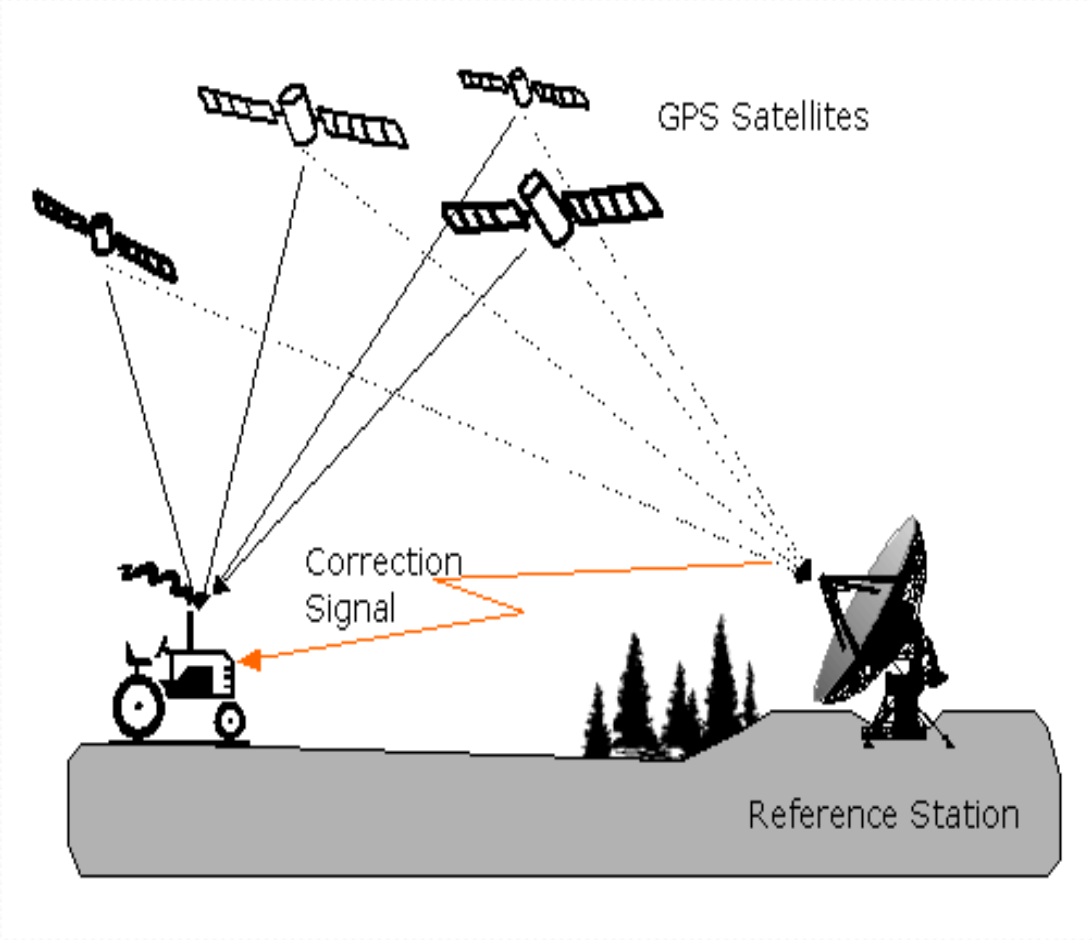
TECHNOLOGIES OF PRECISION AGRICULTURE



Global Positioning System (GPS)

- First GPS satellite was launched in 1978. Global Positioning System – US military system, fully operational since 1995
- There are 24 GPS satellites in orbit at this moment.
- Having precise location information at anytime allows crop, soil and water measurements to be mapped. GPS receivers, either carry to the field or mounted on

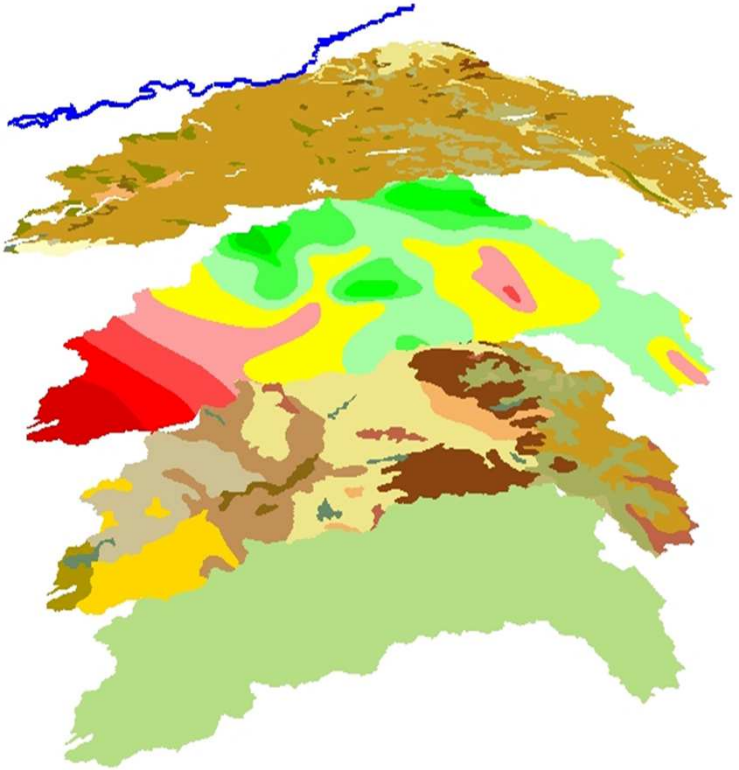
implements allow users to return to specific locations to sample or treat those areas.

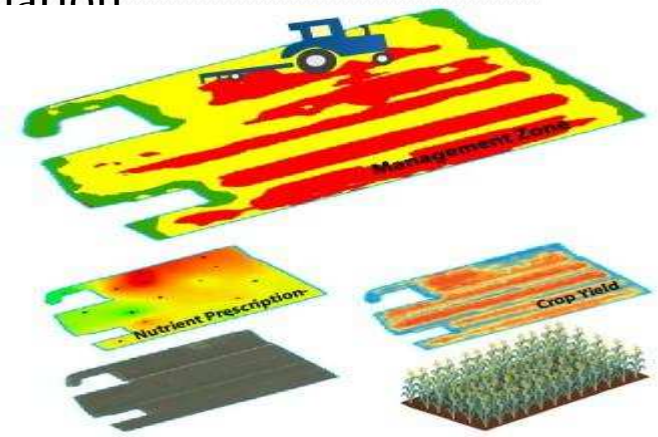


Geographic Information Systems

- GIS is powerful set of tools
- GIS can be used to produce images, not just maps, but drawings, animations.
- While natural inputs in farming cannot be controlled, they can be better understood and managed with GIS applications such as crop yield estimates, soil amendment analyses, and erosion identification and remediation

Map layers





Remote sensing

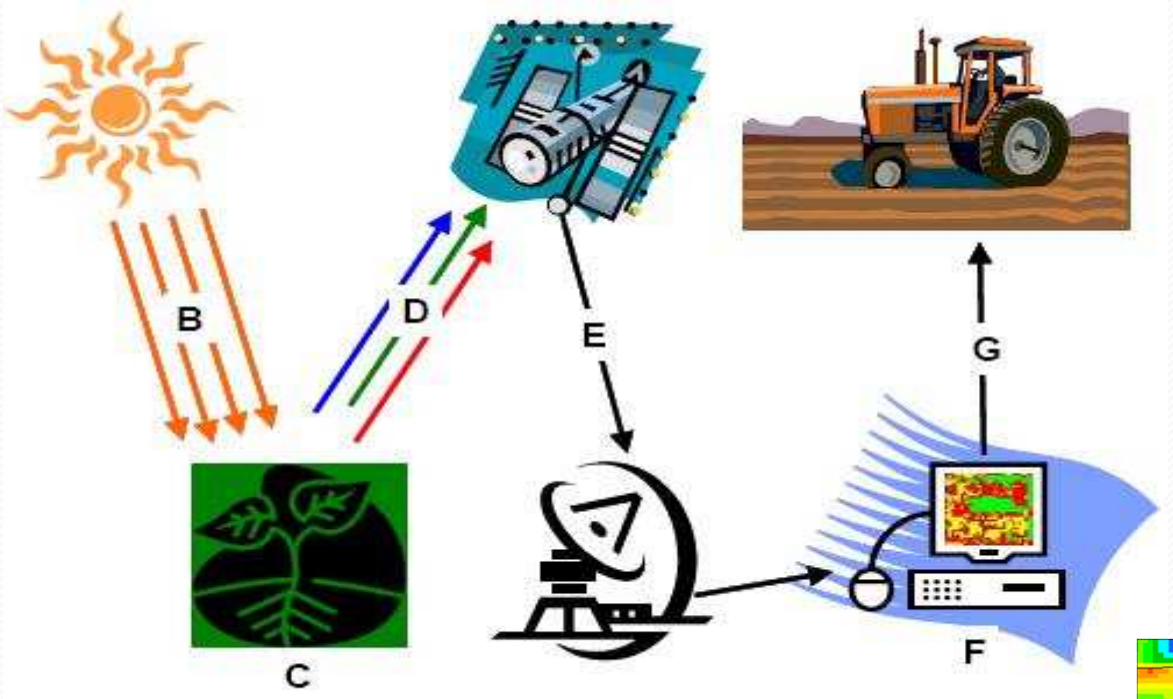
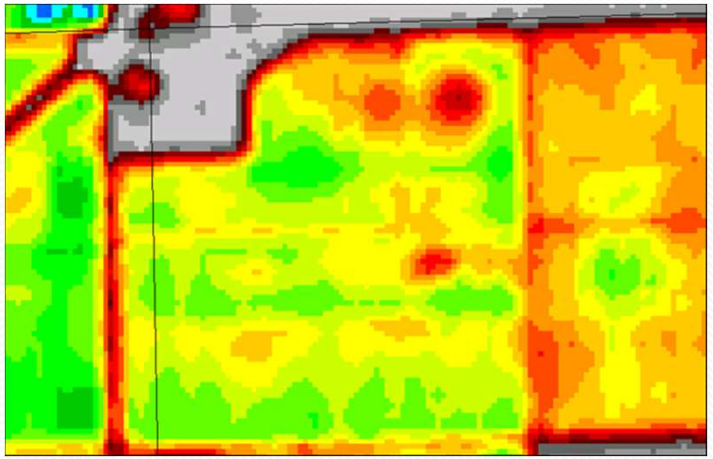


Figure 4. The remote sensing process.

Remotely sensed images taken from satellites and aircraft provide a means to assess field conditions, without physically touching them, from a point of view high above the field.

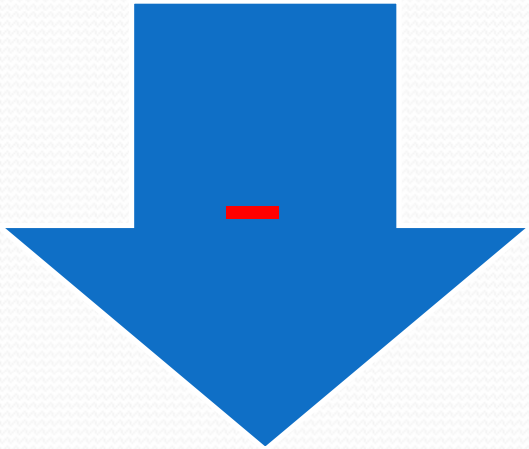


Variable Rate Technology

Example of variable-rate seeding prescription maps.

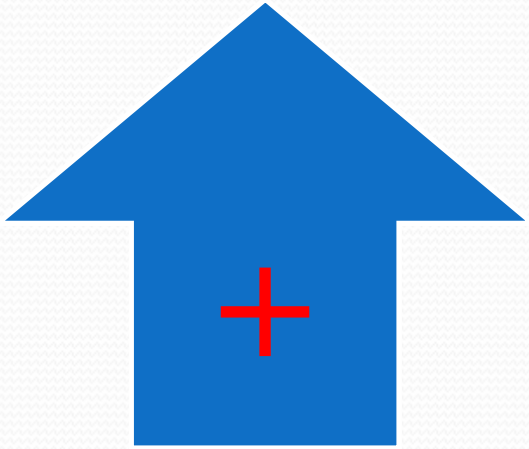
Variable-rate input application technology (VRT) allows farmers to customize the application of fertilizer, chemicals, and pesticides using GPS data—often from yield and soil maps or guidance systems. Farmers can even use VRT to plant different types of seeds at different locations with a single pass of the tractor.

PRECISION AGRICULTURE- DIFFERENT ARGUMENTS



High initial cost for small and medium sized farms
-Not suitable for small scale set up
- Incapability and complexity issues
- Lack of education

- Reduce input costs
- Improved soil conditions
- Improved accuracy in terms of land selection, fertilizers e.t.c.



CONCLUSIONS

- Precision agriculture is an information-based, decision-making approach to farm management designed to improve the agricultural process by precisely managing each step. In this manner, PA can provide a management approach optimizing both agricultural production and profitability – which is the key goal of most farming enterprises. Additionally, part of profitability can come from the reduced use of inputs (machinery, labour, fertilizer, chemicals, seeds, water, energy, etc.), leading to both cost savings and also environmental benefits
- While in the early days the crop yield monitor was seen as the first step to PA, suppliers of equipment consider that the regulations linked with obligatory soil monitoring open new possibilities for the adoption of PA. These type of tasks can be conducted very efficiently with GNSS and the new sensors offered in the framework of PA.
- Different studies across Europe seem to suggest that farmers consider PA a viable solution for them. Nevertheless, it seems that there is a long way to go before the majority is convinced