"WEED" Data Acquisition Software

Fisheries Environment for Electronic Data

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OFWIM Annual Meeting
October 2019
From Raw Data to Knowledge

http://www.datacommunitydc.org/blog/2013/08/the-pyramid-of-data-science
From Raw Data to Knowledge

Which Elements Can and Should Occur at the Point of Data Collection?

http://www.datacommunitydc.org/blog/2013/08/the-pyramid-of-data-science
What’s VIMS?

Virginia Fisheries Laboratory
- Chartered by the Commonwealth with a few employees to investigate crabs, oysters, fish.

Virginia Institute of Marine Science
- ~450 Employees
- All areas of marine science
- Degree-granting
- Large fleet of Research Vessels
Why VIMS?

State Mandated Research Arm for Management of Marine Species
Electronic Data Acquisition

A long history... 1988... DOS
Electronic Data Acquisition

A long history... 2008... Commercial Product
Electronic Data Acquisition

A long history... 2012... FEED
FEED Design Considerations

1. Design **FOR** the technical staff rather than **AGAINST** them

Examples:
- Straightforward User Interface
FEED Design Considerations

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- **Interface Matches the Sampling Design**
  - **Context Sensitive Entry Choices**
  - **Entry Choices Determine Which Data Elements May be Entered**
  - **Quota Tracking**
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- Allow (limited) self-editing
  - Data Checks and Cross-Checks Warn of Possible Errors
  - Allow for Supervisory Review in the Field
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  - Allow for Supervisory Review in the Field
- Provide Audible Feedback
  - Differentiated by the Type of Response
FEED Design Considerations

2. Behind the Scenes

- Highly Structured Data Base
  Enforces Data Base Rules
  (e.g. Prevents Orphaned Records)

- Automatic Backups

- Time Stamps Help Trace
  Mis-Labeling Errors
FEED Design Considerations

3. Auto Entry

• Automatically Enter Rarely Changing Fields (but allow editing)

• Get Direct Input From External Devices
FEED Design Considerations

4. Data Summarization

- Graphical Display (Visualization)
- Numerical Summaries (Cleaning, Feature Extraction)
FEED Design Considerations

5. Scalability, Works Equally Well Whether...

• On a Single Tablet
• On Multiple Networked Workstations
• On Your Enterprise Data Base at Home or in the Lab
What’s the Result?

NEAMAP Survey
• ~35 Field Days
• 150 Trawl Locations – Cape Cod to Cape Hatteras
• ~500,000 Specimens Captured - ~100,000 Measured
• ~5,000 otolith pairs and stomachs preserved

Time from Field Data to Master File Inclusion...

• DOS Software ~2 Months
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- 1st Windows Software ~2-4 Weeks
- FEED ~2-3 Days
Application Development

1. Build a Data Base
   - Should be hierarchical/relational
   - Carefully define key fields for each table
   - Link tables (One-to-Many) to cascade updates and deletions
Application Development

2. Build the Application File
   - Clear text format
   - Tells FEED how to connect to the database and how to present its interface to the users
   - Build links to tables and fields slowly and test often.
Application Development

3. Add Features
   • Tables for drop-down boxes
   • Queries for error checks and messages
   • Special features such as timers, push buttons, device connections, etc.

4. Wash, Rinse, Repeat
Application Examples

On the Simple Side

[Image of a software interface with highlighted text]

- Please Tare Your Scales
- Fin Clips
- Length > Max Size 60: Check Wt. Estim. = 10.964
Application Examples

Taking Random Samples
Application Examples

Keep Track of Quotas
Application Examples

Read NMEA Data Streams
# Application Examples

## More Complex

![VIMS Fisheries Environment for Electronic Data](image_url)

### SERIAL
- **Serial**: 27
- **Lengths**, **Codes**, **Numbers**
- **Oto Summary**, **Complete**

### SUBSAMPLE Y/N
- **SubSampl?**: N
- **Multiplier**: 1.000
- **Sample Wt**, **Species Wt**

### SPECIES
- **Species**: 106, **Alewife**

### LIFE STAGE
- **Life Stage**: [Input]
- **LF Only**, **Fish Data**, **Not in LF**

### TR FISH
<table>
<thead>
<tr>
<th>Length</th>
<th>Fish #</th>
<th>Weight</th>
<th>Sex</th>
<th>Maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fin Clip</td>
<td>Tag</td>
<td>Box</td>
<td>Hole</td>
<td>Gonad Wgt</td>
</tr>
<tr>
<td>Wound Chk</td>
<td>A1</td>
<td>A2</td>
<td>A3</td>
<td>A4</td>
</tr>
<tr>
<td>Age Struct</td>
<td>B1</td>
<td>B2</td>
<td>B3</td>
<td>A4</td>
</tr>
<tr>
<td>Struct. Taken</td>
<td>Stomach</td>
<td>Muscle</td>
<td>Fin Tiss.</td>
<td>Prey</td>
</tr>
</tbody>
</table>

### Warnings
- **OK? Y/N**
- **Next Fish**

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**VIMS | William & Mary**

**Virginia Institute of Marine Science**
Questions and Comments

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“Wheelhouse” App Demo

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