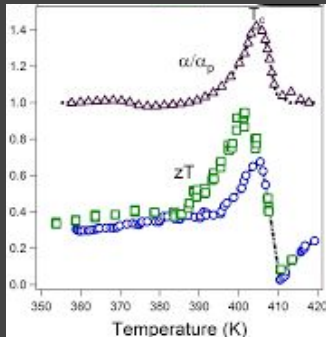# David Brown, Pivot Bio

My goal is to make agriculture into engineering.
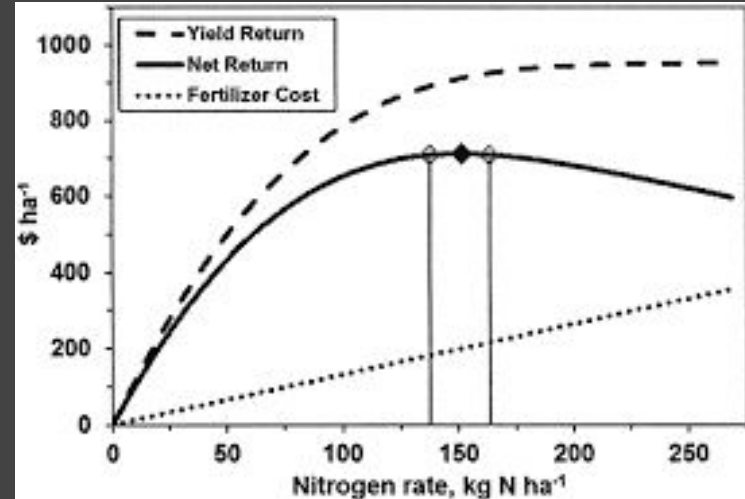
Ph.D.
Applied Physics

Google [X]

"Machine Learning, agriculture, & robots"
- Astro Teller

Pivot Bio

Agricultural Experiments at National Scale

Farmers care about yield and profits

Untreated   Treated
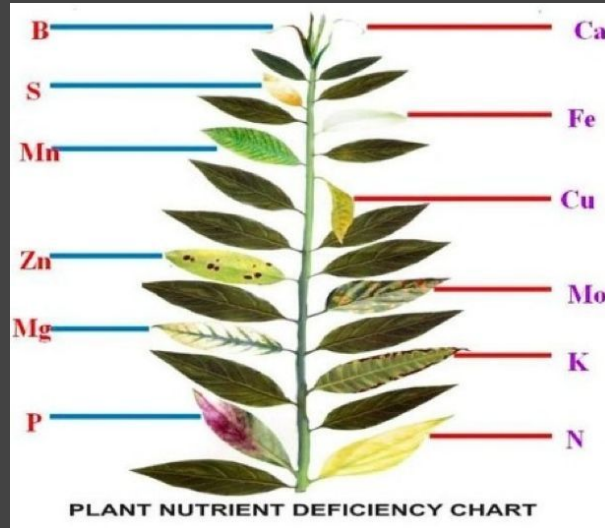
Yield is money in farmer's pocket

Optimize input to maximize returns and reduce their risk.
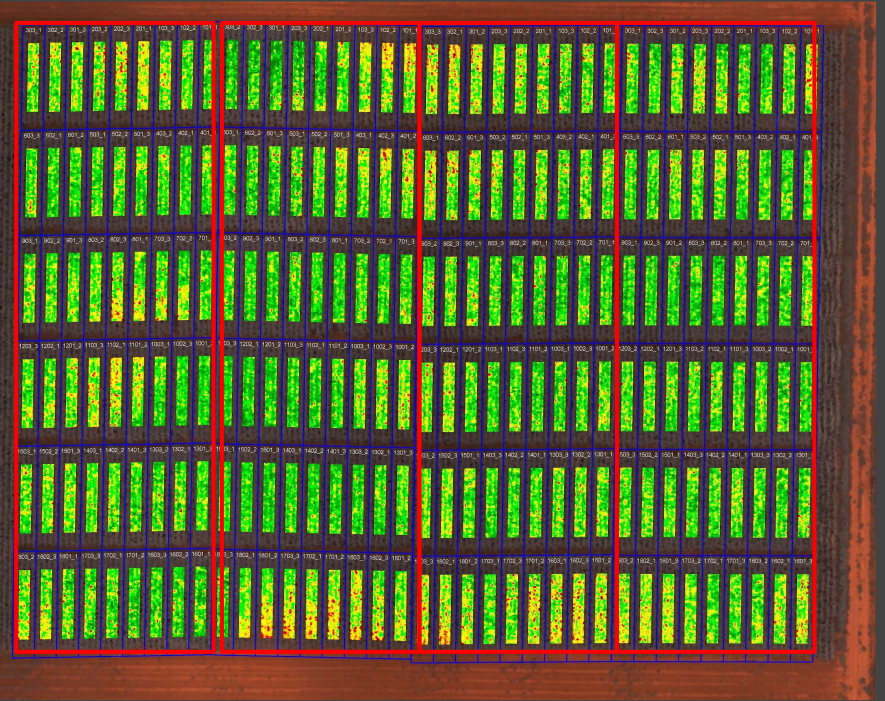
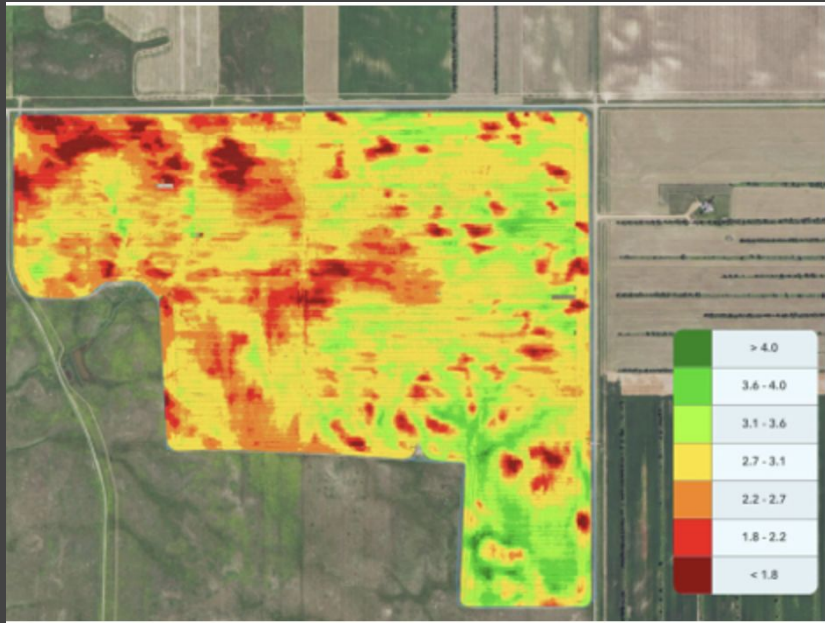# Agriculture is prone to disasters.
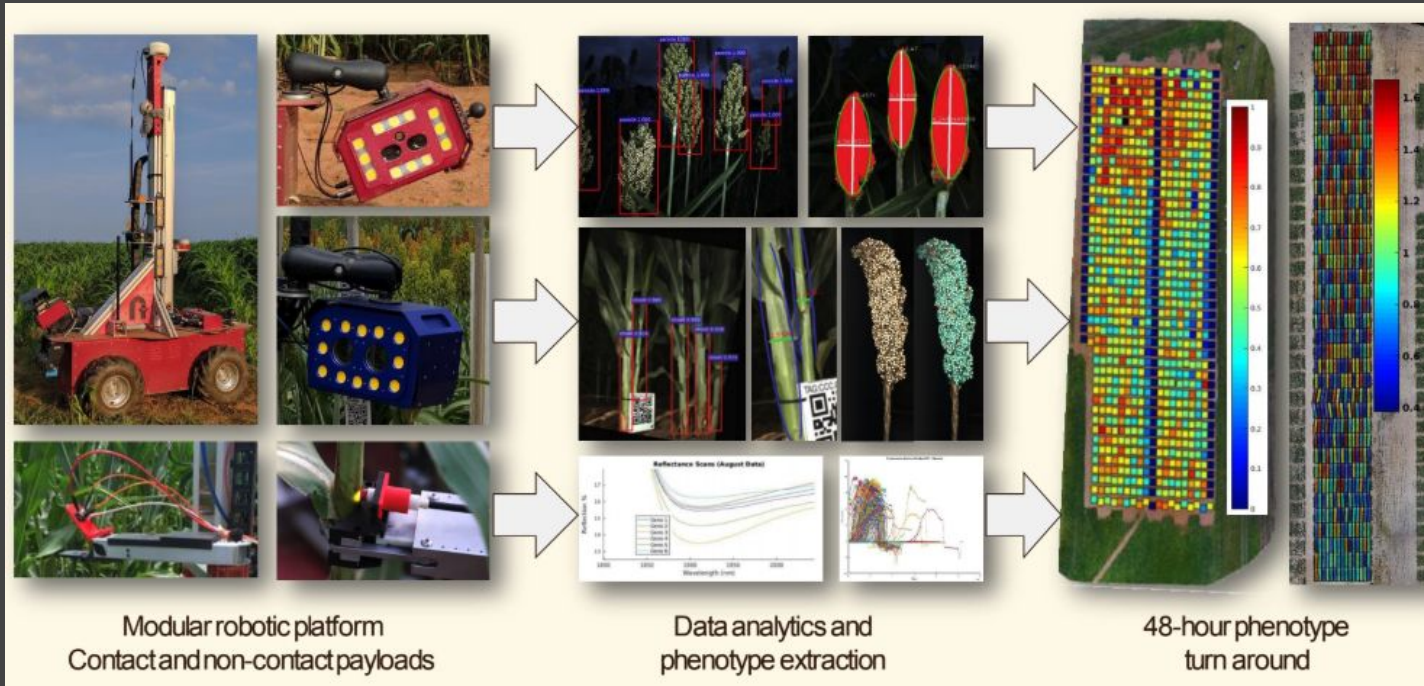

Drought impact

Nutrient shortage

Blight

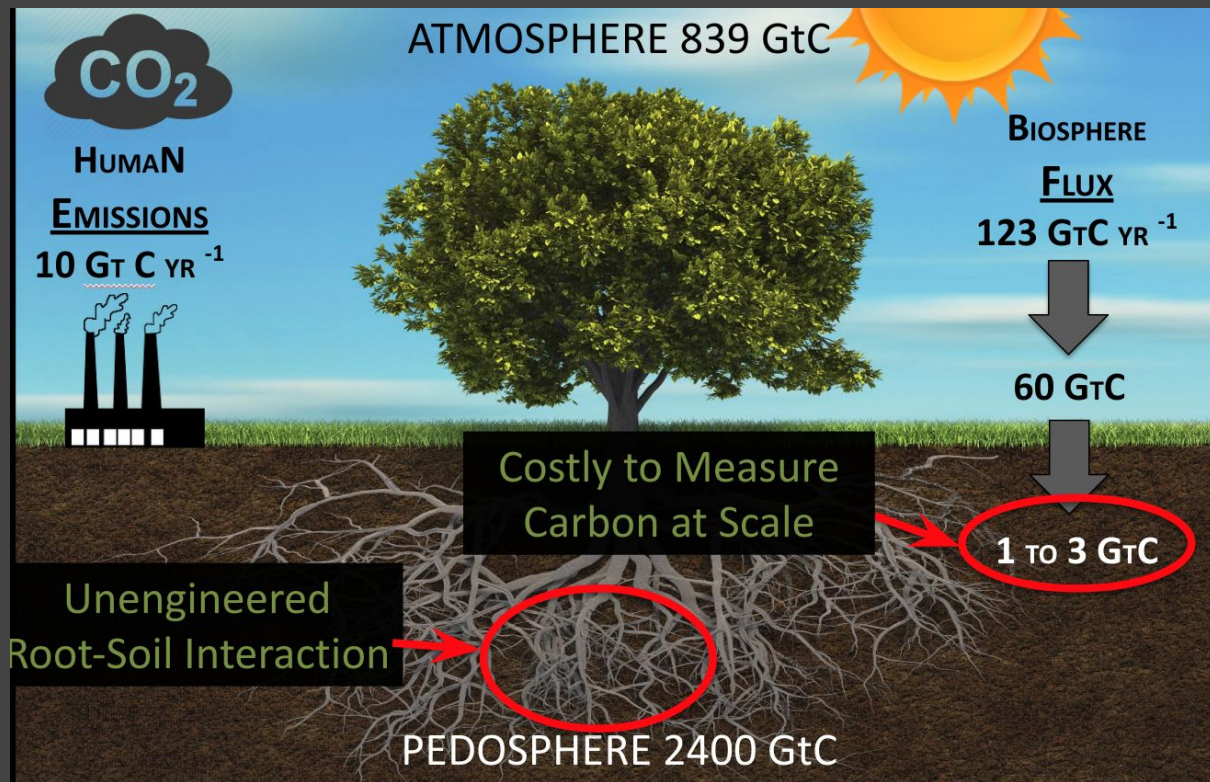# The challenges: variability, scale and cost.

$1000/acre in revenue limits interventions and advancement of knowledge

1000 acres could be a million experiments

Modular robotic platform
Contact and non-contact payloads

Data analytics and
phenotype extraction

48-hour phenotype
turn around

George Kantor, CMU

Agriculture matters for climate change

ATMOSPHERE 839 GtC

CO₂

HUMAN EMISSIONS
10 GT C YR⁻¹

BIOSPHERE FLUX
123 GtC YR⁻¹

60 GTC

Costly to Measure Carbon at Scale

1 TO 3 GTC

Unengineered Root-Soil Interaction

PEDOSPHERE 2400 GtC

5%

of global warming caused directly by N₂O from fertilizer

In the next five years,
we will finally have the data…
…how will we make it useful?

Health Soil (E) produces good outcomes (P)
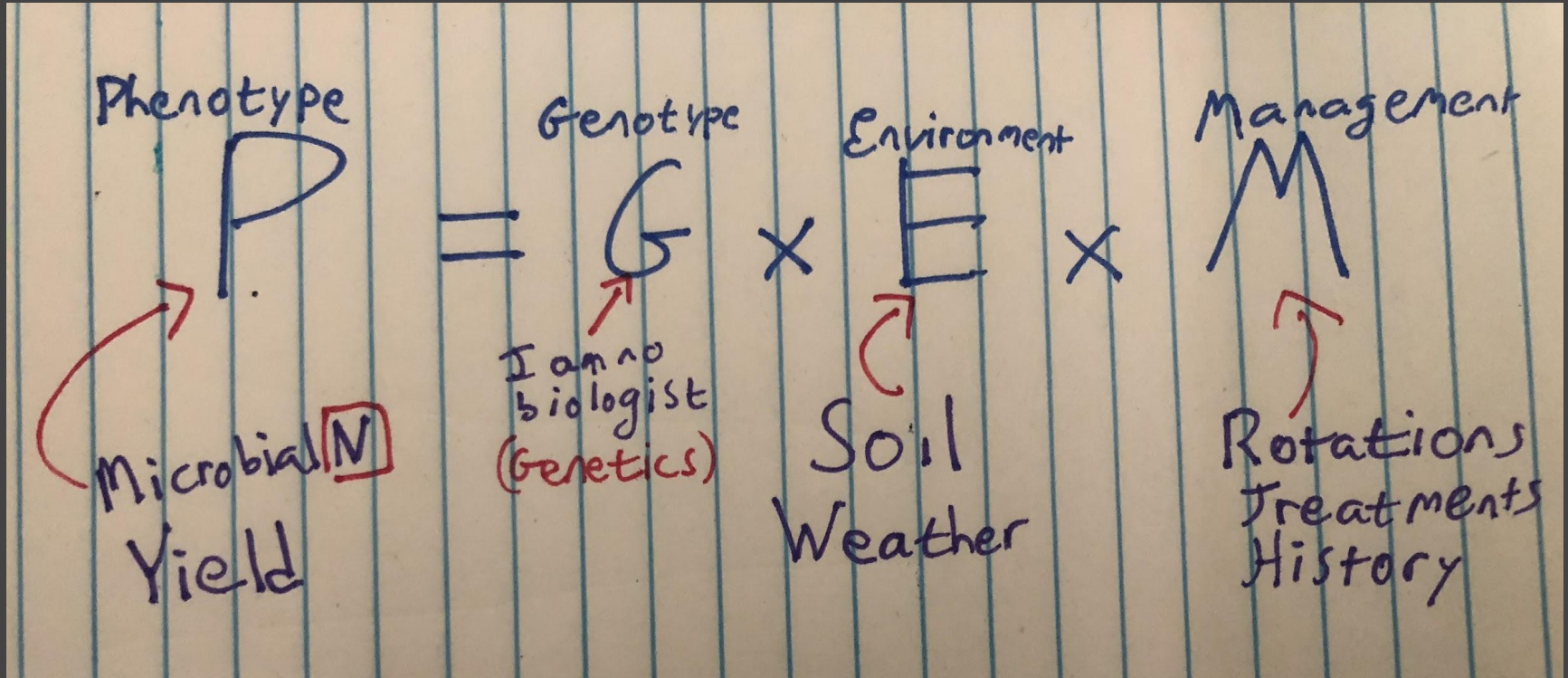
Precision Phenotyping unlocks agriculture

"What if farmers could manage the plant instead of the plot? What if crops could be bred 10X faster, 10X cheaper? What if any farmer could have access to the best advice anywhere, rather than being limited to personal or local know-how?"

- Google X blog.