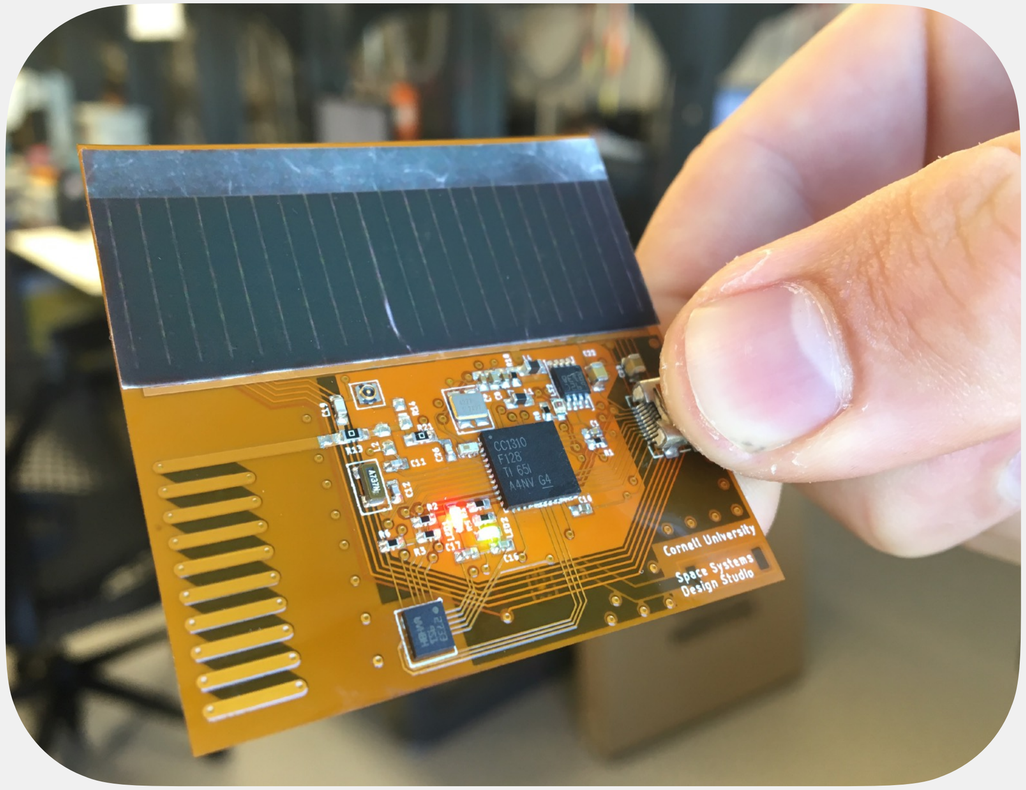
Monarch

Team 1316



A device that enables cool-climate vineyard managers to take preventative action against wine grape loss to frost and fungus by providing realtime, in-canopy temperature and humidity data.

Hunter Adams, EL

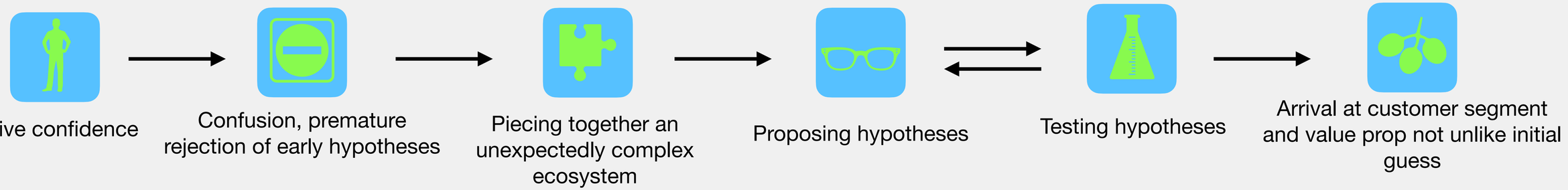
Mason Peck, PI

Ken Rother, M

	Interview Count			
Total	100	74	3	23

CornellEngineering

10-minute story short . . .



Hunter Adams, EL

PhD candidate in aerospace engineering at Cornell University, focused on low-power electronic systems, online state estimation, and multi-agent systems.

Mason Peck, PI

Associate professor of mechanical and aerospace engineering at Cornell University, former CTO of NASA.

Ken Rother, M

Managing director of eLab at Cornell University, visiting lecturer at the Johnson School of Management, director of the hardware accelerator at Rev Ithaca Startup Works, and longtime entrepreneur.

Key Partners

- Texas Instruments
- Alta Devices
- SkyTraq
- Board fabrication house
- Board assembly house

Key Activities

- Electronics prototyping
- Printed circuit board design
- Hardware installation and maintenance

Key Resources

- IP over a critical aspect of the system
- Electronics prototyping facility
- Humans

Value Propositions

- Improve the quality and prevent loss of wine grapes by enabling higher resolution maintenance of vineyards, as opposed to the standard practice of treating all grapes on a vineyard identically.
- Decrease the number of fungicide sprays per season at cool-climate vineyards *(in anticipation of regulation).*

Customer Relationships

- Free hardware installation and trial period
- Maintenance & updates
- Incentivize data sharing

Channels

- Trade shows (in particular Unified Wine and Grape Symposium)

Customer Segments

- Vineyard managers at cool-climate vineyards (end user).

Cost Structure

- Printed circuit board fabrication and assembly
- Receiver station fabrication, assembly, and installation
- Facilities costs
- Human beings

Revenue Streams

- Hardware leases by vineyards
- Data monetization through a subscription service

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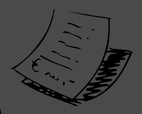

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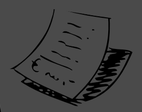

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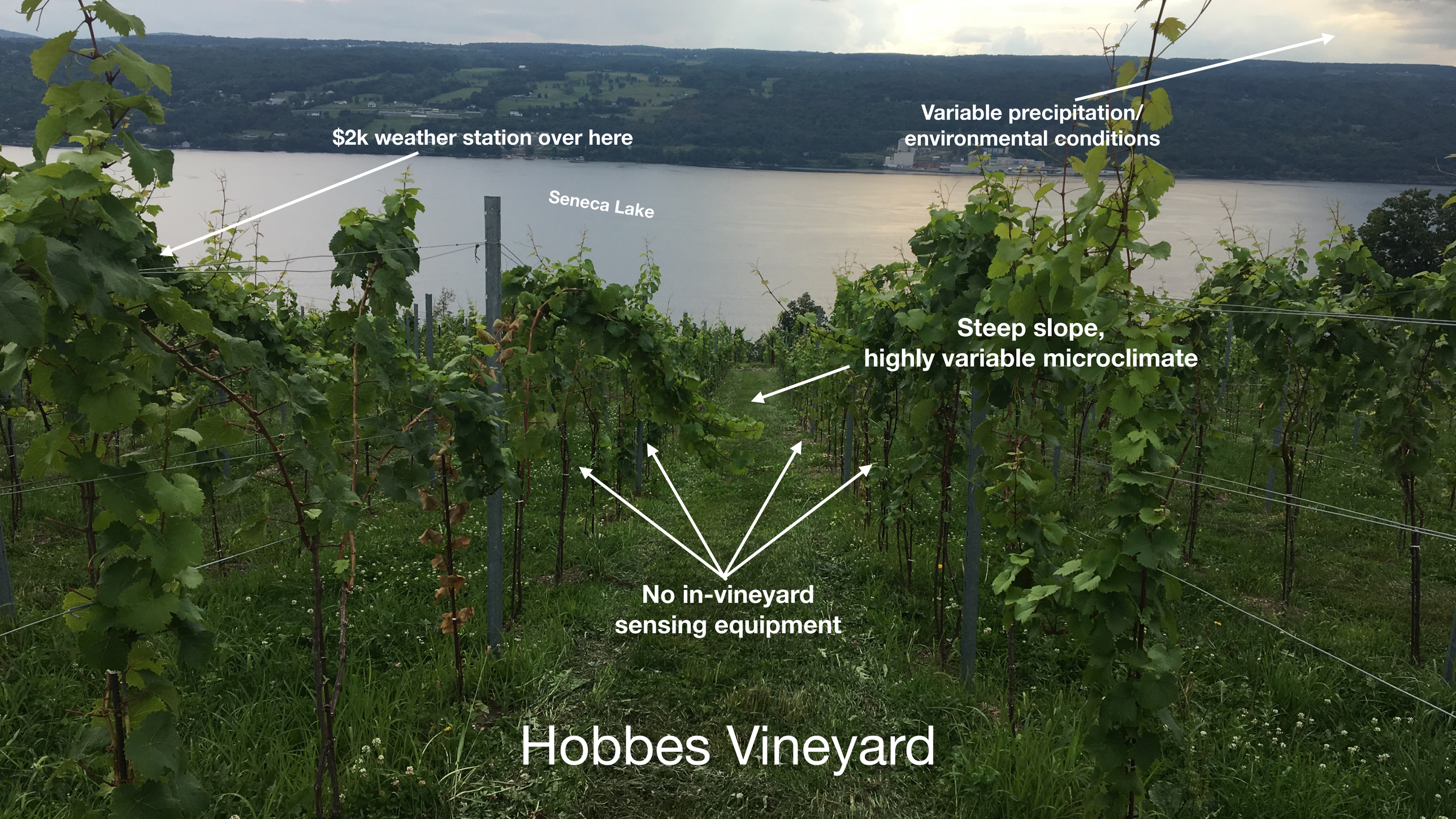


Hobbes Vineyard

Value Propositions

- Decrease number of fungicide sprays per season (decreases labor/cost)
- Improve quality of wine grapes (increasing selling price)
- Decrease loss of wine grapes
- Reduce wine disturbance during analysis
- Improve wine marketability to sustainability conscious consumers
- Improve leaf management, thereby preventing sun damage to wine grapes
- Deter birds from vineyards
- Improve sustainability score of vineyard to make new retailers available for sales (e.g. Whole ...
- Provide additional vineyard data to winemakers making grape purchasing decisions
- Provide plant-level soil moisture measurements to decrease water usage during irrigation
- Provide temperature data across a vineyard to prevent frost damage by letting vineyard ...

Customer Relationships

- Free hardware installation and trial period
- Maintenance & updates
- Incentivize data sharing

Channels

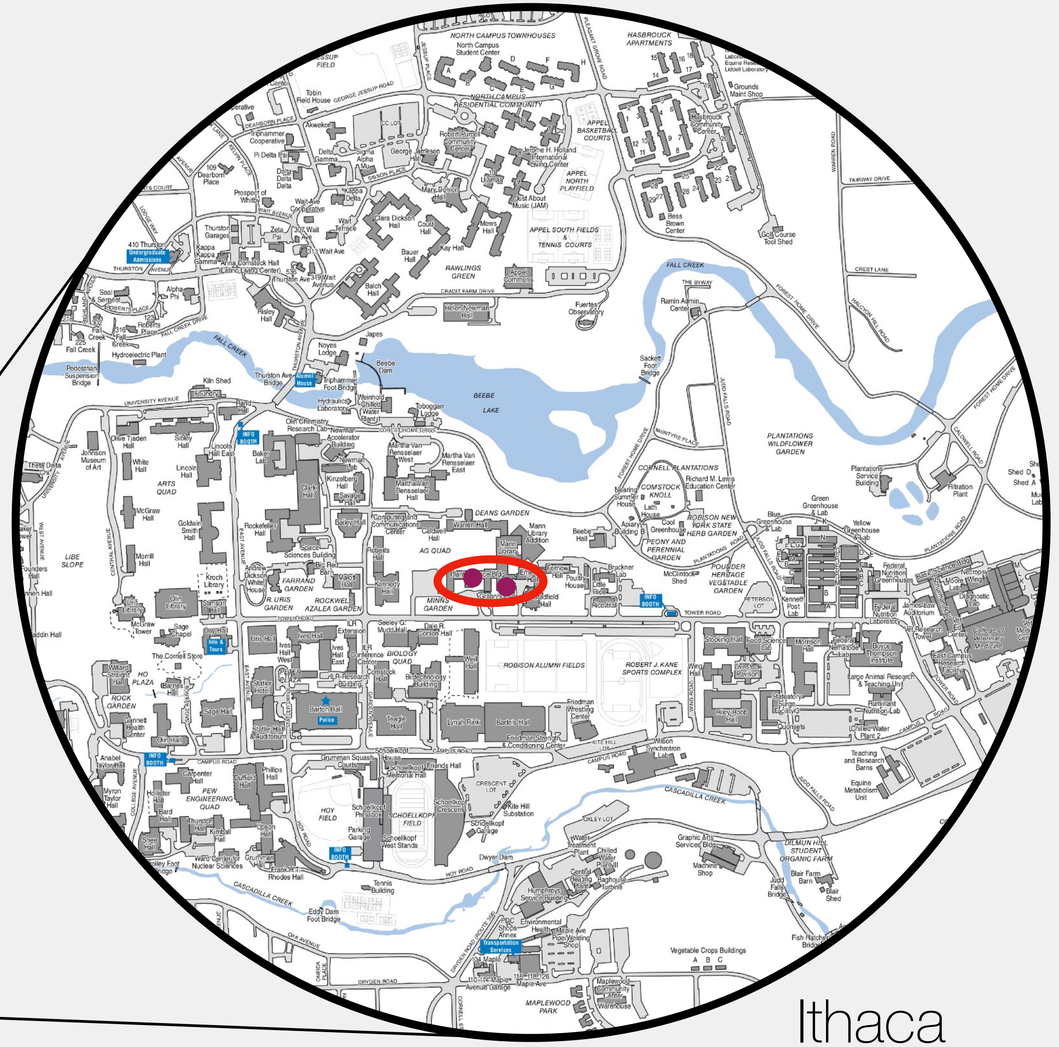
- Trade shows (in particular Unified Wine and Grape Symposium)
- Online purchasing
- On-site installation
- Direct Sales

Customer Segments

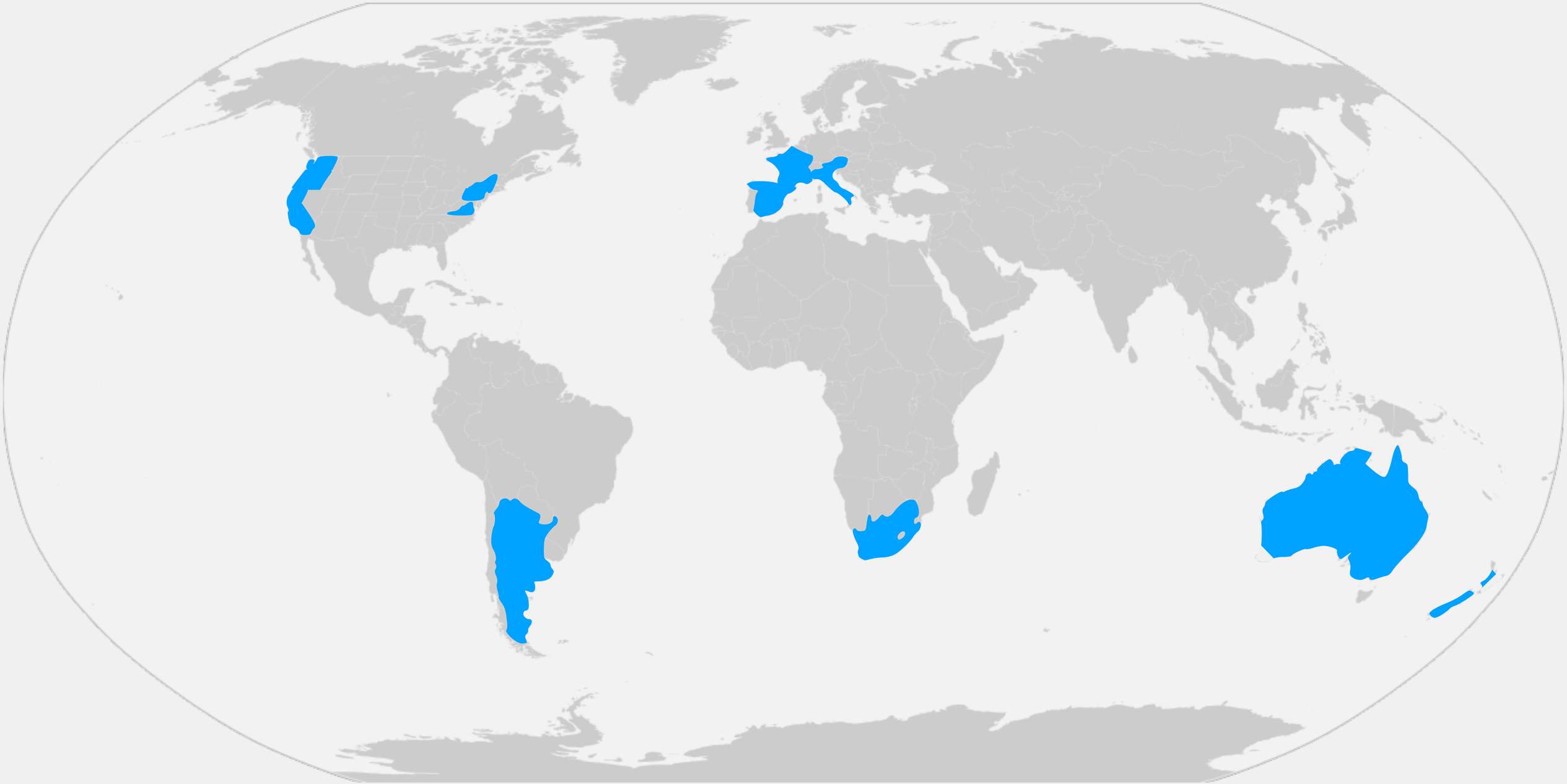
- Vineyard managers at cool climate vineyards (end user)
- Data scientists at large California vineyards (like Scheid)
- Winemakers (end user)
- Winemaker agents (influencers)
- Vineyard managers at warm-climate vineyards (end user)
- Wine brokers (influencer)
- South African vineyard managers
- Academic Extension Programs (influencers)
- Orchard Owners

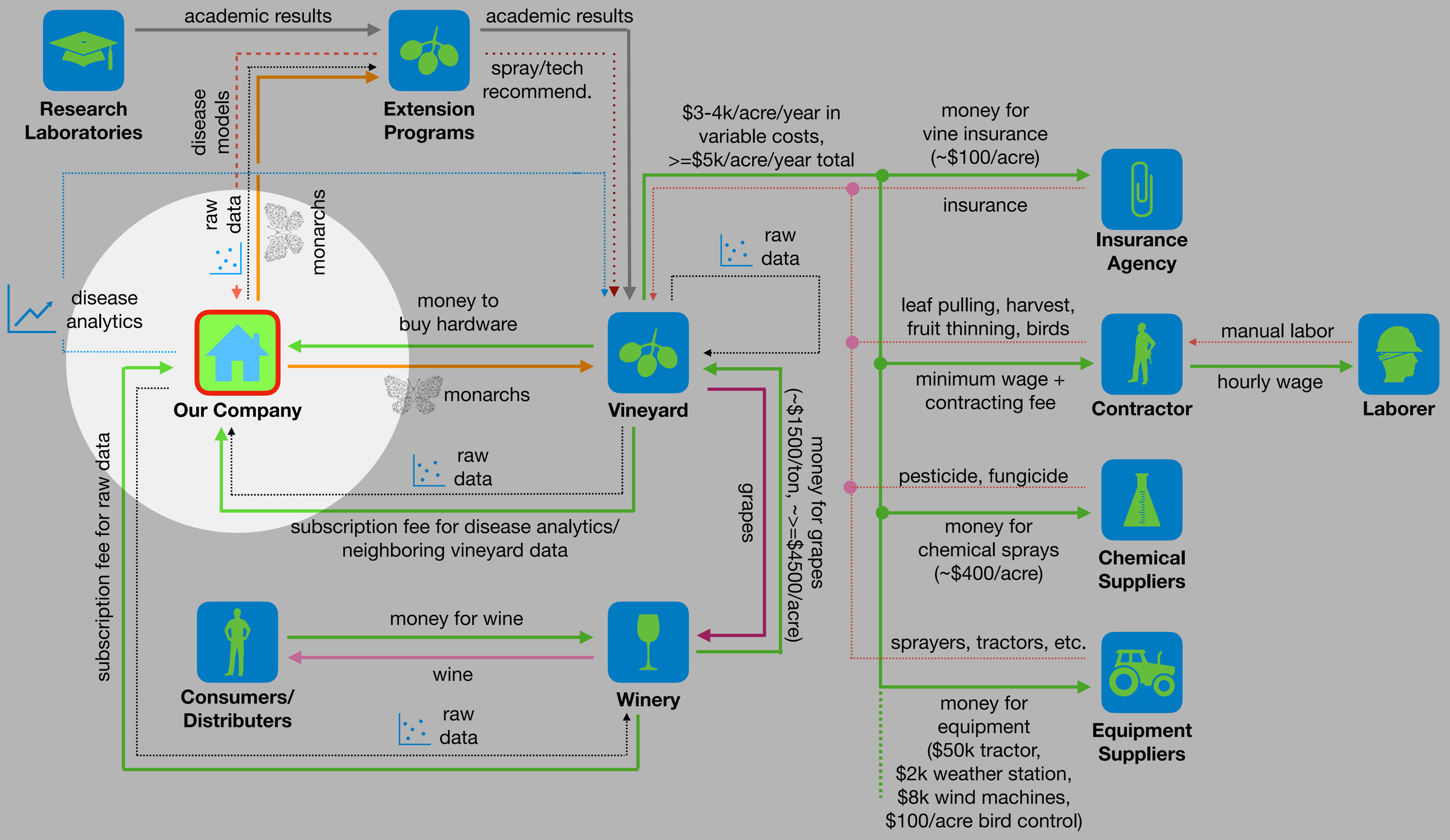
Local on-site interviews

- vineyard
- orchard
- extension specialists



Nonlocal interviewee locations




Research Laboratories
academic results
Extension Programs
academic results
spray/tech recommend.
disease models
raw data
monarchs
disease analytics
Our Company
money to buy hardware
monarchs
raw data
Vineyard
raw data
$3-4k/acre/year in variable costs, >=$5k/acre/year total
money for vine insurance (~$100/acre)
insurance
Insurance Agency
leaf pulling, harvest, fruit thinning, birds
minimum wage + contracting fee
Contractor
manual labor
hourly wage
Laborer
pesticide, fungicide
money for chemical sprays (~$400/acre)
Chemical Suppliers
sprayers, tractors, etc.
money for equipment ($50k tractor, $2k weather station, $8k wind machines, $100/acre bird control)
Equipment Suppliers
money for grapes (~$1500/ton, ~>=$4500/acre)
grapes
subscription fee for disease analytics/ neighboring vineyard data
subscription fee for raw data
money for wine
wine
Consumers/ Distributers
Winery
raw data

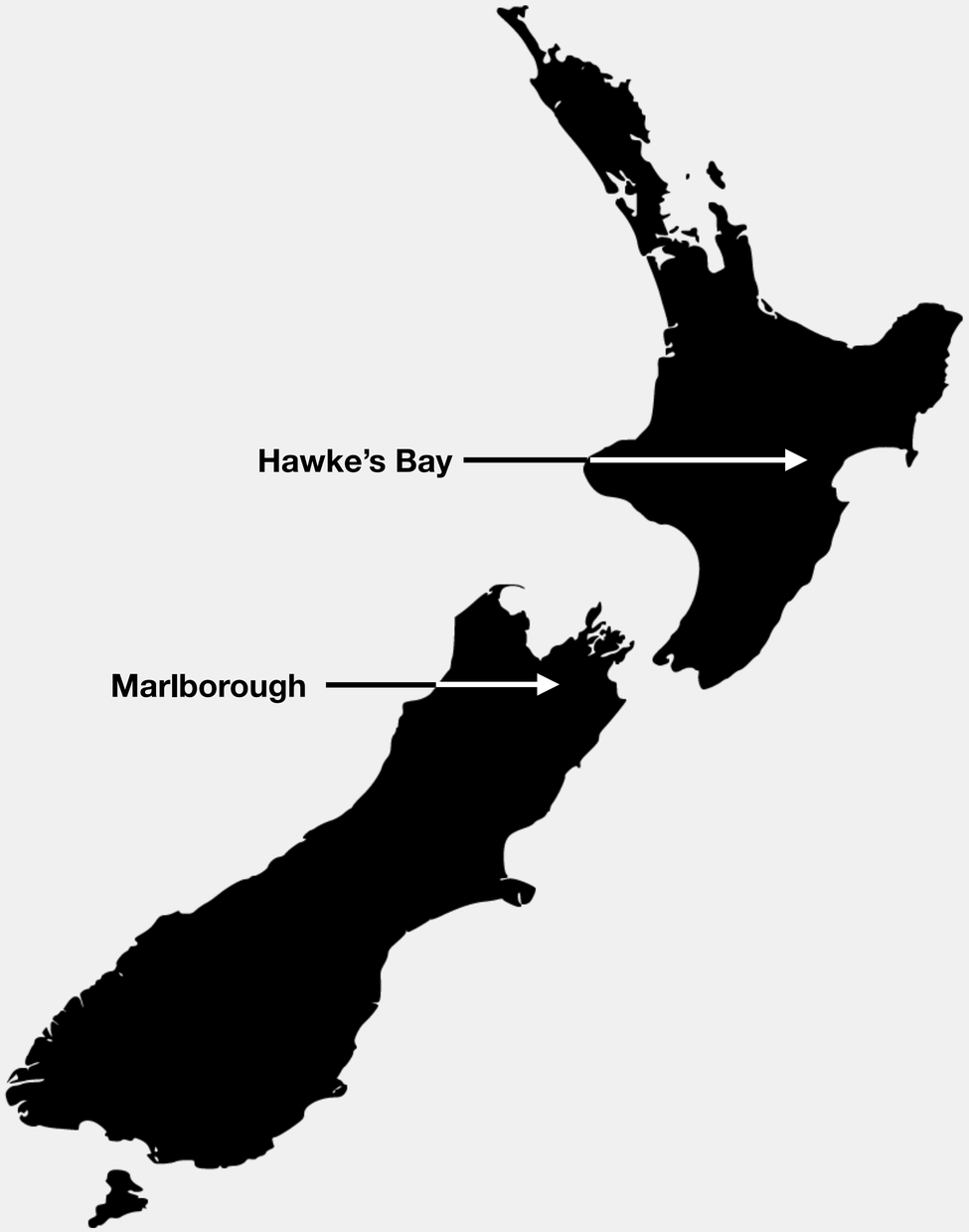
I learn of every new technology and build my entire spray program through the Finger Lakes Grape Growers meetings with the Cornell Extension.

Annie Bachman - Lakeshore Vineyard

When your livelihood depends on this year's crop, you are not afforded the luxury of being forward-thinking.

Our only job is to make sure that we have clean grapes at this year's harvest. - Jon Cupp, Thirsty Owl


. . . unless you are forced to be.



97 percent adherence to sustainability accreditation system

Principally concerned with *soil moisture* to inform irrigation.

An eventual market, but one that will require a slightly different technology.

Value Propositions

- Provide temperature data across a vineyard to prevent frost damage by letting vineyard ...
- Decrease loss of wine grapes
- Deter birds from vineyards
- Improve leaf management, thereby preventing sun damage to wine grapes
- Decrease number of fungicide sprays per season (decreases labor/cost)
- Improve quality of wine grapes (increasing selling price)
- Improve sustainability score of vineyard to make new retailers available for sales (e.g. Whole ...
- Provide additional vineyard data to winemakers making grape purchasing decisions
- Provide plant-level soil moisture measurements to decrease water usage during irrigation
- Provide insurance agents with data that proves crop destruction due to weather and not ...

Customer Relationships

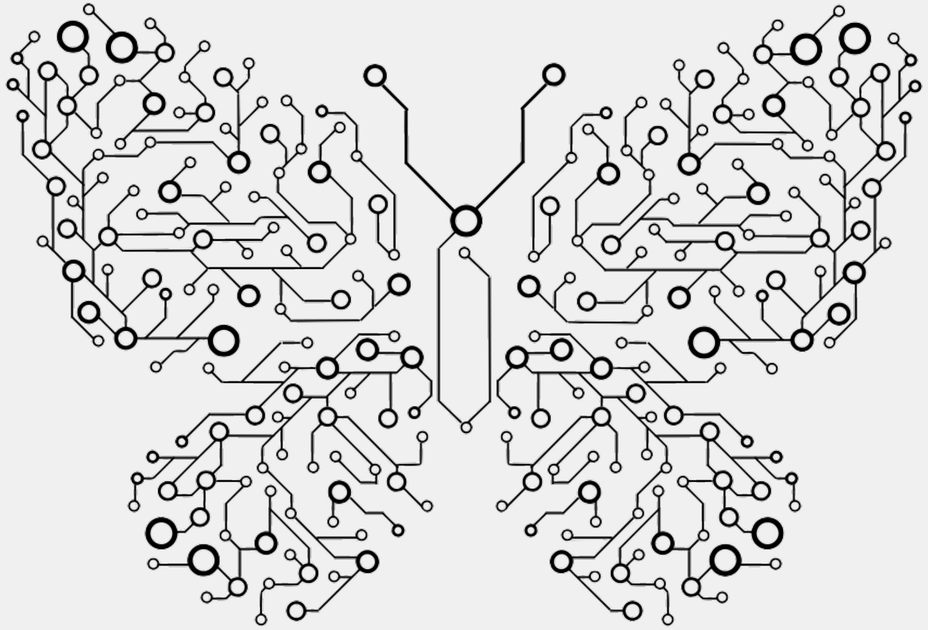
- Maintenance & updates
- Incentivize data sharing
- Trade shows (Unified and IQ)

Channels

- Online purchasing
- On-site installation
- Direct Sales

Customer Segments

- Vineyard managers at cool climate vineyards (end user)
- Academic Extension Programs (influencers)
- Winemakers (end user)
- Data scientists at large California vineyards (like Scheid)
- Winemaker agents (influencers)
- Vineyard managers at warm-climate vineyards (end user)
- Wine brokers (influencer)
- Orchard Owners
- Staple crop farm owners



go.

Customer discovery in Marlborough and Hawke's Bay, New Zealand

Today - Sept. 8

Co-development of vineyard-specific Monarch with the Cornell Extension

Sept. 2018 - Jan. 2019

Research-vineyard technology demonstration with minimum-viable receiver

March 2019 - Aug. 2019

Marketing of Monarchs and minimum viable receivers to local vineyards

Jan. 2019 - Aug. 2019

Development of advanced, internet-connected receiver

Sept. 2018 - Aug. 2019

IP-protection of receiver

Aug. 2019

Cloud-based service for disease analytics using published disease and fungus models

Sept. 2018 - Aug. 2019

Further vineyard marketing and technology upgrading of existing customers

Aug. 2019 -

Marketing of vineyard data to wineries, insurance agencies, agricultural consulting firms, and staple-crop farmers via subscription

Aug. 2019 -

Vineyard kickbacks from subscriptions for providing data

Aug. 2019 -

Development of consumer-market Monarch/receiver kits for distribution on Sparkfun

Jan. 2019 - Aug. 2019

Development of other application-specific Monarchs using vineyards as case study

Aug. 2019 -

Realtime-market of kickbacks for data contribution based on data traffic

Aug. 2019 -

Global network of Monarchs providing realtime data for scientific research and market prediction.