

New Tools to Manage Pests in a Museum Environment

Automating Data Collection & Reporting to
Promote Urban IPM



Riverside Municipal Museum

3580 Mission Inn Avenue, Riverside, CA 92501

Picture of museum on this slide



On the Outside...

In the museum realm, IPM is typically viewed as a collections management tool, and issues of building structure and the urban environment are seldom dealt with. Nevertheless, across the US, most local museums and historical societies are housed in rehabilitated historic structures - old railway stations, post offices, libraries and school buildings – and many of these are in downtown or otherwise urban settings.

The Riverside Municipal Museum's building is a renovated 1914 Federal Post Office, located in downtown Riverside. Using such a building for museum purposes entails coping with a bevy of structural and environmental issues, quite a few of which relate directly to pest management. While issues of historic preservation and sheer cost can prevent dealing with structural problems head-on, IPM methods can offer low cost, indirect alternatives.

On the Inside...

(exhibits)

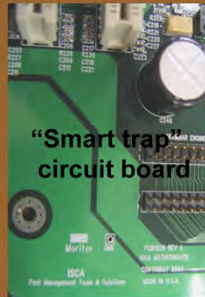
(collections)

(Nature Lab)



Mission Statement

Provide integrated pest management solutions that are effective, economical, environmentally friendly, and most importantly, do not have the harmful side effects of many conventional pest management techniques that rely solely on insecticides.



Objectives for Urban IPM Project

- Immediate:
 - Simplify & reduce time required to...
 - **Collect field data**
 - **Process and analyze data** (combining with computer models and algorithms to estimate pest population densities)
 - **Generate Reports**
- Long-range:
 - Develop a device or system that automates the identification process
 - Provide IPM strategies for each pest species based on specific environmental parameters

MUSEUM MAINTENANCE RECORD MONTH: August YEAR: 2002

Daily interior trash pickup (check one box per day)

<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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Special events (write date)

• Pest Records

- Presence / Absence
- Identification
- Density
- Distribution

Exterior trash & debris pickup (write date)

<u>8-5</u>	<u>8-10</u>	<u>8-12</u>	<u>8-13</u>	<u>8-17</u>	<u>8-20</u>	<u>8-31</u>
<u>REPAIRS</u>	<u>REPAIRS</u>	<u>REPAIRS</u>	<u>REPAIRS</u>	<u>REPAIRS</u>	<u>REPAIRS</u>	<u>REPAIRS</u>

Additional exterior trash & debris pickup (write date & location)

<u>8-12</u>	<u>8-13</u>	<u>8-17</u>	<u>8-17</u>	<u>8-20</u>	<u>8-20</u>	<u>8-31</u>
<u>REPAIRS</u>	<u>REPAIRS</u>	<u>REPAIRS</u>	<u>REPAIRS</u>	<u>REPAIRS</u>	<u>REPAIRS</u>	<u>REPAIRS</u>

Exterior pressure washing (write date)

• Decision Making

- Control Measures - Are they needed? If so: Where, When, How much?
- Effectiveness

Interior public spaces vacuumed/dry mopped once per week (check one box per day)

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Interior public spaces wet mopped as needed (write date and location)

<u>8-5</u>	<u>8-9</u>	<u>8-10</u>				
<u>REPAIRS</u>	<u>REPAIRS</u>	<u>REPAIRS</u>	<u>REPAIRS</u>	<u>REPAIRS</u>	<u>REPAIRS</u>	<u>REPAIRS</u>

Work spaces vacuumed/dry mopped once per week (check one box per week)

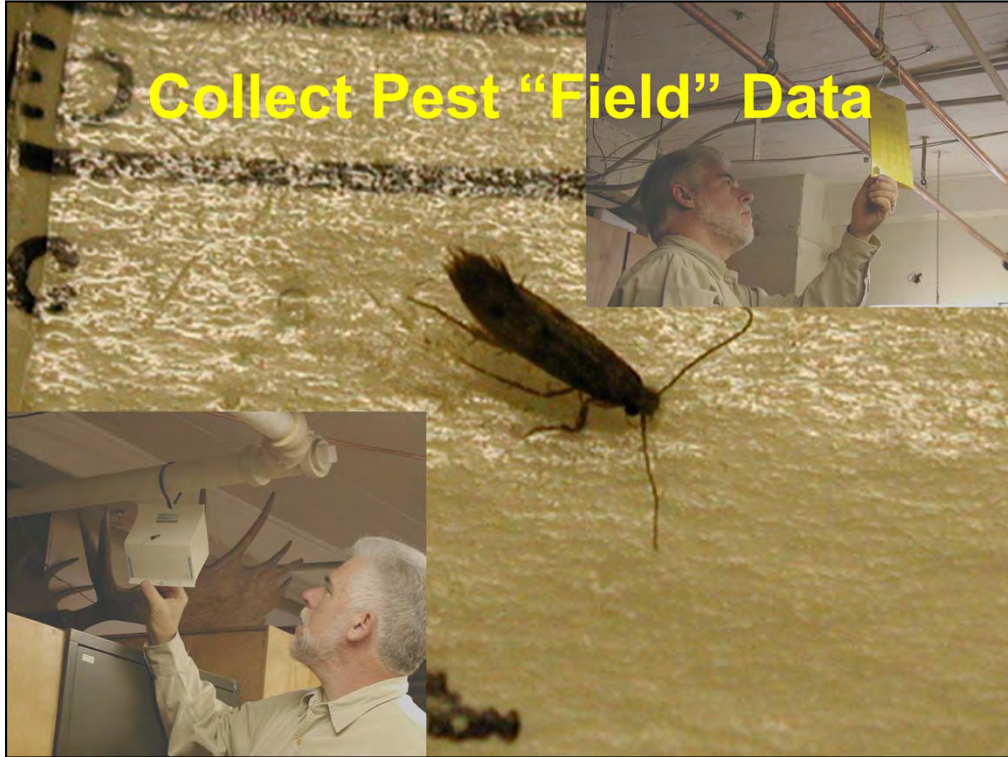
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Problems Inherent with IPM

- **Information Collection:** Labor intensive monitoring is the backbone to any sound IPM program.
 - Status of pest
 - Condition of building (torn screens, doors left ajar etc.)
 - Effect of control strategies
- **Action to be Taken**
 - What should be done based on data collected?
 - How do you implement IPM?

Collect Pest "Field" Data



Collect Building Structure Info

- Integrity of building (excluding pests)
- Maintenance (general upkeep of building)

MUSEUM MAINTENANCE RECORD MONTH: August YEAR: 2002

Daily interior trash pickup (check one box per day)

<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Special events trash pickup (write date and location)

RECEIVED
8-10

Exterior trash & debris pickup/ once per month (write date)

Additional exterior trash & debris pickup (write date & location)

ARIZONA	8-28-02	B-24
8-28-02	8-28-02	B-24
8-28-02	8-28-02	B-24
8-28-02	8-28-02	B-24
8-28-02	8-28-02	B-24
8-28-02	8-28-02	B-24
8-28-02	8-28-02	B-24
8-28-02	8-28-02	B-24
8-28-02	8-28-02	B-24
8-28-02	8-28-02	B-24
8-28-02	8-28-02	B-24

Exterior pressure washing as needed (write date & location)

8-28
FRONT AND
SIDE STEPS

Interior public spaces vacuumed/mopped (check one box per day)

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Interior public spaces wet mopped/needed (write date and location)

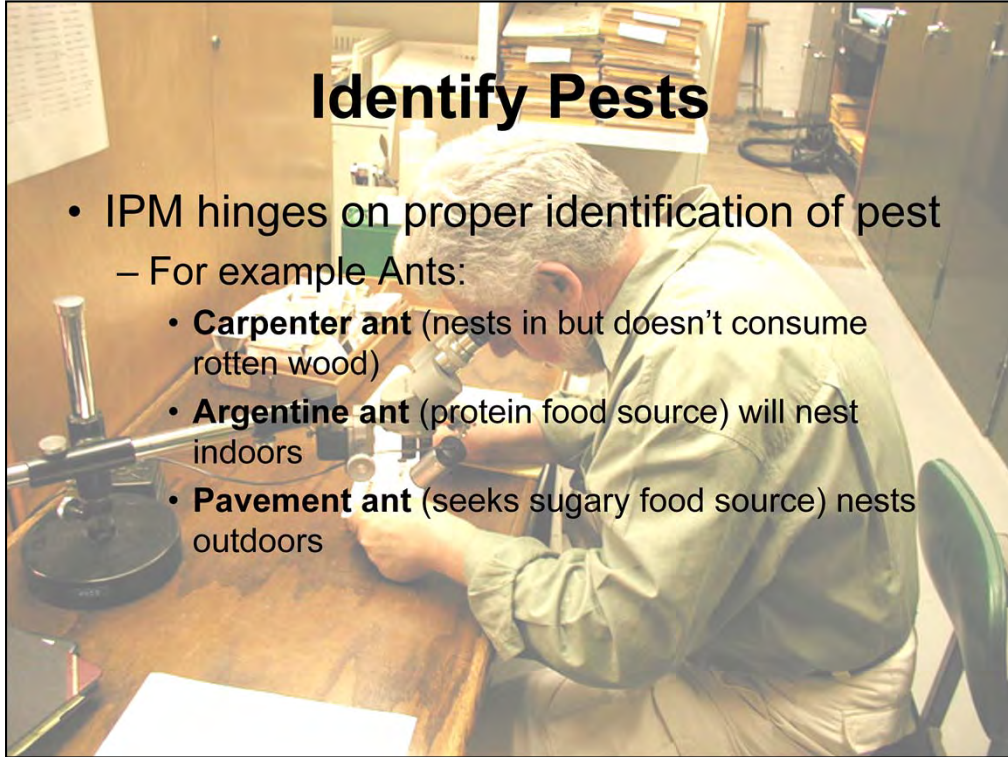
RECEIVED	8-28-02	
8-28-02	8-28-02	
8-28-02	8-28-02	
8-28-02	8-28-02	
8-28-02	8-28-02	
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8-28-02	8-28-02	
8-28-02	8-28-02	

Work spaces vacuumed/mopped once per week (check one box per week)

<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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Identify Pests

- IPM hinges on proper identification of pest
 - For example Ants:
 - **Carpenter ant** (nests in but doesn't consume rotten wood)
 - **Argentine ant** (protein food source) will nest indoors
 - **Pavement ant** (seeks sugary food source) nests outdoors

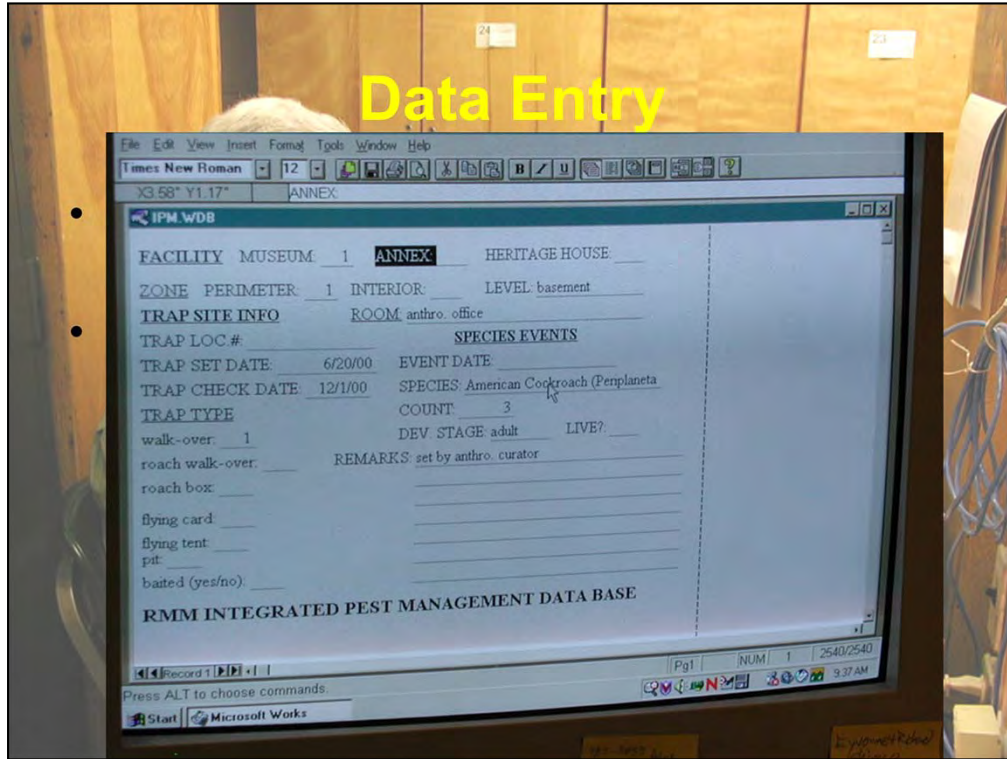


Tabulate information

- Number of each pest at distinct developmental stage
- Location
- Date

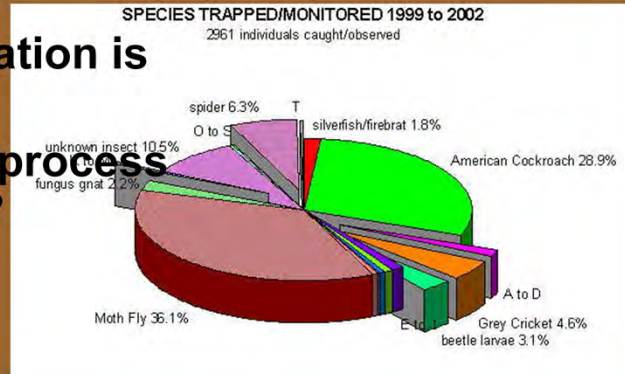


Data Entry



Analysis & Graphical Presentation of Data

- What information needs to be presented?
- What information is pertinent?
- How do you process information?

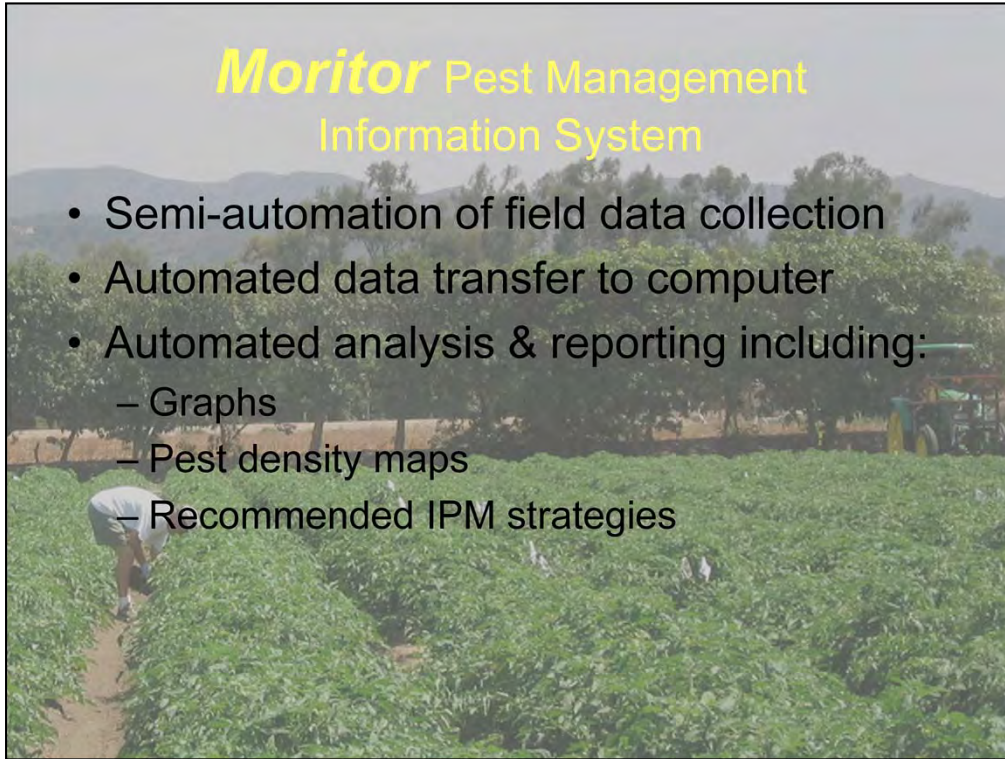




With ISCA's patented and award winning agricultural information system, field data is collected with handheld or automated devices,

Moritor Pest Management Information System

- Semi-automation of field data collection
- Automated data transfer to computer
- Automated analysis & reporting including:
 - Graphs
 - Pest density maps
 - Recommended IPM strategies

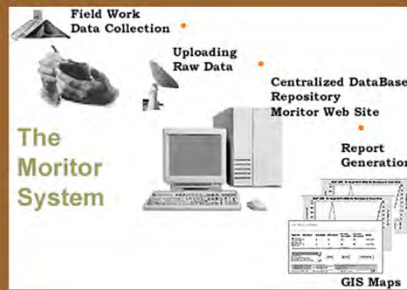


Monitor Components

- **Desktop companion** – installed on office computer
- **Pocket PC or Palm Pilot** – used to collect field information
 - Handheld can be equipped with either:
 - **Scanner**
 - **GPS**

Moritor - Pest Management Information System

- Collect field data using Pocket PC
- Synchronize data on handheld with desktop unit
- Data transferred from desktop computer to centralized database
- Data processed and analyzed by ISCA
- Automated reports - depicting pest information and suggesting IPM control strategies
- Centralized database enables easy access to data by authorized users, and allows for easy comparisons of pest problems between institutions



With ISCA's patented agricultural information system, known as the Moritor System (www.moritor.com), field data is collected with handheld or automated devices, sent to an internet accessible centralized database, where they are parsed, stored and analyzed to generate reports which identify alarm situations and predict pest population densities, thereby facilitating decision making and the deployment of pest control measures in the field.

Advantages of *Moritor*

- Shortens the data management processing time from weeks to hours or minutes
- Allows managers to stop pest problems as soon as they are detected, thus avoiding crisis pest management weeks later, and resulting in significant cost savings from the reduction in pesticide use

Developed in part with funding from the National Science Foundation and National Institute of Standards and Technology, **the Moritor System enables targeted, environmentally friendly pest management practices - the right pesticides at the right quantity, at the exact location, at the right time.** Moritor's algorithms are designed to predict pest outbreaks weeks in advance. By shortening the process of data management from weeks to hours or minutes, the Moritor System allows farmers to stop pest problems as soon as they are detected, thus avoiding crisis pest management weeks later, and resulting in significant cost savings from the reduction in pesticide use (approximately \$23,000 annually for the average U.S. farm with 240 acres) and potential crop damage.

Field Data Structure

Moritor Desktop Companion

Basement
Second Floor

Building: Building 2
Construction: Wood

Please enter in the data for a new building.

Trap

Pest 1
Pest 2: *Subterranean termites*
Pest 3: *Sowbugs*
Pest 4: *None*
Pest 5: *None*
Pest 6: *None*
Pest 7: *None*
Pest 8: *None*
Pest 9: *None*
Pest 10: *None*

Upload Data Clear Collected Data Delete All Fields

Delete

Delete

Delete

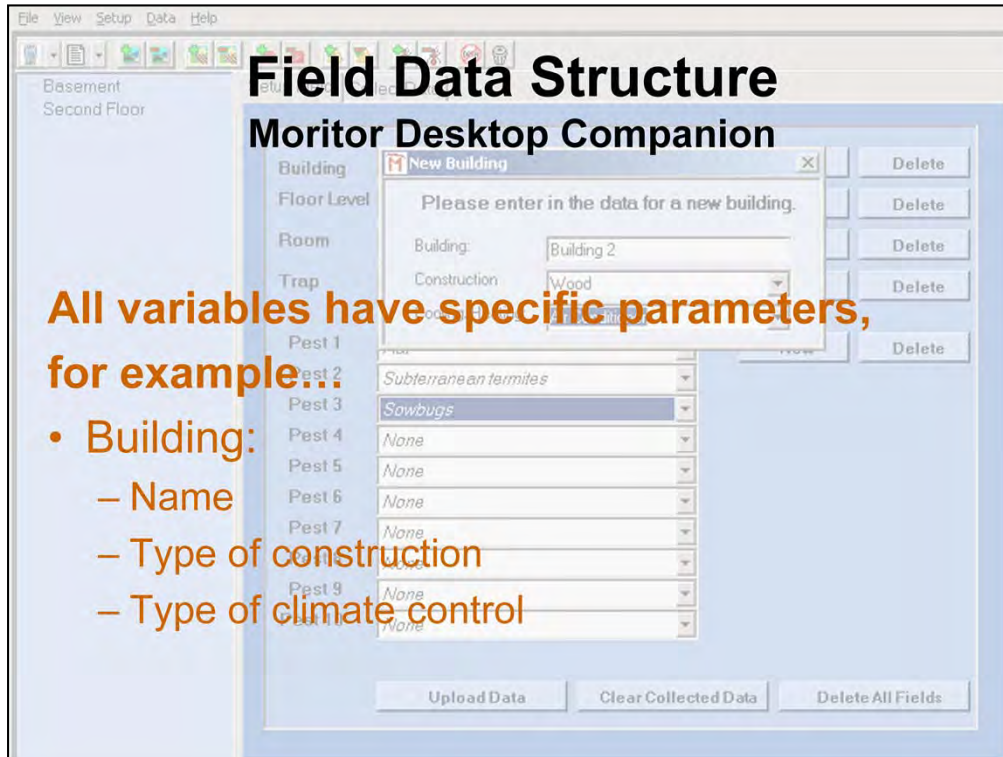
Delete

Delete

Delete

All variables have specific parameters, for example...

- Building:
 - Name
 - Type of construction
 - Type of climate control



Field Data Structure Moritor Desktop Companion

• Rooms can similarly be assigned

- Names
- Types
- Size & heights (volume)

Field Data Structure

Moritor Desktop Companion

• Most important...

↳ Traps are not only named, but assigned descriptors that allow for efficacy testing

Buttons: Upload Data, Clear Collected Data, Delete All Fields

Field Data Structure Moritor Desktop Companion

Basement
Second Floor

Building: Riverside Municipal Museum [New] [Delete]
Floor Level: Basement [New] [Delete]
Room: Room 101 [New] [Delete]
Trap: Trep0001 [New] [Delete]

Pest 1: Rat [New] [Delete]
Pest 2: Subterranean termites
Pest 3: Sowbugs
Pest 4: None
Pest 5: None
Pest 6: None
Pest 7: None
Pest 8: None
Pest 9: None
Pest 10: None

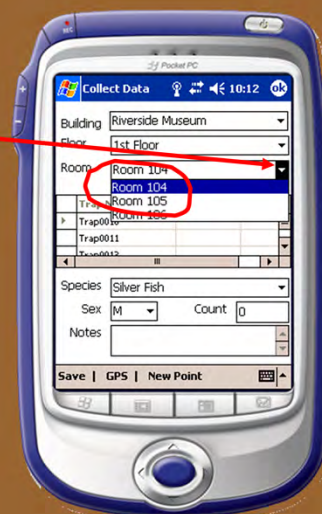
[Upload Data] [Clear Collected Data] [Delete All Fields]

- *Moritor's initial set-up is a one time event!*

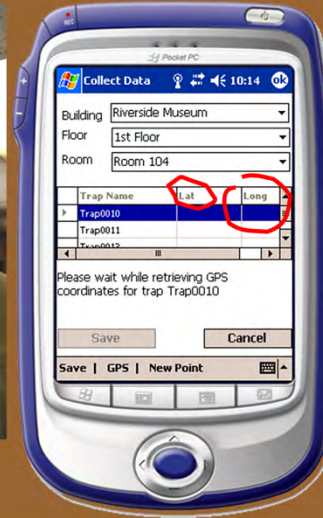
vs.

- *Traditional: Need to write in variables during each data collection event*

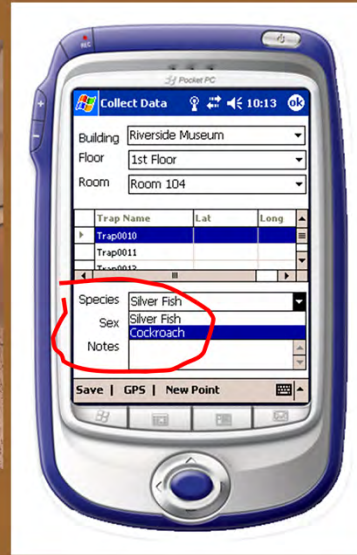
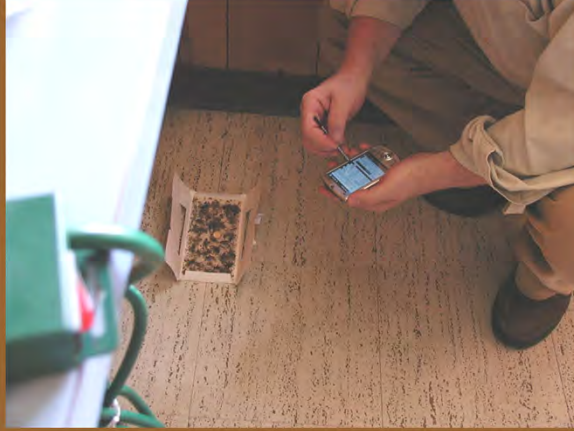
Data Collection with Pocket PC



Data Collection with Pocket PC

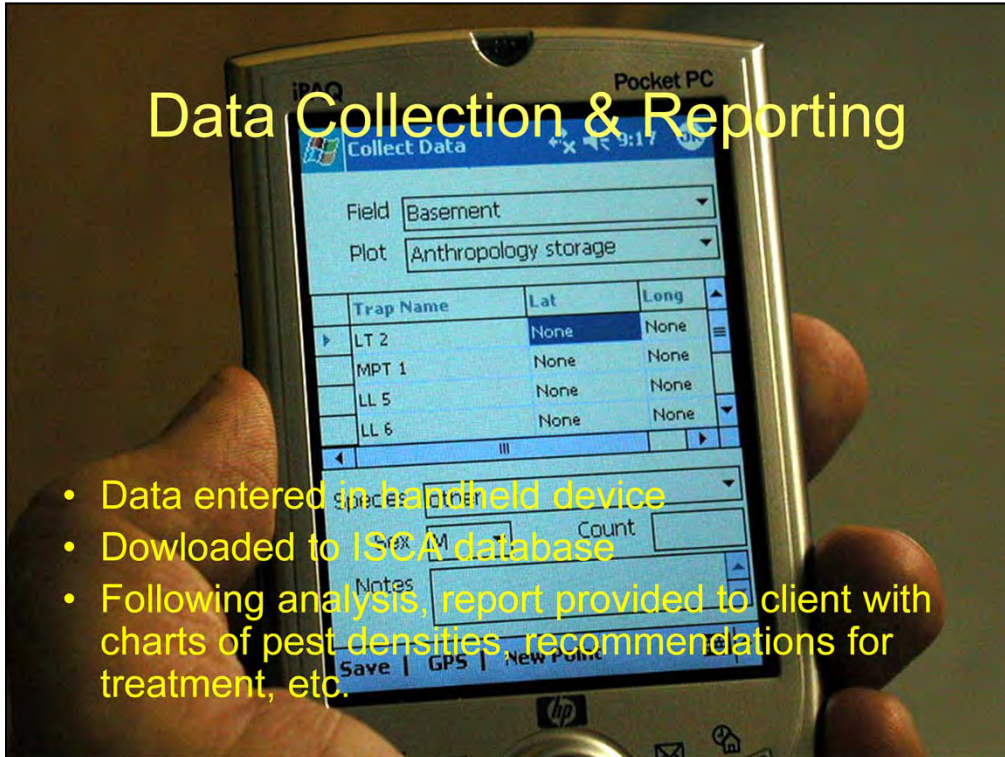


Data Collection with Pocket PC



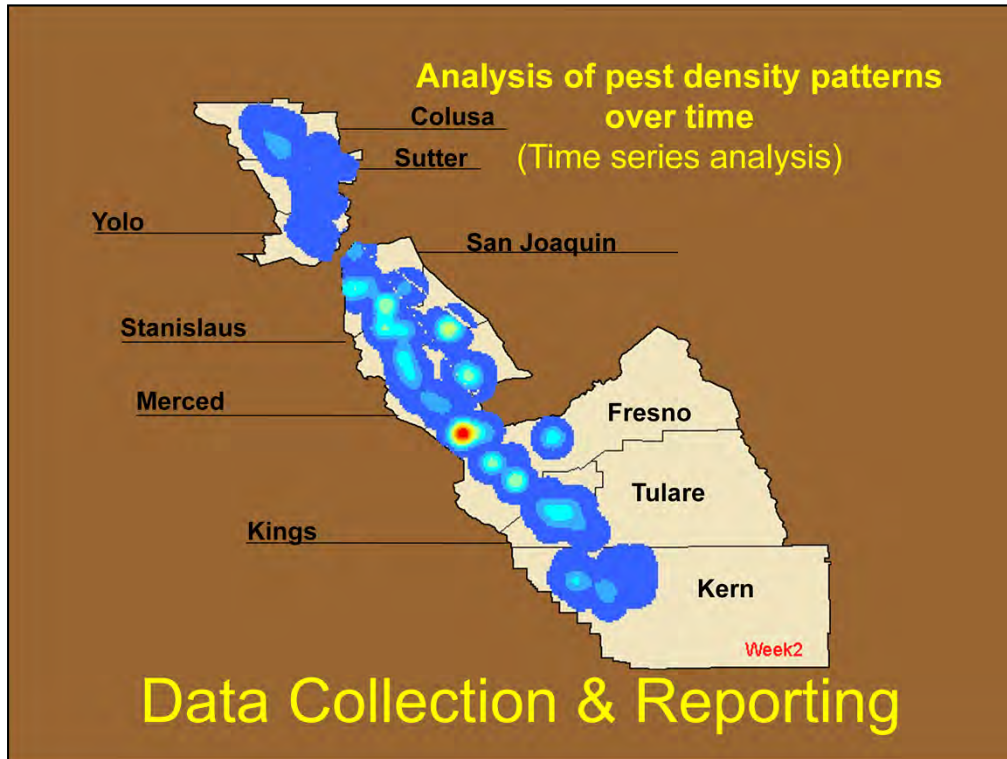
Data Collection & Reporting

- Data entered in handheld device
- Downloaded to ISCA database
- Following analysis, report provided to client with charts of pest densities, recommendations for treatment, etc.



Data Collection & Reporting

- Pest Reporting will ultimately include:
 - Density maps as well as charts
 - Proposed control strategies
 - Automated pest identification data analysis
 - Graphical presentation of data collected in GIS format, providing more “real world” views of problems...



Reporting IPM Information

- Pest Occurrences vs. Structural Integrity of Building
 - Screens
 - Door sweeps
 - Pipes through walls



Conclusion

- This collaboration will continue, with implementation of the field data gathering model, and downloading of existing Museum data to ISCA database
- Analysis and reporting methodologies will be developed, based on ISCA urban IPM resources
- Over the next year, “smart trap” strategies will be developed along with GIS data methodologies, resulting in full implementation of the project concept