

Focus on Environment

- Don't focus on the particular organism
 - Instead focus on how you impact of the environment
 - Eg. Measuring CO₂ flux as a consequence of the biological activity
 - Then, breed to environmental impact and how would you measure this phenotype.
 - Measure the changes!!
 - Association is a functional relationship between the root and the surrounding community.
 - Need paired technologies—root structure, soil chemistry; macro and micro trends
 - Integrated final measurements are as key to the sensor packages; gas fluxes off the field will be the validation of the management
 - Need to phenotype 500 genotypes, in a very small area such as the table in the room, need to deploy 500, trial will cost \$10 per table.

Technologies

- Lots of technology options: need to hone in on what you are measuring:
 - Endoscopy, PET, X-Ray backscatter, LIBS,
- Potential for tracers
- Cost: LemnaTec is the model cost for this hardware system and those facilities are in the million dollar range

Analytics

- Analytics problems at plot scale are difficult:
 - how to fill data gaps
 - estimate net flux – eddy covariance gaps happen on calm days the gasses don't mix.
- Database/Networking, co-register data, resolution/timescale/special resolutions.
 - Need computer vision and machine learning for feature extraction.
 - Expertise need is different based on the data that are collected
- Budget is equal for the data processing as it is for the collection.
 - Day to collect data, week to analyze data.
- Teams: CS, CV, functional genomics, microbiology