



CALIFORNIA DEPARTMENT OF
FOOD & AGRICULTURE

UAS for California Water Resources Summit

Food and Agriculture Perspective

Robert Schmidt, Director
Executive Office OITS &
Agency Information Officer



1. My Story
2. Agriculture Context
3. Use Cases

My Story: Patterson CA



Photo Credit: Wikipedia

My Story

Drafting receives computer

By Jeff Ross

"Preparing them (students) for the future", said drafting teacher Roswell Hunt is the main reason for the new drafting computer.

Hunt feels that "in the future, all drawings will be done on computers," and that if the students have experiences on such a computer it will be all the simpler for them to get a job.

Hunt also feels that the computer can help students since it is quicker and more flexible than drawing out designs on paper, since drafting with the computer eliminates time consuming steps such as darkening lines which need to be done when drafting the "old way."

The computer is an Apple C.A.D. (computer aided design) with a Bausch and Lomb light table and plotter, and Diatech software.

Although this is a very basic set-up, Hunt feels that it can do everything his classes need it for, and nearly anything the more complex systems can do.



THE DRAFTING department has just received a new Apple II. (photo by Robert Schmidt)

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My Story

Orthodontic assembly with reinforcement structure

US 5707231 A

ABSTRACT

An orthodontic assembly including an orthodontic appliance and a region composed of a matrix material having a plurality of reinforcement structures distributed throughout, with some of the reinforcement structures being exposed on an exterior surface of the assembly, as well as an associated method of fabrication. In one embodiment, the entire orthodontic appliance is composed of the noted reinforcement structures and matrix material. In another embodiment, the noted region is actually a layer which is attached to a separately formed appliance, such as a bracket. Nonetheless, the reinforcement structures may be exposed in a variety of locations, such as on the base and/or arch slot. Moreover, this region may be formed by forming the appliance from the reinforcement structures and matrix material in a manner which produces skin on its exterior surface, and removing the skin from the desired areas to expose reinforcement structures partially contained within the matrix material.

Publication number	US5707231 A
Publication type	Grant
Application number	US 08/280,014
Publication date	Jan 13, 1998
Filing date	Jul 25, 1994
Priority date ?	Jul 25, 1994
Fee status ?	Lapsed
Inventors	David E. Watt , Walter Schmidt
Original Assignee	Rmo, Inc.
Export Citation	BiBTeX , EndNote , RefMan
Patent Citations (14) , Non-Patent Citations (4) , Referenced by (19) , Classifications (7) , Legal Events (4)	
External Links: USPTO , USPTO Assignment , Espacenet	

Stacks, Inc.

Invented US patented processes and
manufactured over 3 million ceramic dental braces

Digital Disruption Context

Context: Labor, Energy, Water, Land



Context: By the Numbers



By **2050**
9 Billion people



100%
more food, and



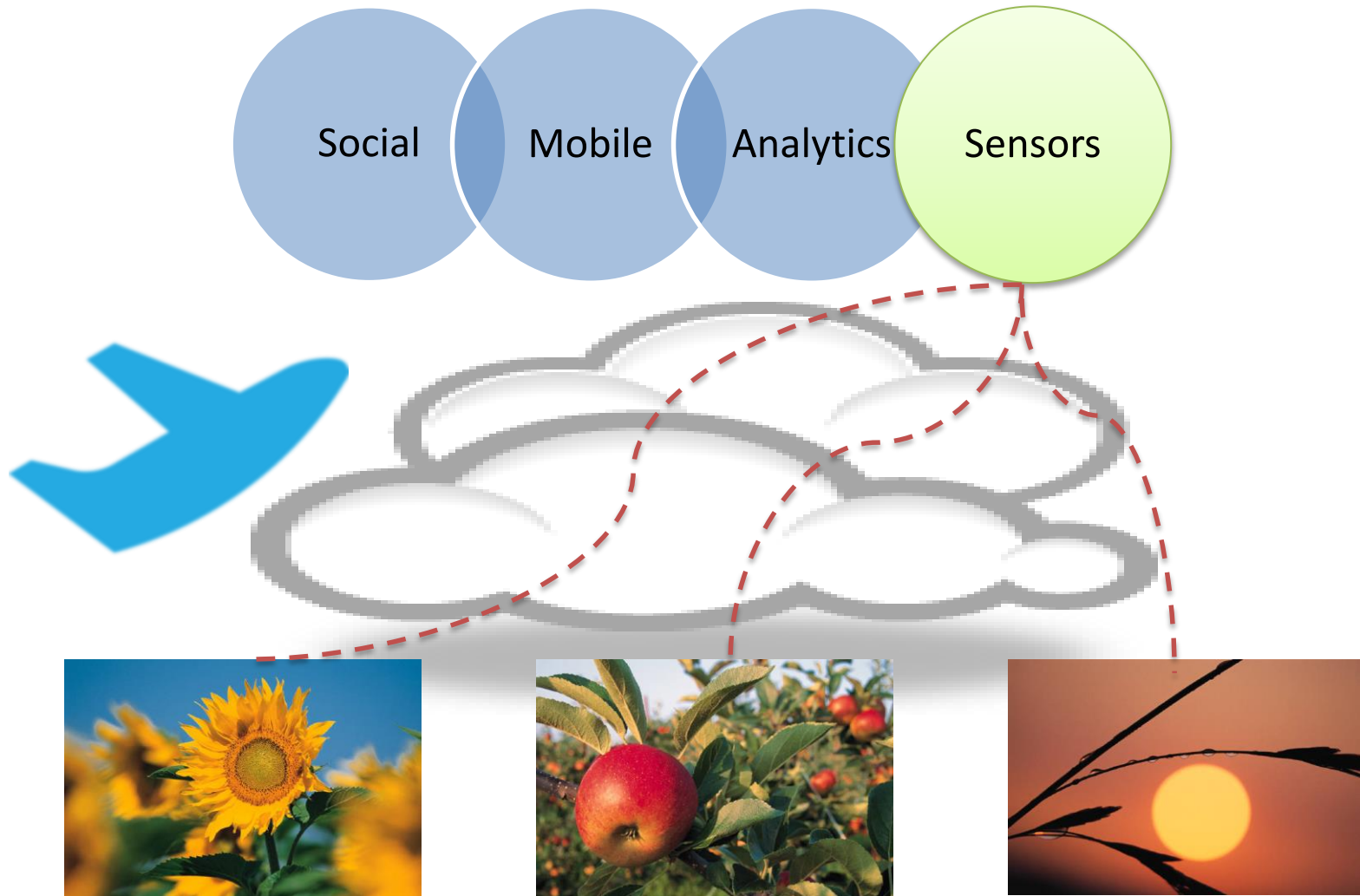
70%
will be from technology

Digital Disruption CDFA Case Study

CDFA Workforce



Disruptive Technologies



UAS Use Cases

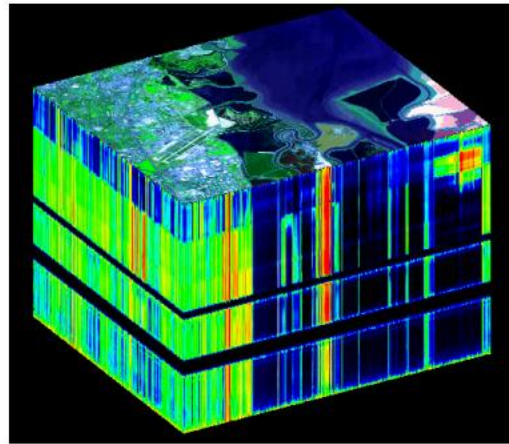
Visualisation

- Asset mapping and monitoring
- Plant health assessment, identification of problems
- Terrain mapping
- Watershed management
- Irrigation management
- Environmental assessment and reporting
- Prescribed burn planning and reporting
- Fire landscaping

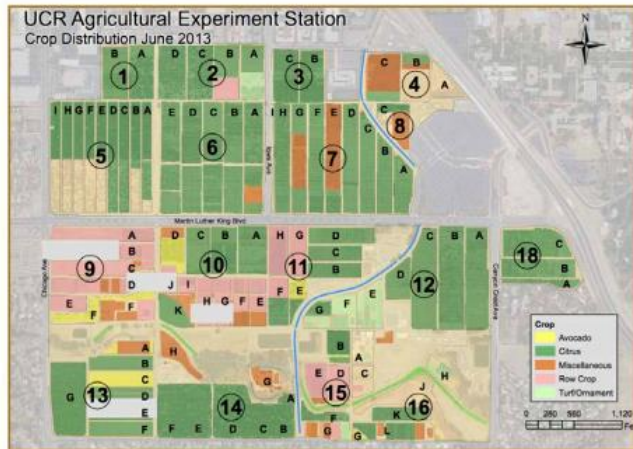


UAS Use Cases

2013 UC Riverside Hyperspectral image



Photos Courtesy: NASA JPL
(Not Export Controlled Technical Data)



UAS Use Cases

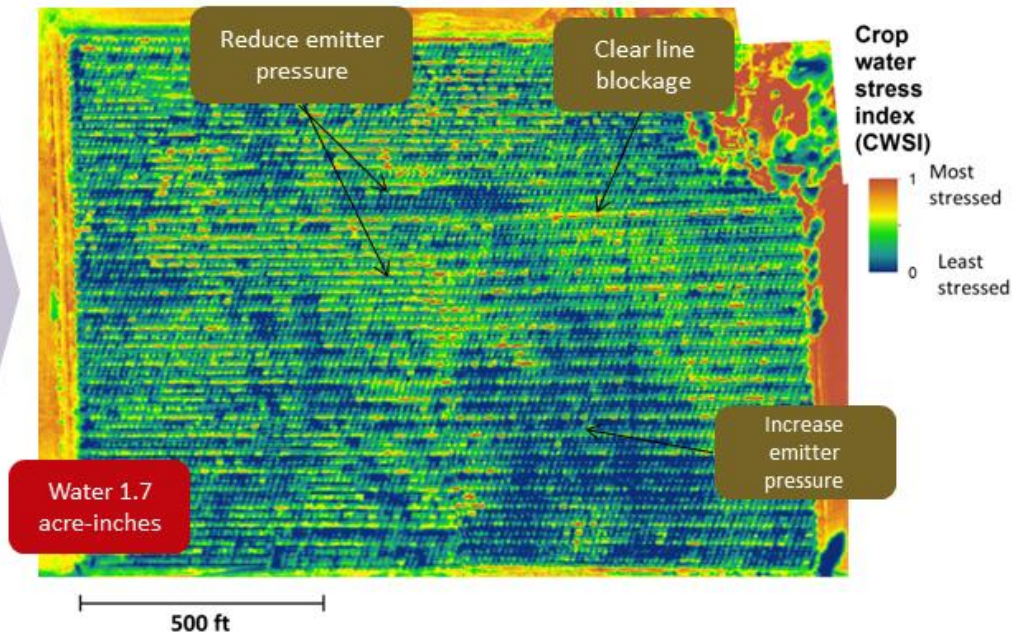
Precision Agriculture

The old way of irrigating (60 acre almond orchard)



Farmer picks one spot (out of ~10k trees) to measure soil moisture and decides water application

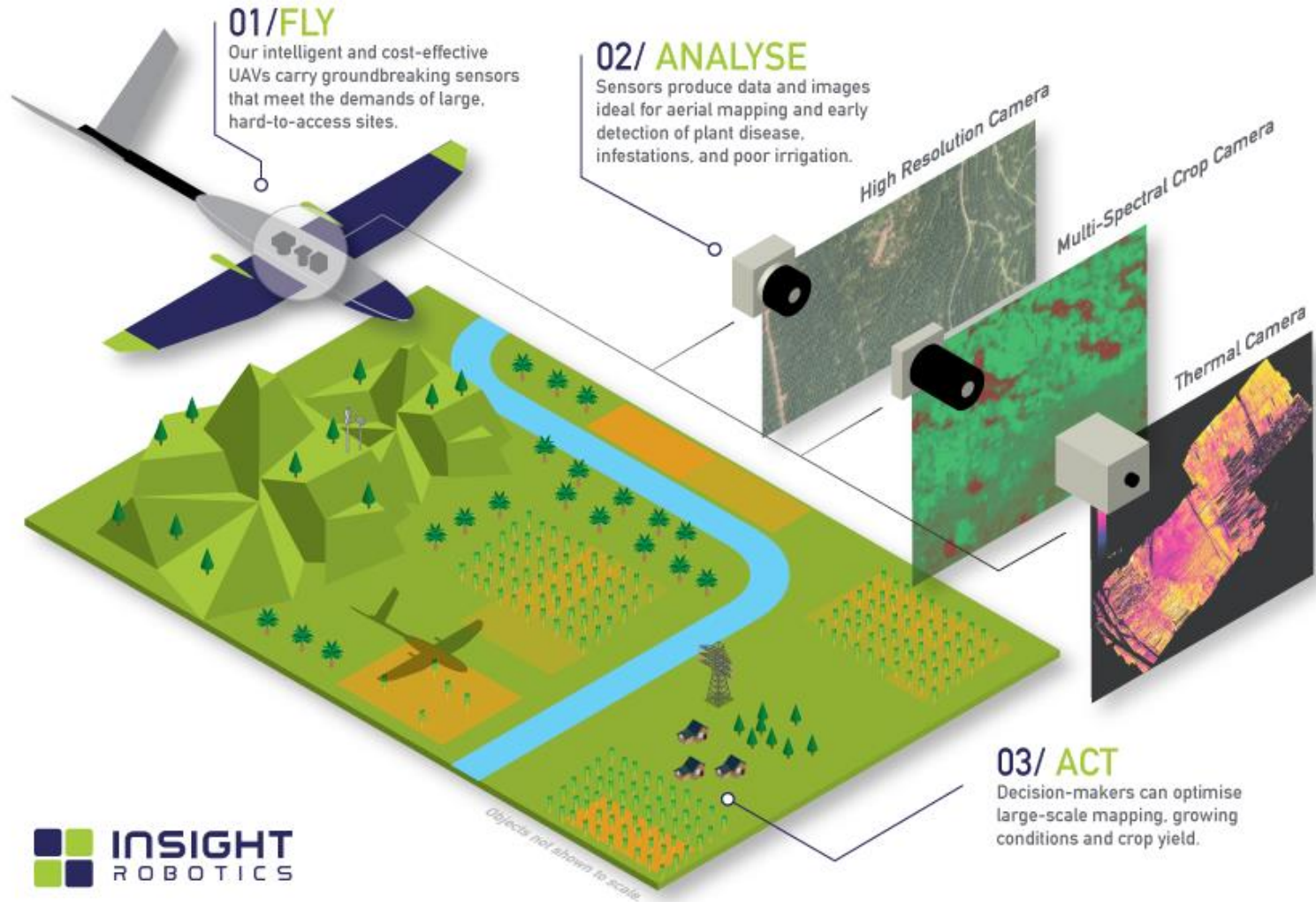
Irrigation with our water stress prototype



Farmer gets optimized calculation of water to apply + tactical field recommendations

UAS Use Cases

Make Ag Data Actionable for Farmers



UAS Use Cases

Solving Watering Problems



Courtesy: ATV Illustrated

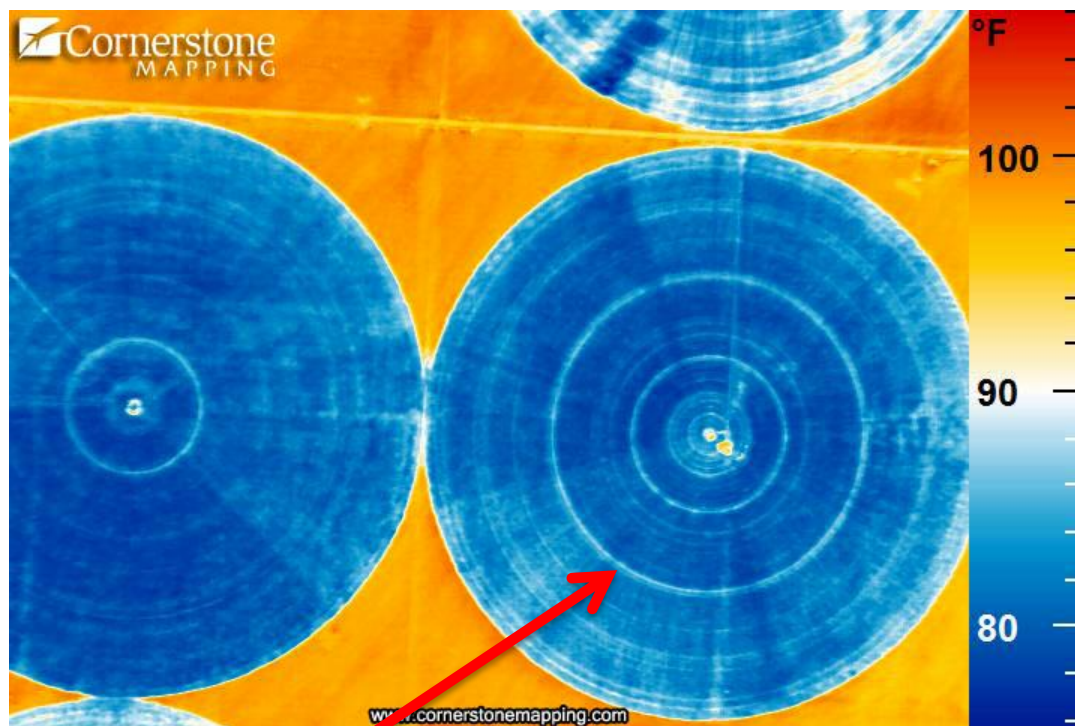


Courtesy: 3DR

UAS Use Cases

Thermal image

- See thermal differences in vegetation
- Identify water distribution problems



Courtesy: Cornerstone Mapping

Light blue represents a clogged water nozzle

UAS Use Cases

Digital Orthophoto Model (DOM)

- High resolution
- Geo-tagging
- Mosaic created from images captured by visible light camera

Visualise the land to identify problems quickly

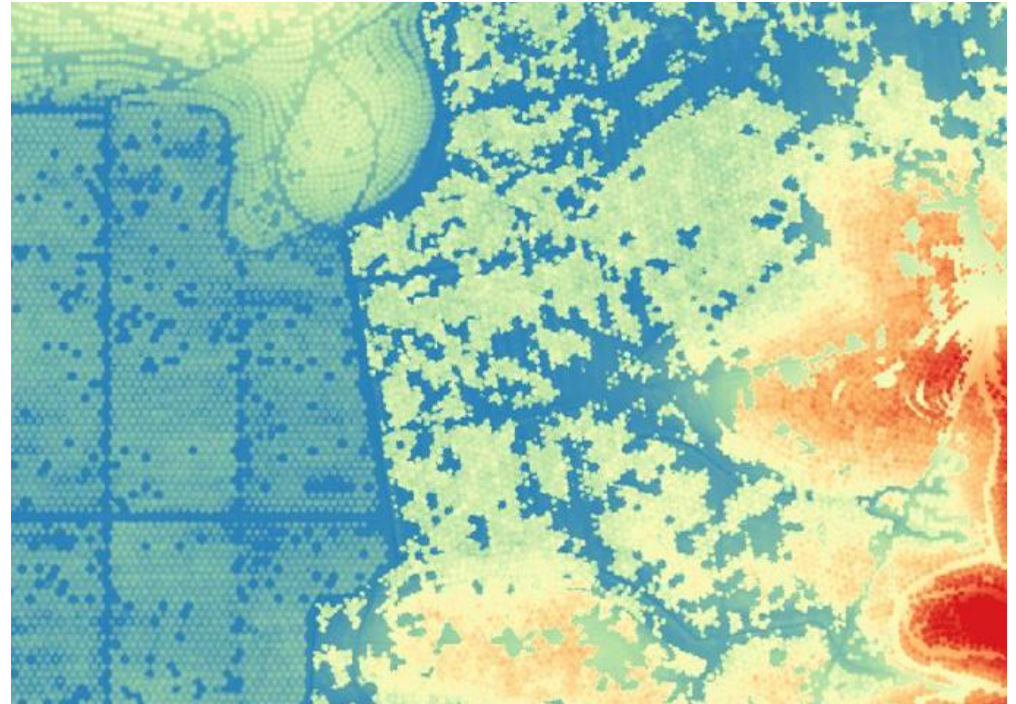


Courtesy: Insight Robotics

UAS Use Cases

Digital Surface Model (DSM)

- 3D topology of land
- Includes trees and buildings



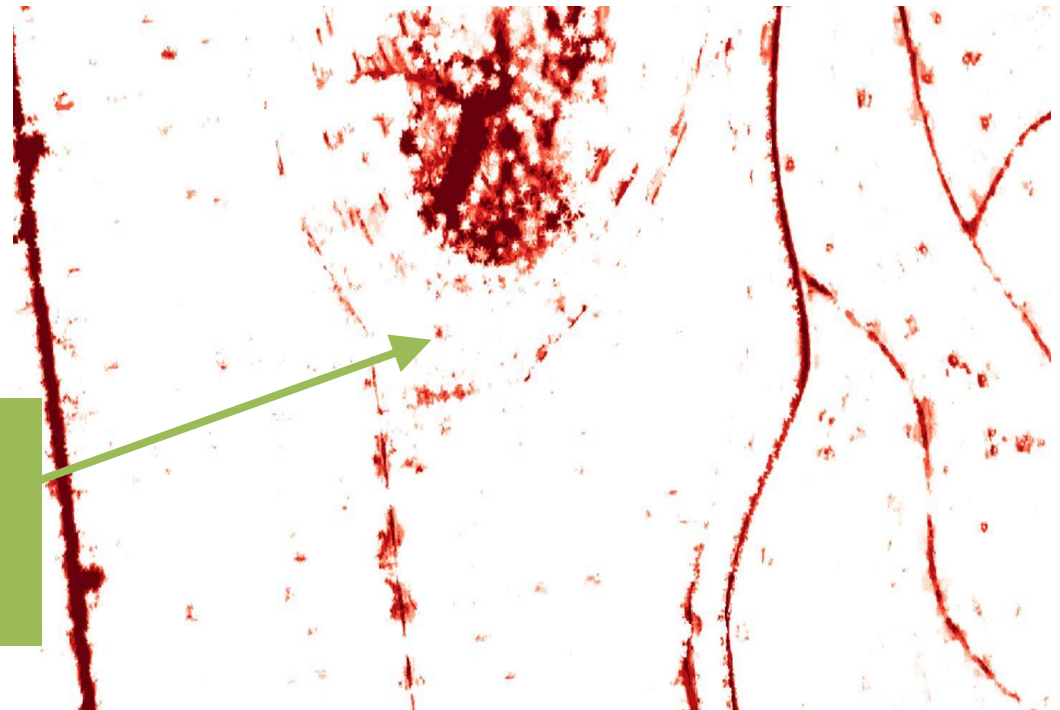
Courtesy: Insight Robotics

UAS Use Cases

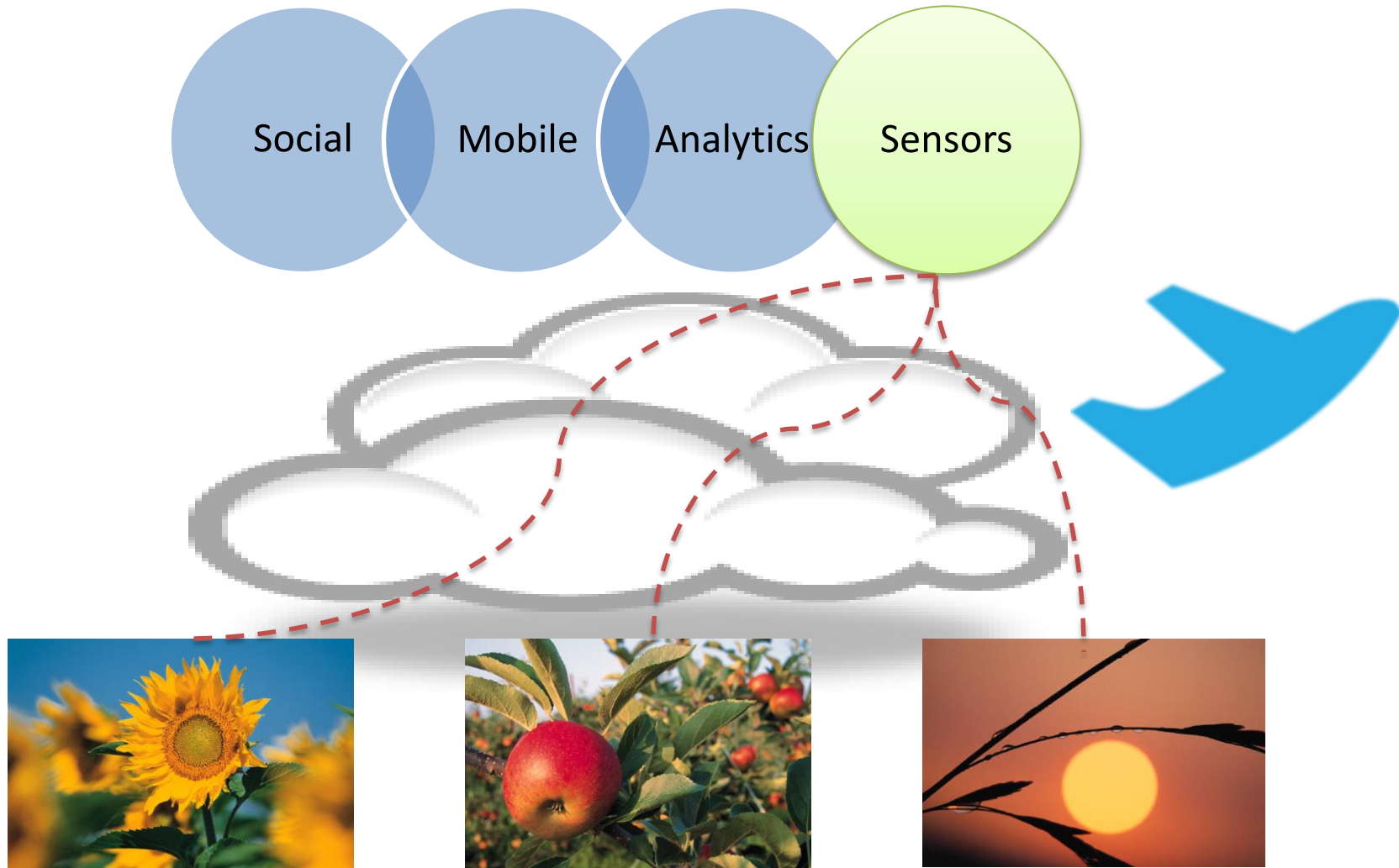
Normalized Difference Vegetation Index (NDVI)

- Measures plant photosynthesis
- Highlights problems with vegetation

Easily
locate



What Else? Disruptive Technologies



Social Media

Recognizing the global agriculture community is connected and engaged.



Growing California video series: Delta Delicacy



Robert Schmidt
@ambassadorcio

Time for a water technology revolution through both hi-tech and low-tech innovations. #startup #cadrought #drought #ioe

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RETWEETS
6

FAVORITES
15



8:27 PM - 17 Jan 2014

Reply to @ambassadorcio



steve shoap @Fight_Bushfires · Jan 18

@ambassadorcio New topology lower \$ of H2O-efficient intelligent irrigation. Works with all protocols. bit.ly/MLrLpq RT?

Details

Reply Retweet Favorite Buffer More



steve shoap @Fight_Bushfires · Jan 18

@ambassadorcio Digital Pumping Hose System deliver water after emergency. Big co build if customer. RT? bit.ly/SjH5co

Details

Reply Retweet Favorite Buffer More



Kevin Riley @Le_Contrarian · Jan 19

@ambassadorcio Any suggestions on sources of capital for truly innovative water technology that can provide comprehensive solutions?

Details

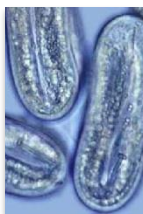
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Information Technology Supports the Business

Mobile Only (and Beyond)

The enterprise potential of mobile is greater than today's smartphone and tablet apps.



Emerging Threats



Public Weigh Scales



Plant Pest Detection



Report a Pest



Cattle Brand ID



CA Geoportal



CA Mobile Gallery

Analytics

Putting the power of research in the hands of California farmers.

BIG DATA



Variety

- Sensors
- Reports
- Images
- Equipment
- Meters
- Forecasts
- Pricing
- Location
- People

Velocity

- Batch
- Monthly
- Weekly
- Daily
- Hourly
- Near Real Time
- Real Time

Volume

- Sensors
- Equipment
- Pumps
- Meters
- People
- Satellites
- Drones
- Forecasts

Analytics

Putting the power of research in the hands of farmers while protecting our environment.



Ecosystem Services

- Wildlife habitat
- Nutrient cycling
- Recreational, cultural activities
- Soil structure, formation, fertility
- Biodiversity conservation
- Water cycling
- Water quality
- Pollination services



Problems in AgTech

- Regulatory
- Intellectual property of Ag Land
 - Who owns the data?
 - Who controls the data?
 - How do we secure the data?
- Ag Standards
 - How do we connect billions of Ag devices to the internet?
 - What are the methods of interfacing Ag devices?

Closing Thought

Define the Use Cases.

*A farmer doesn't want
a drone; he wants an
answer.*

Sources and Contacts:

- Sources:
 - CDFA Website: <http://www.cdfa.ca.gov>
 - Planting Seeds Blog: <http://plantingseedsblog.cdfa.ca.gov>
 - White Paper: “Agriculture Tech Advances Opportunities for Entrepreneurs, Kauffman/Danforth Plant Science Center Paper Shows”
<http://www.kauffman.org/newsroom/2014/04/agriculture-tech-advances-opportunities-for-entrepreneurs>
 - Forbes Article: “Kauffman Report Makes The Case For AgTech Innovation & Investment”
- Contact:
 - E-mail: robert.schmidt@cdfa.ca.gov