GIS, GPS and Smartphone Workshop

Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
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<tbody>
<tr>
<td>11:00-12:00</td>
<td>Demonstration of data collection and map making using free</td>
<td>Ryan Trapp, GIS Specialist, SLO County Ag</td>
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<tr>
<td></td>
<td>and low cost tools</td>
<td>Commissioner</td>
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<td>10:40-11:00</td>
<td>GIS usage in SLO Ag Commissioner</td>
<td>Russ Linhart, Trimble</td>
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<td>10:00-10:40</td>
<td>Uses of GPS Technologies in Farming</td>
<td>Mike Bobbitt &amp; Associates</td>
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<td>9:50-10:00</td>
<td>Applications for GIS in Vineyards</td>
<td>Kelly Bobbitt, Mike Bobbitt and Associates</td>
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<td>9:20-9:50</td>
<td>Intro to GIS/Mapping and GPS</td>
<td>Kelly Bobbitt, Mike Bobbitt and Associates</td>
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<tr>
<td>9:00-9:20</td>
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<td>Applications for GIS in Vineyards</td>
<td>Kelly Bobbitt, Mike Bobbitt and Associates</td>
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<td>8:50-9:00</td>
<td>Break</td>
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Kelly Bobbitt

Russ Linhart

Jillian Cole

Mike Bobbitt & Associates

- 10 Year old vineyard mapping and database consultants with offices in Sonoma and in Atascadero
- Specialize in GPS data capture, map production and GIS/Spatial database usage and training
- Clients include
  - Wineries
  - Vineyards
  - Vineyard mgmt. companies
  - Wine marketing and distributors
  - Graphic Design companies
  - Regional Associations

Well over 1000 vineyards mapped

What do we do?

- Help develop new vineyards
- Help redevelop existing vineyards
- Create, manage and display vineyard information
- Create marketing tools for Vineyards and Wineries

Definitions

**Geographic Information System** vs. **Positioning System**

“An organized collection of computer hardware, software, geographic data, and personnel designed to efficiently
- Capture
- Store
- Update
- Manipulate
- Analyze
- Display
all forms of geographic referenced information”
Popular GIS Packages

- **ArcView**
  - Full functioning GIS
  - Used by most GIS professionals
  - Not the most user-friendly
- **Manifold GIS**
  - Inexpensive and very powerful GIS
  - No major releases since 2008
- **Farmworks**
  - Inexpensive GIS made for Agricultural users
- **ArcExplorer**
  - Free GIS viewer
- **Google Earth**
  - Some very basic GIS capabilities
- **Various Open Source GISs**
  - Layer PDFs have many GIS capabilities

Definitions

- **Global Positioning System (GPS)**:
  - GPS is an efficient and convenient tool for accurately measuring locations on the globe.

GPS Horizontal Accuracies

<table>
<thead>
<tr>
<th>Type</th>
<th>Autonomous</th>
<th>Differential</th>
<th>Carrier</th>
<th>Processed</th>
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</thead>
<tbody>
<tr>
<td>Low End Mapping</td>
<td>40 ft</td>
<td>&lt; 3 ft</td>
<td>&lt; 1 ft</td>
<td></td>
</tr>
<tr>
<td>High End Mapping</td>
<td>40 ft</td>
<td>&lt; 3 ft</td>
<td>&lt; 1 ft</td>
<td></td>
</tr>
<tr>
<td>Survey receivers</td>
<td>40 ft</td>
<td>&lt; 3 ft</td>
<td>&lt; 1/2 in</td>
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Spatial Information Flow in Vineyards

- Spatial analysis of physical and chemical characteristics allow for maintaining fruit quality and form ability though better design, ordering and installation
- "Common" information between winegrowers and winemakers allows better farming practices and higher quality wines
- Tools for showing unique qualities of a vineyard and the resulting wines
1. Vineyard Development

GIS is being used to support Viticulturists, Wine makers and Soil Scientists on:
- Soils investigations
- Chemical characteristics
- Physical characteristics
- Vineyard block designs
- Ground preparation
- Planting recommendations

These and other technologies are used to maximize fruit quality and minimize management inputs by designing "flavor" blocks with uniform vigor and fruit maturation.

Normalized Difference Vegetation Index

The NDVI measures the infrared reflectiveness of the vegetation, resulting in an indication of vigor relative to other plants in the image. This is used for:
- Identifying and locating variations in vine vigor
- Developing better field sampling plans
- Designing differential harvesting plans
- Adjusting irrigation schedules and irrigation breaks
- Locating frost damaged areas (less green)

GPS is used to georeference the NDVI data so that it can be related to other data in the GIS.

Example of NDVI illustrating poor uniformity

Existing Information - Soils

Step 1 - The Development process starts by compiling together existing information on a property.
Step 2 - GPS is used to map soil pit sampling locations and other features that will determine plantable area.

Characteristics of the soils can be graphically represented to aid in the interpretation of soils on the site.

Characteristics of the soils can be classified.

But this does not do us much good...

Soil Characteristics
Preliminary Block Design and Rootstock Recommendations

Graphic work orders

Soil Characteristics

Precise estimates for material orders (plants, end posts, stakes, wire, drip hose etc.) can all be derived from the design.

Precise plans for irrigation design

Step 3 - Final Design and Material Estimates

- Avenues and turnarounds are factored in to determine net plantable area and vine counts.
- Precise estimates for material orders (plants, posts, stakes, wire, drip hose etc.) can all be derived from the design.
- Precise plans for irrigation design.
- Precise plans for stakeout.
2. Production

Two phases to building and using a Vineyard Information System

A. Vineyard Mapping and Inventorying
   - Initial compilation of existing physical data and the spatial component to this data

B. Vineyard Management
   - Using the GIS for better decision making and communicating across the organization
   - Ongoing updating information building history of vineyard in a centralized information depository

2a Vineyard Mapping and Inventory

The objective is to compile existing viticulture data and capture new data at appropriate levels:

- Block Level
- Vine Row Level
- Plant Level

- Block Boundaries
- Varietal, rootstock, clone info
- Planting date
- Acreage
- Other info

How is data delivered to clients

- Traditionally
  - Electronic or hard copy maps

- Currently
  - "Layered" pdf’s
Such as Multilayered PDF Maps

And other convenient uses;

How is data starting to be delivered within organizations

► Web based interactive maps
  • Data can be updated through multiple avenues
  • PDA or smart phone with GPS or without
  • Through web browser on PC

2b Vineyard Management

The GIS database is used to store and analyze historical information on:

- Data vines
- Pruning weights
- Pressure bomb readings
- Irrigation schedules
- Cluster counts
- Yields
- Petiole data
- Pest and disease locations

Storing this information in a single location on a corporate network makes the vineyard accessible to everyone in the organization
Vineyard Information System

Vineyard Information System

What is happening today?

- Technology (smartphones) is moving GPS into the background and data into the foreground
- A move towards simple data collection/synchronization and usage
- Real-time monitoring and analysis (important for harvest)
Spatial Information Flow in Vineyards

1. Development

2. Production

3. Marketing

- Demonstrate to customers where the components of a particular wine were grown
- Educate wine writers about the factors that influence the quality of your grapes and wines

Marketing Map

Main components:
- Vineyard
- Soil
- Topography
- Climate

3 Views that are important to show a sense of place:
- Regional View
- Vineyard View
- 3D View
Traditionally Wineries had to bring the market to the vineyard
Now bring the vineyard to the market
Can be used for
- Kiosk
- Tastings or tasting rooms
- Web
- Presentations
- Educational tool
Vineyard Information Summary

1. Development
2. Production
3. Marketing

Consumer

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Atascadero
Sonoma