MDC Mobile: Using iPad’s for Collecting Field Data

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Data Entry on Mobile Devices...

Before 2012

CMT: CMT-ROS (ROM Operating System)

dBase III programming language

Data terminals: ROS/DOS

C/C++ programming language

Pocket PC: Windows Mobile 2003

.NET (C#, sql server mobile) ArcPad

Trimble Rangers & Nomads

Windows Mobile 5 and 6.1

.NET (C#, sql ce)
Nature Center Surveys...

12 Nature Centers, 4 Hatcheries, 8 Shooting Ranges, 2 Large Conservation Areas...
60,000 – 100,000 Annual Visitors per site...
Visitor Use Survey

We are conducting a year-long Visitor Use Survey

Why?
We want to learn more about our visitors including who you are, how often you visit, what kind of activities you participate in, and what is important to you. Information about our visitors is used in planning and development, so it needs to be accurate.

When?
The survey only takes 2 to 3 minutes and will be done for 7 one-hour randomly selected periods a month.

Where?
Visitors will be surveyed from the comfort of their car as they exit the area.

• Random one-hour survey periods throughout the year
• Tally and interview visitors as they leave
• Ask them a bunch of nosey questions
• It’s a conversation, not an interrogation.

Courtesy
Tom Treiman
**Cons:**
- Screen too small
- Data transfer complicated
- Expensive
- .NET Compact Framework (lacking for data entry)

**Pros:**
- Big Screen
- Data transfer simplified **
- Inexpensive
- 3G wireless network

**Cons:**
- Need protective cover
- Apple app store

**Pros:**
- Weather Proof
- Ruggedized
In my ideal world...

- **Tough pad** with Android for data entry (N/A)
- Virtual Desktop (expensive, complicated...)
- MS Access Data Entry Forms as a front end to SQL Server
  - .NET support instead of ADO (N/A)
  - More touch screen functionality (N/A)
Things you might be interested in...

- Web based data entry (HTML5, CSS3, Javascript, JSON, AJAX, JQuery)
- iPad or other mobile device for data entry.
- Single “cloud” database (SQL Server).
- Web Services (.NET, SQL Server)
- Browser based data storage (Safari, SQLite)
- Will work offline using Cache Manifest (HTML5).
- MS Access Frontend/Backend.
- Ruggedized and weather resistant iPad case.
**JSON**

Text-based - human readable data

```
{
    "firstName": "John",
    "lastName": "Smith",
    "age": 25,
    "address": {
        "streetAddress": "21 2nd Street",
        "city": "New York",
        "state": "NY",
        "postalCode": "10021"
    },
    "phoneNumber": [
        {
            "type": "home",
            "number": "212 555-1234"
        },
        {
            "type": "fax",
            "number": "646 555-4567"
        }
    ]
}
```

**AJAX call to Web Services**

Client-side web tools to send/receive data asynchronously w/o interfering with display

```
function retrieveConfigurationObj(centerID) {
    var surveyYear = $('#surveyYear').val();
    var dnldDTO = {'centerID': centerID,
                   'surveyYear': surveyYear};
    $.ajax({
        type: "POST",
        contentType: "application/json; charset=utf-8",
        url: url1,
        data: JSON.stringify(dnldDTO),
        dataType: "json",
        crossDomain: true,
        success: function (data) {
            $.each(data.d.configurationRecs, function(i, item) {
                insertConfiguration(item.objectID, item.centerID,
                                   item.centerName, item.downloadDateStr,
                                   item.ratingOption, item.optQ1Wording,
                                   item.optQ1Type, item.optQ2Wording,
                                   item.optQ2Type, item.colName1,
                                   item.colName2, item.duration,
                                   item.surveyYear);
                rc1++;
            });
        },
        error: Error
    });
}
```

**SQLite**

RDBMS - embedded implements most of the SQL standard

```
var  db = window.openDatabase("iCenterDB", "", "Configuration", 1024*1024);

$(document).ready(function() {
    db.transaction(function(tx) {
        tx.executeSql('CREATE TABLE IF NOT EXISTS configuration (objectID TEXT PRIMARY KEY, centerID INTEGER, centerName TEXT, downloadDateStr TEXT, ratingOption INTEGER, optQ1Wording TEXT, optQ1Type TEXT, optQ2Wording TEXT, optQ2Type TEXT, colName1 TEXT, colName2 TEXT, duration INTEGER, surveyYear INTEGER)', []);
    });
});
```
jQuery Plug-ins:
- FullCalendar (Adam Shaw)
- Confirm Box (Christopher John Paul)
- jqClock (41031651)
- Ketchup Form Validation (Sebastian Senf - mustardamus)

jQuery: JavaScript library that simplifies client-side scripting of html. 1000’s of “plug-ins” available on the web.
SOH >>> Latest Update: Aug 29 2012
OptQ1(mc1): Would you ask for regulations?, OptQ2(mc1): Confidence about participating, Interview Period: 1 hour
IT-15624
centerID: 5601
ID: 24567171.54157

Enter IT number:

IT- Number
Set

Enter CenterID:

MUST BE A NUMBER.
THIS FIELD MUST HAVE A MINIMAL LENGTH OF 4

Retrieve

Survey Year: 2012
jQuery Plugins:
- Confirm Box (Christopher John Paul)
- jQuery Countdown (Keith Wood)
- Ketchup Form Validation (Sebastian Senf - mustardamus)
<table>
<thead>
<tr>
<th>Visitor</th>
<th>Gender</th>
<th>Age</th>
<th>Race</th>
<th>Impair</th>
<th>Idea</th>
<th>Ask</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>female</td>
<td>35-44</td>
<td>white</td>
<td>none</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>male</td>
<td>35-44</td>
<td>white</td>
<td>none</td>
<td>myIdea</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>male</td>
<td>0-11</td>
<td>white</td>
<td>sight</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>female</td>
<td>12-15</td>
<td>white</td>
<td>none</td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>
1) You must upload in order 1 >> 2 >> 3.
2) You **must** wait for the server response "success" before performing the next upload.
3) Each upload process may take 30 seconds or longer.
4) Please return to the Survey Calendar when finished with the uploads.
jQuery Plugins:

- Confirm Box (Christopher John Paul)
- jqGrid (Tony Tomov)
Snags and other problems...

Temperature

iPad needs to cool down before you can use it.
Snags and other problems...

• Had to remove primary/foreign key constraints on all tables as well as the not null restrictions. Any time the SQLite database would get a bad entry (say from a hot shut down) the iPad would be unable to upload data.

• Working with JSON data, .NET and Sql Server is very difficult to debug.

• Be especially vigilant when working with dates – in Javascript you will want to treat them as text as often as possible!

• When it does work, it is time to celebrate!!!

• There is a very good web based help site for this: http://encosia.com/

• I would not be confident of ruggedized cases in more extreme field conditions. Water resistant but not waterproof.
Summary

• Successful Pilot: Not too many phone calls from users – and we are still receiving data! ***

• The use of a single “in-the-cloud” database is a big hit! It greatly reduces the work load when combining data from multiple hand-held devices. ***

• Will we do this again? Yes, we have plans to start another nature center survey in January.

• However, Tom Treiman informed me he has requested funding for an outside programmer for next year. I can only assume that they would do something different.
Credits

• **Tom Treiman** – Resource Economist – Principal Investigator

• **Linda Chorice, Tamie Yegge, Kathy Cavender, Colleen Scott** – Nature Center Managers: Survey question design

• **Steve Sheriff** – Biometrician (retired) – Survey sampling design

• **Kirk Keller, Todd Larivee, Jerico Whitaker** – IT – Initial iPad Framework design

• **Julie Fleming** – Programming/DB Admin: MS Access database front/back end for Sql Server, database interface to sample design and analysis.

• **Jerico Whitaker** – IT – CSS/CSS3 Design, Provided final look to Web app

• **Sartwell** - Javascript, jQuery, JSON, AJAX, HTML, CSS, Sql Server, Web services (C# .NET)