MAKING WORK WORTH DOING

ENHANCHING EMPLOYEE VOICE AND DRIVING WORK INNOVATION

Erik Nicholson,
Independent Consultant and former National Vice President for United Farm Workers

STS RT
SOCIOTECHNICAL SYSTEMS ROUNDTABLE INC.

Farmworkers as knowledge workers

This presentation

Goal is to have a vibrant conversation, not to get through all the slides

- Please ask questions, feel free to interrupt

Have divided the presentation into three acts:

Act 1: Farmworkers as knowledge workers
Act 2: Overview of food system: the current eco-system
Act 3: Agtech taking rural communities, growers, and farmworkers off the cliff

We'll have break out sessions in small groups between each act

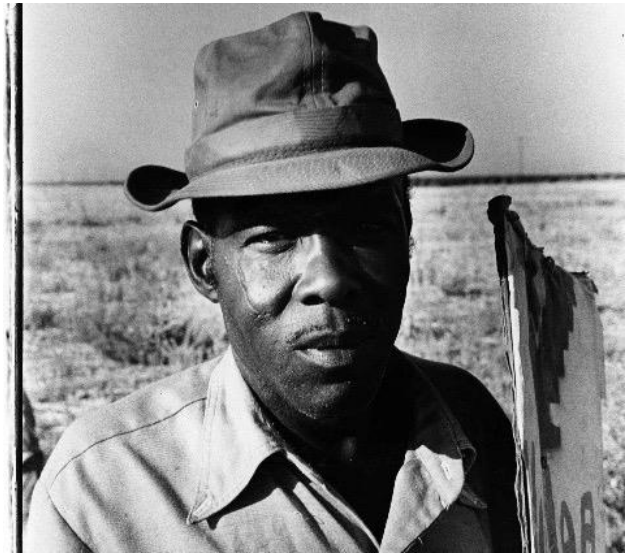
Questions?

A bit about me

Spent entire career working in Ag.
Much of career focused in US
- Have worked across Latin America in coffee, bananas and other produce
- Have worked in Europe, Asia and Africa to a lesser degree in fresh produce

30 year veteran of US Labor Movement, former union officer
Co-founder of two successful, international, multi-stakeholder non-governmental organizations and board member of Fair Trade USA

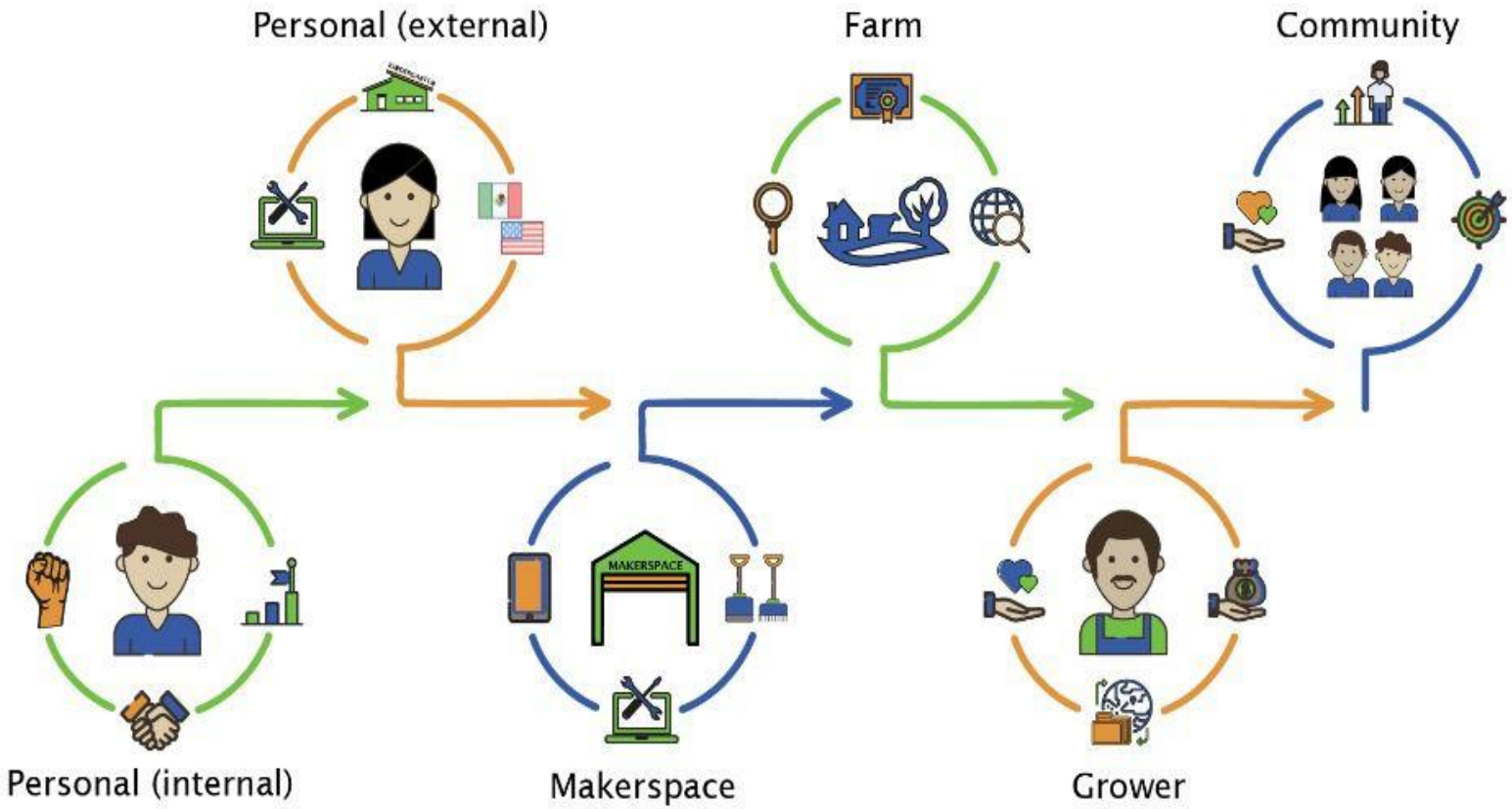
Doing the work we don't want to do.
Diverse Frameworker Backgrounds.



Japanese
Puerto Ricans
Salvadorans
African Americans
Sikhs
Mexicans
Yemenis
Anglos
Filipinos
Native American
Chinese

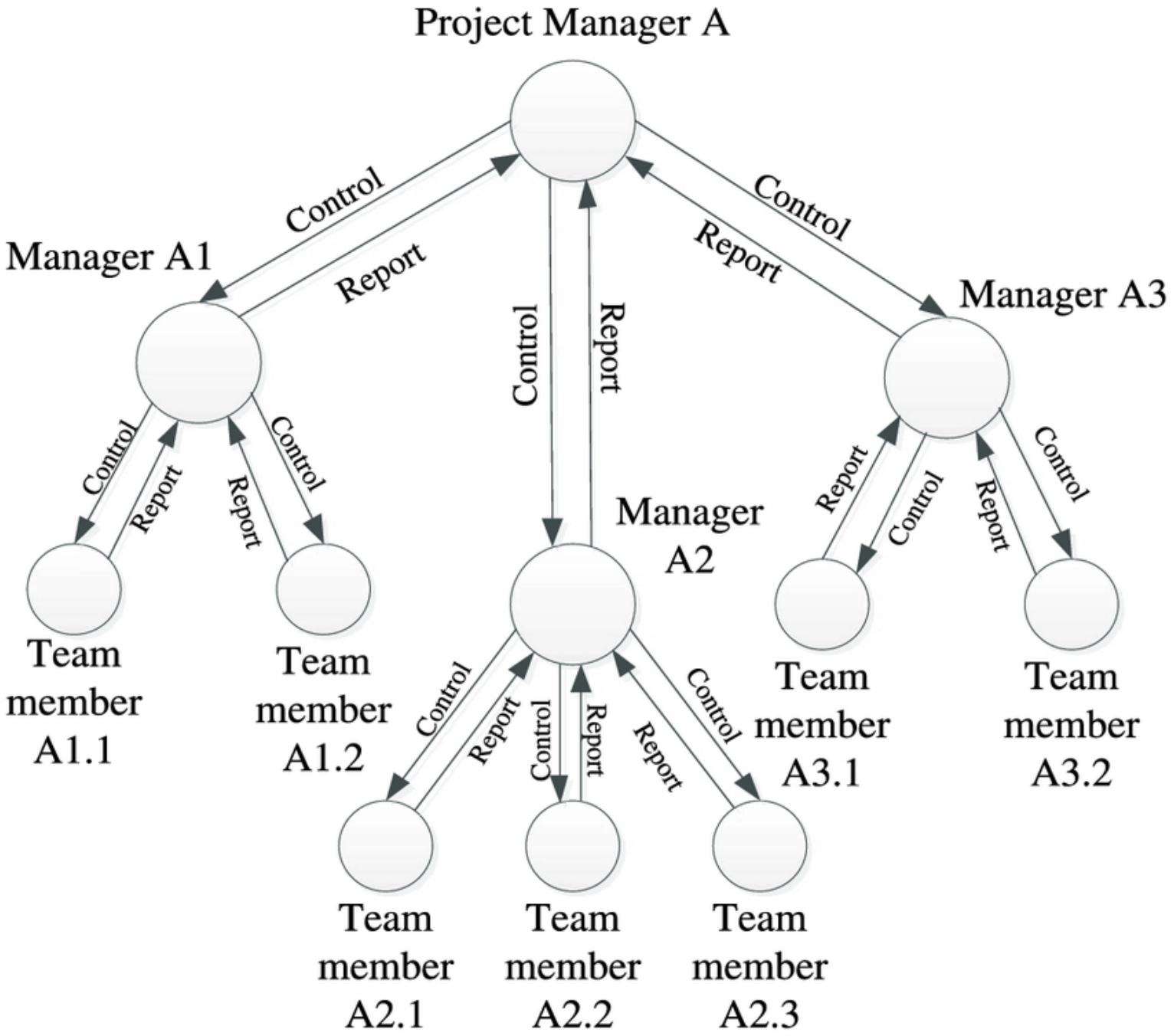
PANDION strategy

Designing for Farmworker Innovation



ACT 1: Farmworkers as Knowledge Workers

- No one knows more about what really happens in the fields around the world than the essential women and men who work in them
- The micro-structure of the farmworker culture withholds this knowledge
- The meso-culture of the farm oppresses this knowledge
- The macro-structure of our societies suppresses this knowledge



https://www.researchgate.net/profile/Alex-Gorod/publication/326231721/figure/fig1/AS:645556699426819@1530924119613/Command-and-control-management-approach.png

Job to be done

- For a farmworker, the “job” is to maximize the return on a day’s labor
- To remain employed, don’t make eye contact with supervisors, say “yes sir”/ “yes mam” and comply with what you’re told to do
- Few if any supervisors at any level of a farm have had any HR training. Best case is that they’ve obtained their position through being a “good” picker/pruner
- Their “job” is to make their supervisors never hear about any problems with the crews they supervise.


MLS


wafla
wafla.org

Farmworkers and Innovation

Mobile Tech Lab

Sewing machines, Silhouette Cameo

3 D printers, drones…

Our goal is to awaken farmworker curiosity

We always center farmworkers as experts of their own experience

Avoid talking about training or upskilling

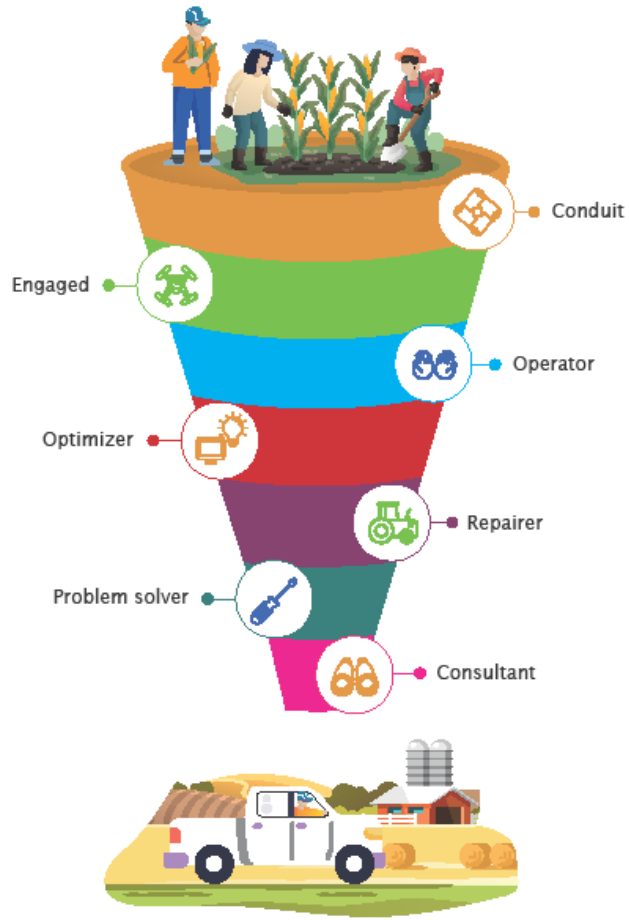
Only reinforces negative self-image and public perception of workers being uneducated/ignorant

Levels of Engagement: **Participant POV**

semillero de ideas

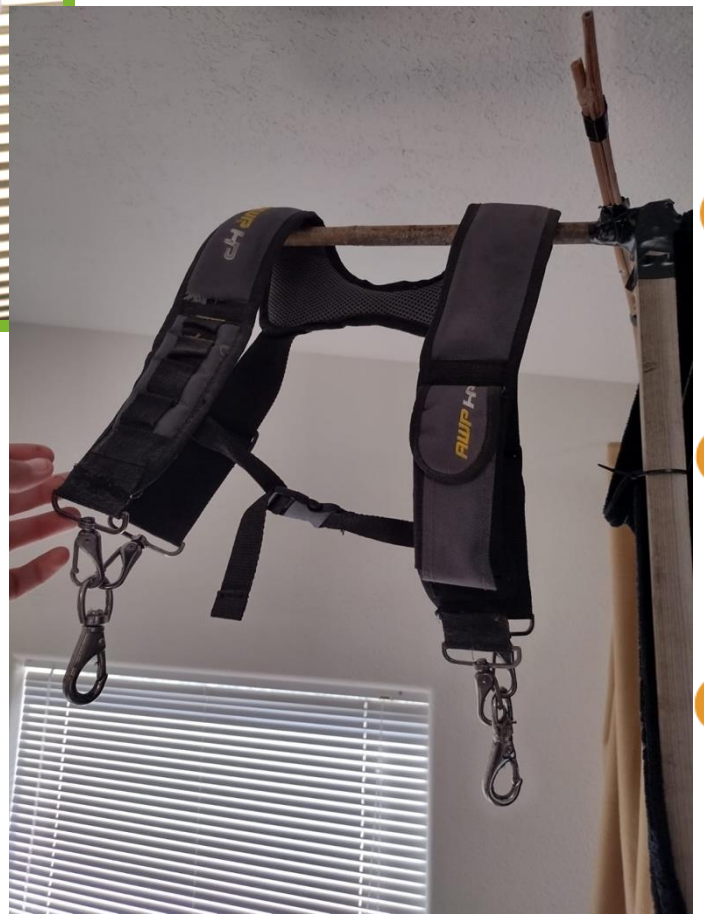
V3

Levels of grower participation



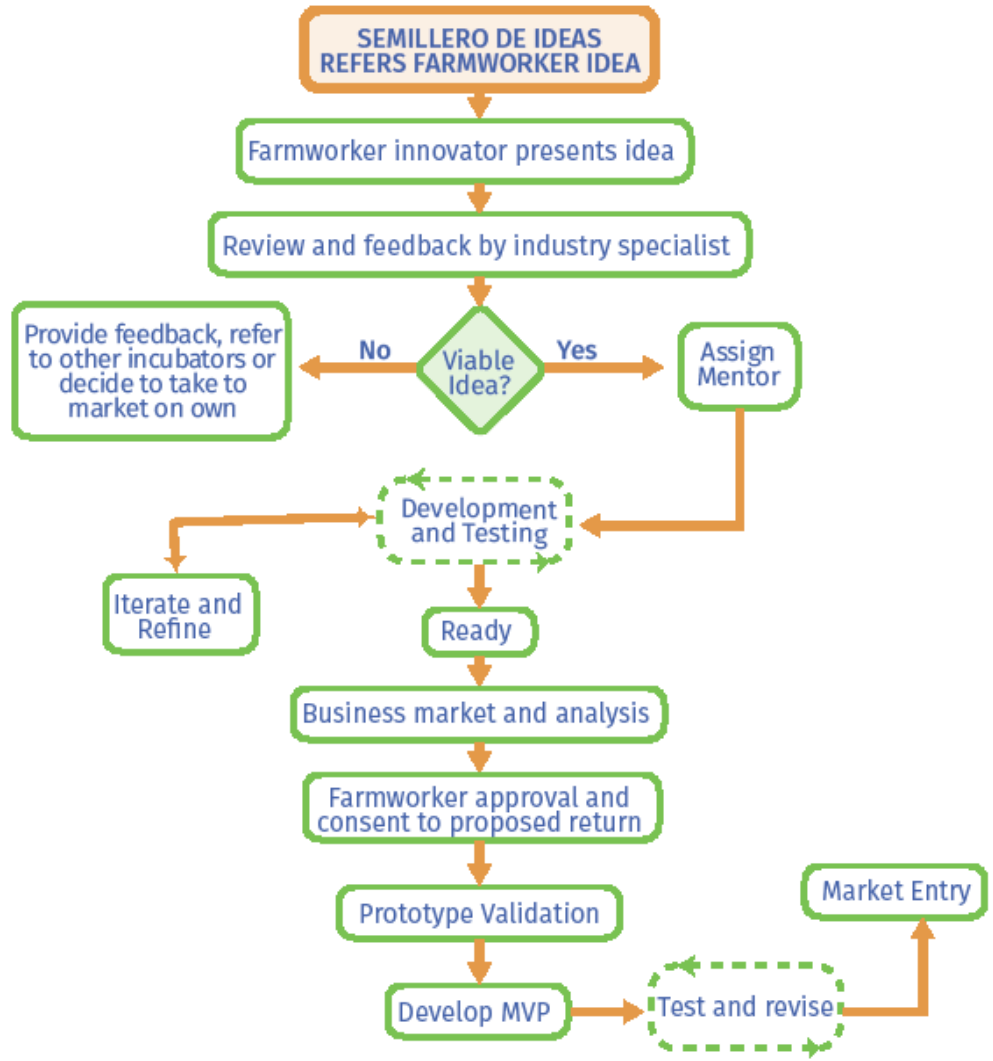

ESPRAYAR
semillero
de ideas
Poda
Descarte
Injerto
Soca


tus ideas cuentan
LUIS ALEJANDRO BARRERA
WINNER: INNOVATION CHALLENGE 2023
ONE THOUSAND DOLLARS ($1,000)
SAUL MARTINEZ



semillero de ideas

SEMILLERO DE PRODUCTOS
MAPA DE EXPERIENCIA DEL TRABAJADOR



Our journey

Transform the culture of agriculture

- Workers see themselves as more than physical labor
- Growers learn how to engage 100% of the essential women and men they employ
- Dignified, humane workplaces that attract rather than repel workers
- Vibrant rural communities
- Diverse, resilient food system that provides world with healthy, tasty food

Small Group Discussions

1) Thoughts, questions, reactions to the presentation

2) Under what conditions could this approach be applied to other industries where workers are perceived as “low-skilled” or “unskilled”?

ACT 2

The global race for dominance through automation

2024 CROP ROBOTICS LANDSCAPE

The Mixing Bowl · Better Food Ventures

ORCHARD-VINEYARD · SPECIALTY FIELD · ROW CROP · INDOOR

AUTONOMOUS MOVEMENT

Navigation & Autonomy
FieldBee · GOtrack · bilberi · robo makers · FLIRT · ACOBOT · AGREENCULTURE · bluewhite · Agtonomy · MeTRAKER · SingularXYZ · e-survey · MOVE ON · Agres · Sveaverken · PHENIX · MACH · farm(x) · Mojow · CHCNAV · PTx trimble · ASI · FJDynamics · TOPCON · SABANTO · RAVEN · Cerea · Ag Leader · HEXAGON · AgriRobot · COGNITIVE PILOT

Orchard-Vineyard Tractor & Platform
SABI AGRI · EXACT ROBOTICS · Herculano · PELLENC · PEK automotive · Bobcat · YANMAR · VINERGY · VineRobotics · ViTiBOT · OXIN · Black Shire · Robotics Plus

Tractor
SITIA · Korechi · MONARCH · Kubota · AMOS · HariTech · ZTRACTOR · FOX · autoagri · SOFTI ROBOTICS · AGOVOR · ACROINTELLI · SIZA ROBOTICS · TERRA · Farmertronics · AGXEED · TRAKTORARVID · NEXAT · NEW HOLLAND · KUHN · BARNSTORM · JOHN DEERE · COMBINED POWERS · METALFOR · CLAAS

Platform/Carrier
FIELD ROBOTICS · BURRO · ANTOBOT · ROBO TECH · farm-ng · naïo · agREOS · AI.Land · FOX ROBOTICS · ANT ROBOTICS · XAG · FARMDROID · twisted · E-TERRY · AgriBotX · DONKEY · XMACHINES · NATURE ROBOTS · CUBOREZ · ABAK · exobotic · Orbital Robotics · ROBOTEERS · permarobotics · BOPA · digital workbench · EARTHSENSE · SAGA 247

Scouting
Robotic systems in other product categories may have scouting capabilities in addition to their primary function.

CENSYS · Aurulent · microdrones · EVENT 39 · ANZUROBOTICS · DELAIR · asteria · aerobots · QUANTUM SYSTEMS · wingtra · skyfront · AgEagle · sentera · EGROBOTS

Prep & Planting
TERRACLEAR · Precision · FENDT · NEW ROSE ROBOTICS · HORSCH

Drone Application
BROUAV · 天途 · PARABUG · HUIDA TECH · Fly Dragon · DRONE VOLT · ASTA · ABZ INNOVATION · General Aeronautics · M-DRONE · draganFLY · LAHAIX · HONGFEI · Hirearia · TopGun · dji · Garuda · THANOS · KRAY · hy · YAMAHA · TITAN FLYING · HEVEN · PSYCHE · JOYANCE · AYAAN · MARUT · AGRODRONE · HAC · FORWARD ROBOTICS · PYKA · NTT e-Drone Technology · PRECISION AI · AGROBEE · ROTOR · GUARDIAN AGRICULTURE · FAVISION

Orchard-Vineyard Application
PANTANO · GUSS · STIHL · AGRICOBOTS · Smart Apply · ag · Ly Tech · ecle · ABTECH BY DESIGN · FREE GREEN · JACTO · HADA

Orchard-Vineyard Canopy/Floor Mgt
LEGER · VITIROVER · AIGRO · probotics · BRAUN · robotic perception

Orchard-Vineyard Harvesting
FINE FIELD · TEVEL · Ubot · OMC

Smart Spraying & Other Application
fieldin · TIRIC · KRETHOLD · MANTIS · DAT · VERDANT ROBOTICS · THORVALD · Legmin · OSIRIS · Kilter · ecorobotix · PerPlant · WEED-IT · MECHTRONIX · bilberry · ONTARGET · Plantium · DAMMANN · ROWBOT · DeepAgro · BBOLEAP · BOSCH · Greeneye · Yara · GOLDACRES · Carbon Bee · CASE IH · FLUX · agrifac · SOLINFTEC · BLUE RIVER · ISARIA · AMAZONE · 360 YIELD · Upside Robotics · Elemental · GRUNNER · Autonomous Pivot

Physical Weeding & Thinning
garford · AIGEN · STOUT · FARMING · TENSORFIELD · oddbot · KULT · TRABTYX · Feldklasse · FarmWise · GREENTECH · GREENSHIELD · CARBON ROBOTICS · Ferrari · AGVAtec · nexus · Dahila Robotics · F POULSEN · AUWEN · CARRÉ · PIXELFARMING ROBOTICS · harvested · Einböck · WEEDBOT · ESCARDA · OLIVER · Tsamo · ANDELA · TERRA ROBOTICS · AgriPass · AGROBOT · CYCLAIR · KONGSKILDE · FARMING REVOLUTION

Field Harvesting
HARVEST CROO ROBOTICS · Tortuga · SYLEKTIS · MUDDY MACHINES · KOPPERT MACHINES · MiFood · SAMI · autopickr · AVL · Fieldwork · upp · LOMMERS

CROP MANAGEMENT

Indoor Platform
SAGA · metazet · AUTONOMOUS ROBOTICS · Continental

Indoor Scouting
HortiKey · ecoation · GEARBOX · CORVUS EYES · MYTHRONICS · IoCrops · TUNU

Indoor Application & Protection
arugga · bogaerts · FTEK · Berkvens · HARVESTX · pats · BERG · OCTIVA · Micathon · polybee

Indoor Deleafing
aisprid · VDL · Lenzeel

HARVEST

Indoor Harvesting
mahla · ORGANIFARMS · certhon · NEUPEAK · Dogtooth · IAV · ERAVBOT · MYCIONICS · AGRIST · AGROBOT · nak · Floating Robotics · ISO · DENSO · CRUX · AAG

This landscape focuses on companies offering smart and autonomous robotic solutions used for growing food crops, not mechanization or fixed automation. The landscape is extensive, but not exhaustive. Companies appear on the landscape only once, though some offer solutions in multiple categories. Best effort has been made to place companies appropriately, but logo positions are not necessarily exact. Also, some segments and solutions may be applicable across crop systems.

www.MixingBowlHub.com

Chris Taylor
chris@mixingbowlhub.com

Michael Rose
michael@betterfoodventures.com

Western Growers

The harvesting process hasn't changed in 100+ years.

- Nearly all apples are harvested manually.
- Labor is 60% of apple production costs.
- Harvesting is 44% of labor cost.
- 70% increase in labor costs over the next 5 years due to rising farm wages and reduced migration.

Introducing [redacted]

a breakthrough technology to identify, pick and preserve quality produce.

VALUATION
$40,000,000

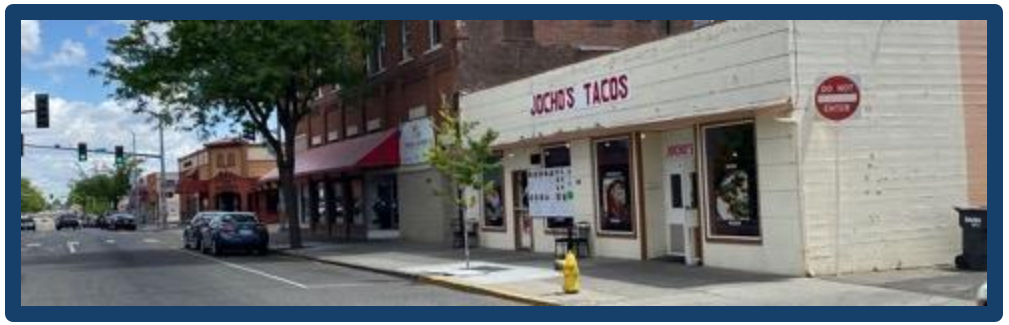
SHARES OFFERED
Common

REGULATION
Regulation A+

PRICE PER SHARE
$2.67

MINIMUM INVESTMENT
$499

TARGET RAISE AMOUNT
$20,000,000


JOCHO'S TACOS


BAUTIZOS
OPEN
La Esmeralda
QUINCEAÑERAS


Fiesta Mexicana
PANADERIA


EL TORITO
BOOTH

Been here before

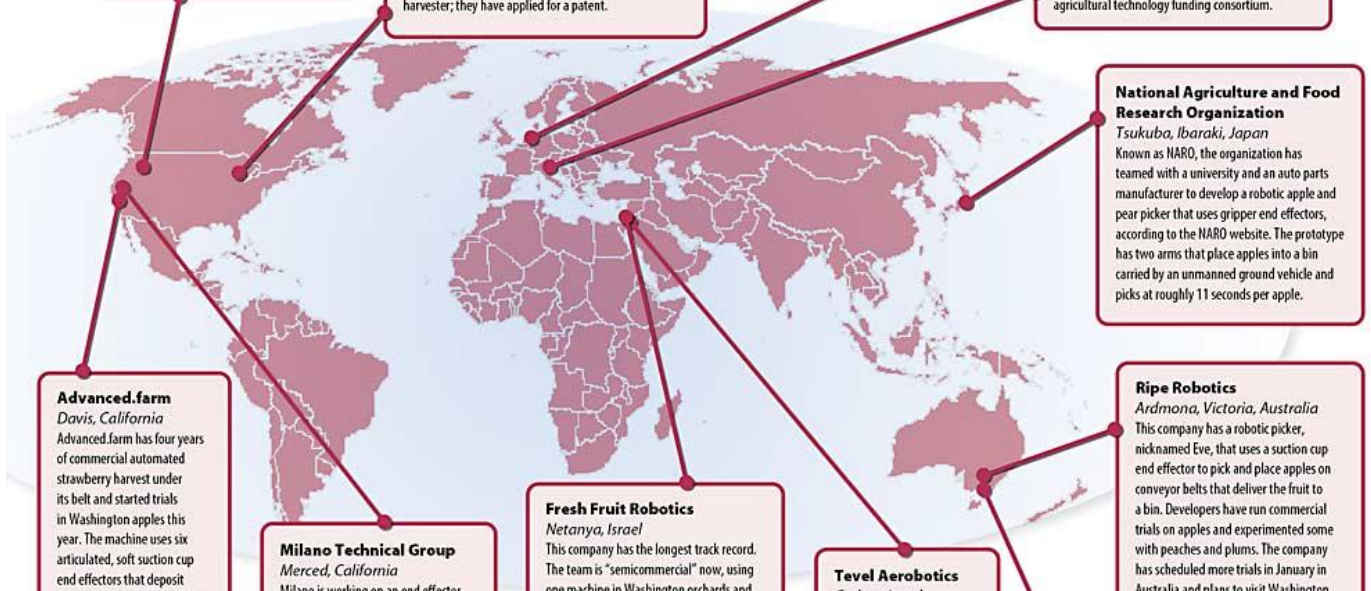
- Tomato harvester
  - Optimized at scale
  - Following deployment, resulting in 88% of tomato farms going out of business
  - Loss of over 30,000 jobs
  - Concentration of land and production in the hands of a few

  - Rural communities across US and Canada depopulated

  - Rural communities across sending countries are ghost towns with their residents working abroad

Global robot roundup

So many companies and researchers around the world are working on robotic apple harvest, it's hard to keep track. Here are a few to watch:



Washington State University
Pullman, Washington
With a one-year grant of $180,000 from the Washington Tree Fruit Research Commission, professor Ming Luo and his team are attempting to build a "soft" robotic picker capable of picking an apple every two seconds with arms that cost less than $2,000 each and is safe enough for humans to work with in close proximity. It uses a soft rubber end effector that weighs half a pound. Getting apples to the bin is not part of the research. So far, work is limited to a laboratory.

USDA Agricultural Research Service and Michigan State University
East Lansing, Michigan
Scientists at the university and the U.S. Department of Agriculture have teamed to develop a harvester that uses a custom-designed suction cup end effector guided by a proprietary vision system. Funded by federal appropriations so far, the developers have tested the machine in the MSU research orchard and aim for commercial trials in Michigan in 2023, with plans to bring the machine to Washington in 2024 as well as marry it to an in-field sorting machine developed separately by ARS. The university and the government would share intellectual property rights for the robotic harvester; they have applied for a patent.

Wageningen University and Research, et. al.
Wageningen, Netherlands
A group of Dutch research institutions and tech startups have joined forces to develop a robotic harvesting arm to use with a well-known orchard platform made by Munckhof Fruit Tech Innovators. They also are working on a multifunctional robot that will pick, among other chores. The efforts so far incorporate a suction cup end effector.

Aigritec
Bolzano, Italy
This company's final prototype uses four padded, three-fingered end effectors to pick and deposit fruit onto vertical and horizontal conveyor belts. The commercial version will have eight. The startup has collaborated with a European platform manufacturer to propel the robot and manage bins. Aigritec plans to start commercial trials in 2023 but has a few contract commitments already in place. Engineers also are designing the robot for precision spraying and thinning. Roughly 500,000 euros in the project's funding comes from the South Tyrol province and agROBOfood, a European Union agricultural technology funding consortium.

National Agriculture and Food Research Organization
Tsukuba, Ibaraki, Japan
Known as NARO, the organization has teamed with a university and an auto parts manufacturer to develop a robotic apple and pear picker that uses gripper end effectors, according to the NARO website. The prototype has two arms that place apples into a bin carried by an unmanned ground vehicle and picks at roughly 11 seconds per apple.

Advanced.farm
Davis, California
Advanced.farm has four years of commercial automated strawberry harvest under its belt and started trials in Washington apples this year. The machine uses six articulated, soft suction cup end effectors that deposit apples onto a conveyor system that carries the fruit to a bin filler. Funding is from Yamaha, Kubota and venture capital firms. If the project remains fully funded, the Washington Tree Fruit Research Commission will contribute $460,000 over three years.

Milano Technical Group
Merced, California
Milano is working on an end effector and conveyor system and is slated to receive $245,000 from the Washington Tree Fruit Research Commission over two years. Company engineers envision eight end effectors that surround, grip and twist each apple, according to the research proposal. Gravity then takes the apple through the padded interior of telescoping arms mounted to a 12-foot transport wall with conveyor belts carrying the apples to a central location. The robot would need to be mounted to an existing platform.

Fresh Fruit Robotics
Netanya, Israel
This company has the longest track record. The team is "semicommercial" now, using one machine in Washington orchards and one in Israel to make its case to growers. The machine uses 12 flexible fingered end effectors that grab, twist and pick fruit then deposit it on conveyor belts that deliver it to a bin filler. Collaborating equipment manufacturer Automated Ag Systems of Moses Lake, Washington, built the chassis and bin management machinery. Funding is from the Israel Innovation Authority and the European Union's Horizon 2020 research and innovation program. The Washington Tree Fruit Research Commission has contributed in the past.

Tevel Aerobotics
Gedera, Israel
This company uses flying drones tethered to a wheeled chassis to pick fruit. The end effector is a fingered gripper.

Ripe Robotics
Ardmona, Victoria, Australia
This company has a robotic picker, nicknamed Eve, that uses a suction cup end effector to pick and place apples on conveyor belts that deliver the fruit to a bin. Developers have run commercial trials on apples and experimented some with peaches and plums. The company has scheduled more trials in January in Australia and plans to visit Washington for the 2024 apple harvest. Funding is about 1.2 million Australian dollars, about half each from the federal government and private companies.

Monash University
Clayton, Victoria, Australia
Professor Chao Chen is leading research into robotic apple harvesters, called the Monash Apple Retrieving System, or MARS, according to the university's Laboratory of Motion Detection and Analysis website. Researchers are experimenting with using lidar as part of the fruit-sensing process and a combination of a suction cup and gripper for the end effector.

ROSS COURTNEY AND JARED JOHNSON/GOOD FRUIT GROWER

ONTARIO TEACHERS'
PENSION PLAN

Digital Sweatshops

While AI is often thought of as human-free machine learning, the technology actually relies on the labor-intensive efforts of a workforce spread across much of the Global South and often subject to exploitation."
https://www.cjr.org/tow_center/qa-uncovering-the-labor-exploitation-that-powers-ai.php

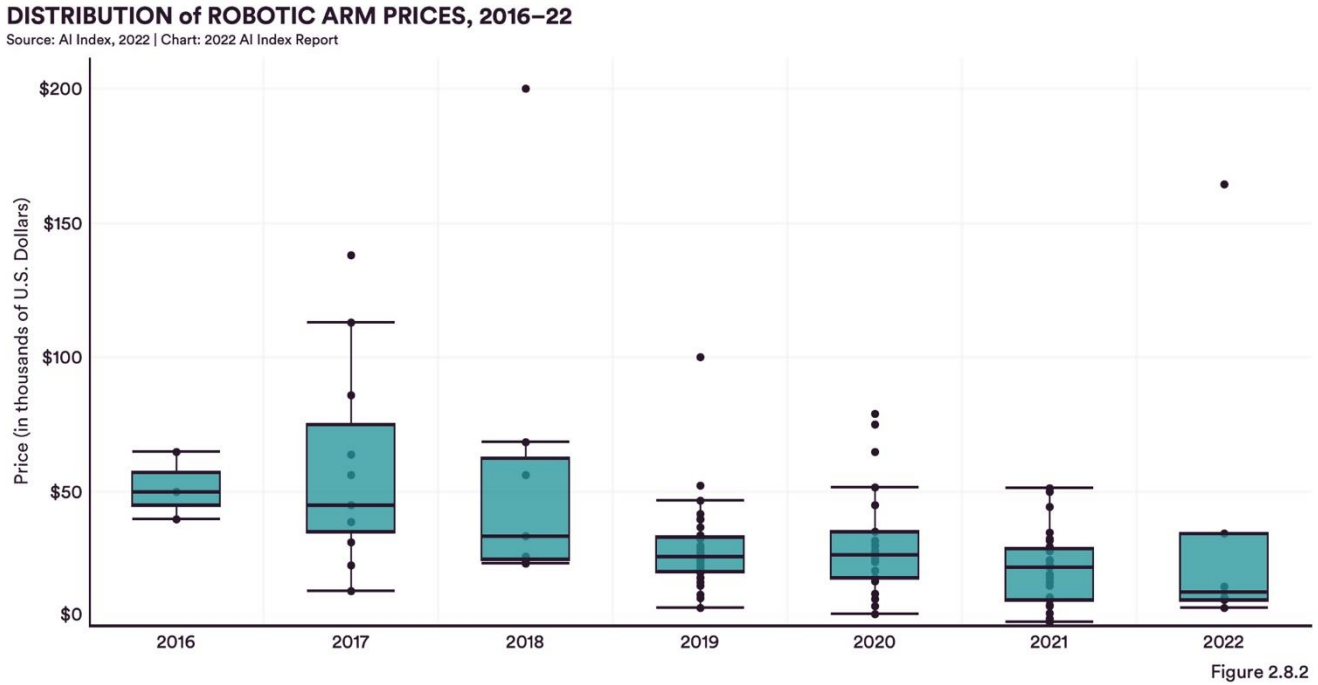


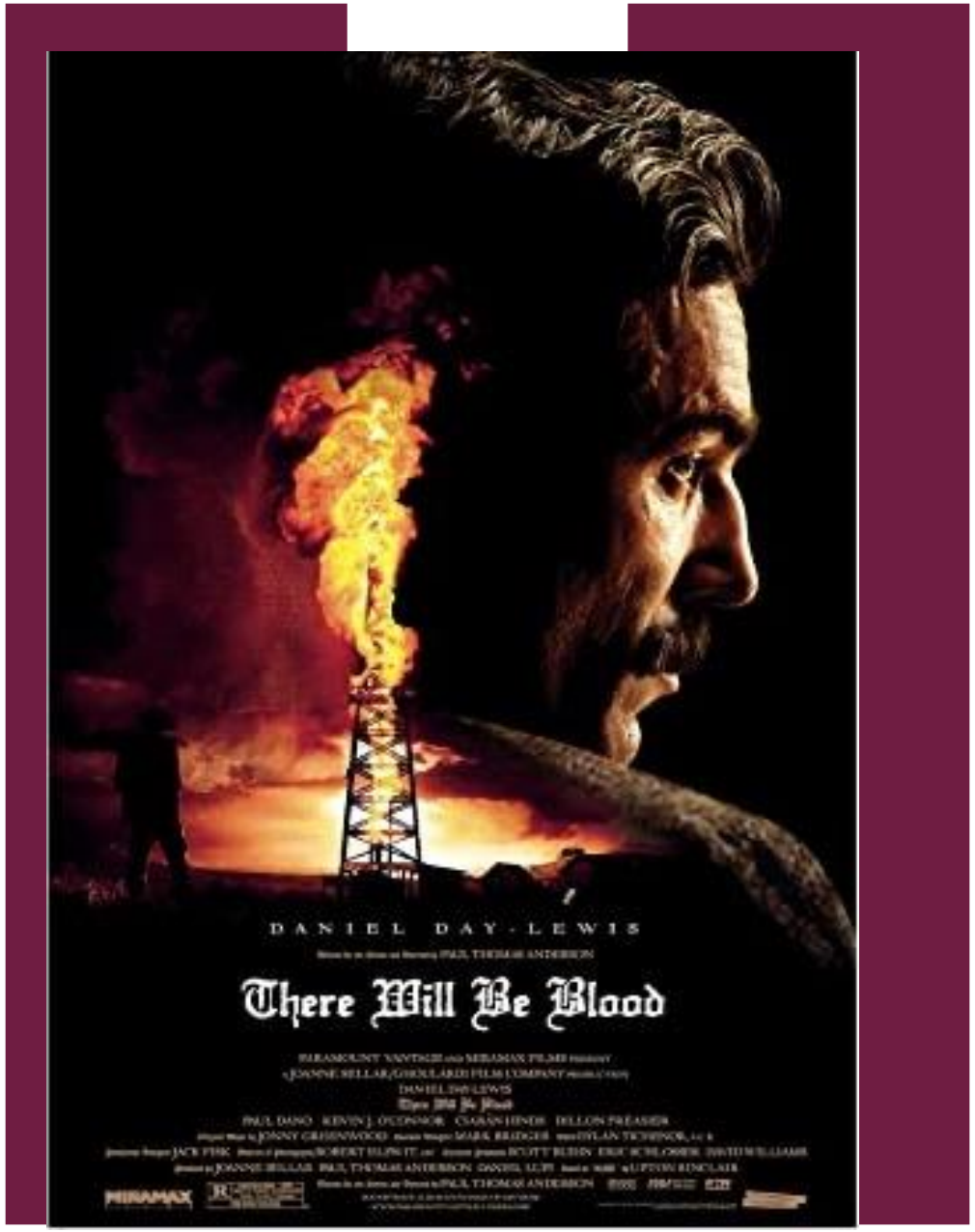
Figure 2.8.2

Do no harm?

The data backs up the accounts of Amazon warehouse workers and former safety professionals who say the company has used the robots to ratchet up production quotas to the point that humans can't keep up without hurting themselves. For each of the past four years, injury rates have been significantly higher at Amazon's robotic warehouses than at its traditional sites.

https://www.seattletimes.com/business/amazons-dupont-washington-warehouse-has-highest-injury-rates-of-any-fulfillment-center-in-the-u-s-report-shows/

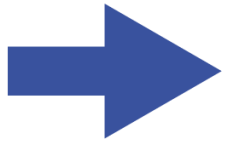
There will be blood

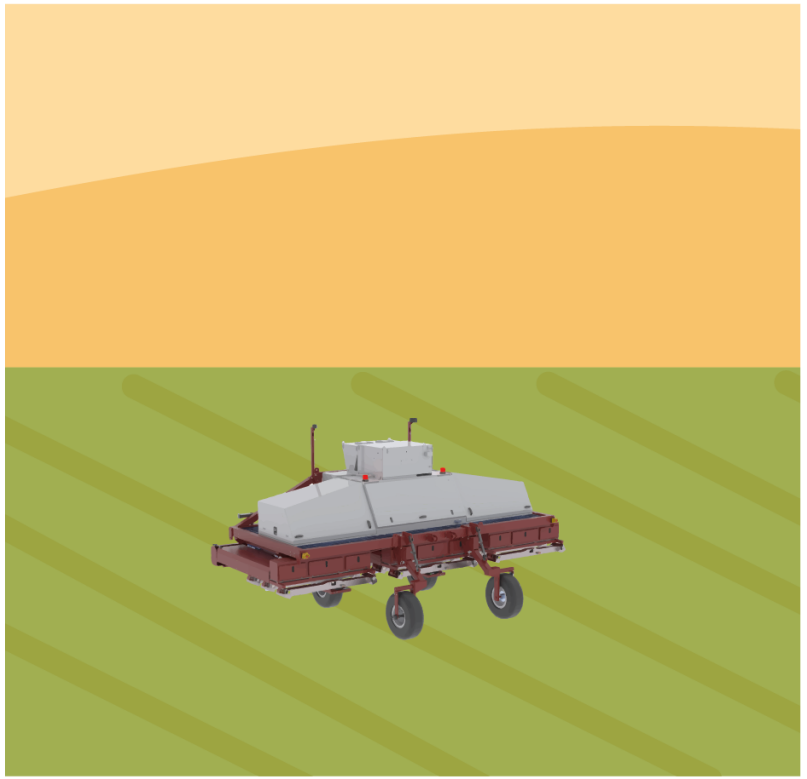



lyft
UBER


AGRICULTURE
ORIGINAL

Automation





Optimization

Scheduler

Evaluator

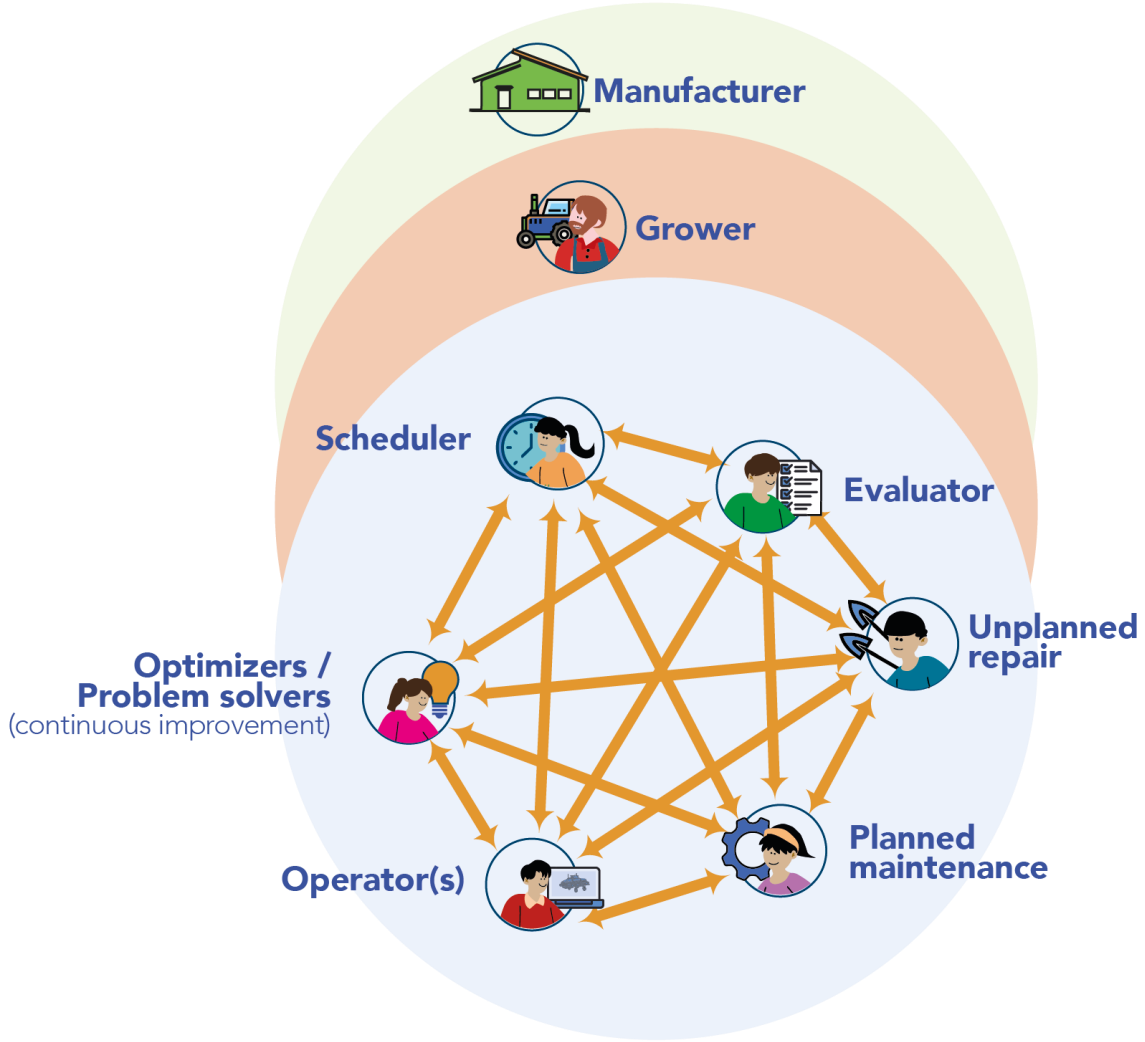
Planned maintenance

Unplanned repair

Operator (s)

Optimizers / Problem solvers
(continuous improvement)

Designing the ecosystem




JV4067

Option A Outcomes

- Further concentration of our food system in hands of the few
- Economic collapse of rural communities
- Depopulation of rural communities
- Growers further beholden to equity capital

Small Group Discussion

1) Thoughts, reactions?
2) What other steps can we take to ensure the deployment of technology doesn’t excerabate economic and racial inequities, but instead fosters enhanced workplace dignity, safety and the ec0nomic resilience of communities?

Upcoming events

THANK YOU FOR COMING!

Erik Nicholson

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Socio-Technical Systems Roundtable

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