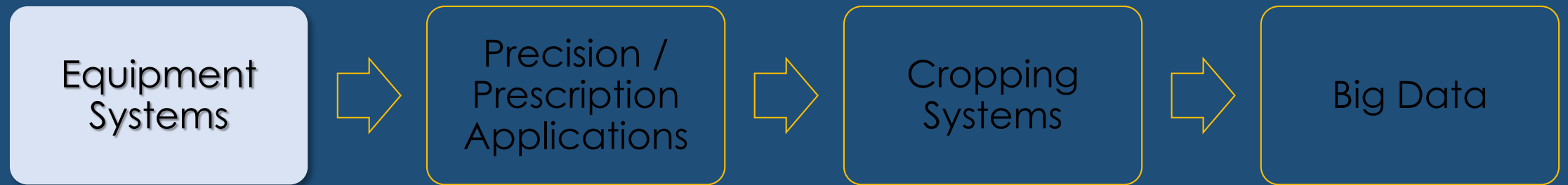# FARMING WITHIN 10 YEARS

Robert V. Avant, Jr., P.E. (Inactive)
Agricultural Consultant

DRIVERS

- Impact of 9 billion people by 2050 will affect demand
- Supply will be stressed
- Age of producers (About 60)
- New generation of producers - new attitudes
- Land availability and cost of rent

FARMING IN 10 YEARS

Equipment Systems → Precision / Prescription Applications → Cropping Systems → Big Data

AUTONOMOUS TRACTORS

Photo by: John Deere

Photo by: CNH

Photo by: John Deere

Photo by: Spirit

Photo by: CNH

AUTONOMOUS OPERATIONS

Photo by: John Deere

Photo by: CNH

AUTONOMOUS OPERATIONS

Photo by: AGCO

Photo by: Spirit

AUTO-STEER

Photo by: AGCO

FARMING IN 10 YEARS

Equipment Systems → Precision / Prescription Applications → Cropping Systems → Big Data
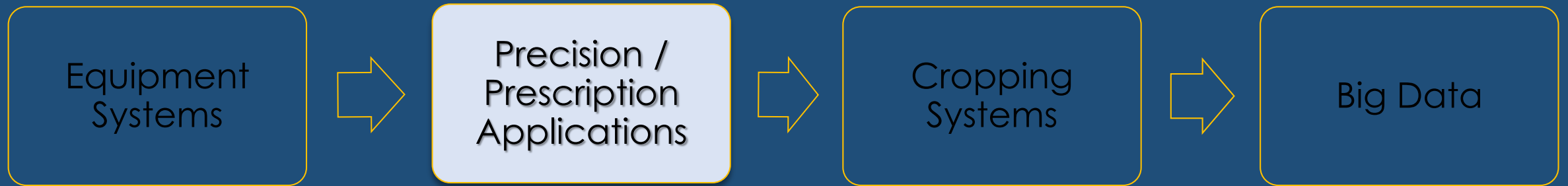
PLANTERS

Photo by: Kinze

SPRAYERS/APPLICATORS

Photo by: John Deere

STRIP TILL

Photo by: CNH

FARMING IN 10 YEARS

Equipment Systems → Precision / Prescription Applications → Cropping Systems → Big Data
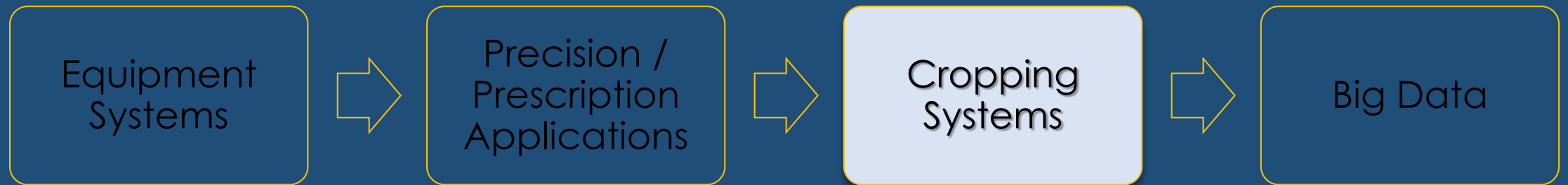
NEW PLANT GENETICS

- Quality components
    - Fiber quality (cotton)
    - High oleic corn
    - Starch/protein/antioxidant content (grain)
- Stress
    - Water use efficiency
    - Nutrient efficiency
    - Climate adaptation
- Pest tolerance
    - Insects
    - Disease
    - Weeds
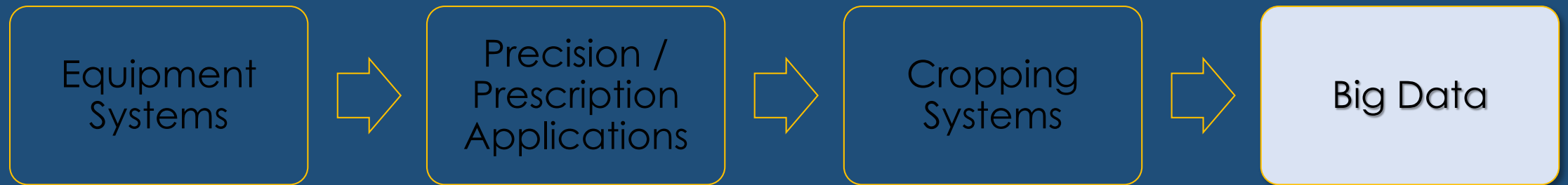

Photo by: AgriLife Research

Photo by: AgriLife Research

UAV'S

- Phenotyping for plant breeders
  - ❖ Plant height
  - ❖ Yield
  - ❖ Individual plant assessment
- Decision support for farmers/ranchers
  - ❖ Stress
  - ❖ Insects
  - ❖ Weeds
  - ❖ Targeted applications
  - ❖ Animal agriculture

Photo by: AgriLife Research

Photo by: AgriLife Research

FARMING IN 10 YEARS

Equipment Systems → Precision / Prescription Applications → Cropping Systems → Big Data

WHAT IS "BIG DATA"

"Big data is an accumulation of data too large and complex for processing by traditional data base management tools." (It was first defined in 1980.)

Meriam Webster

Basically, everything that is done on farm today generates big data and that valuable intellectual property could be jointly owned – equipment companies, suppliers, producers.

CONTEXT

- Users are accumulating 100's of terabytes of data
- Requires new storage capacity
- Requires new processing systems
- Must be merged
- Must be managed

BIG DATA MANAGEMENT

- Data consistency and validation
- Release of confidential information
- Protection of generated IP
- Valuation of and compensation for IP
- Security of data acquisition and management systems
- Liability for inadvertent release
- Users don't want to be IT managers

**AGRICULTURE TECHNOLOGY PROVIDERS (ATP)
PRIVACY AND SECURITY
PRINCIPLES FOR FARM DATA
November 13, 2014**

American Farm Bureau Federation ® www.fb.org

American Soybean Association

Beck's Hybrids

Dow AgroSciences LLC

DuPont Pioneer

John Deere

National Association of Wheat Growers

National Corn Growers Association

National Farmers Union

Raven Industries

The Climate Corporation – a division of Monsanto

USA Rice Federation

TECHNOLOGY TRENDS (10 YRS)

- Autonomous systems

- Smart equipment systems (Internet of Things)

- Remote sensing (aircraft and satellites)

- UAV's (sensing and application)

- Advanced sensor systems

- New crop traits (pests, disease, stress, quality)

TECHNOLOGY TRENDS (10 YRS)

- Big iron to small iron
- Reduced field operations
- Precision/prescription applications (Variable Rate Tech)
- Attention to soil health
- Microbes, endophytes, bacteriophages
- Big data