

# Sterling Survey System

Designing a Multi-Mode, Multi-Platform JavaScript Survey Authoring Framework

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# What Is It?

- Survey Administration Software

**WISCONSIN**  
UNIVERSITY OF WISCONSIN-MADISON

What is your phone number?

Thinking of three of the most recent Ph.D. students you mentioned above, which of the following best describes their positions in the first jobs each of them obtained after completing their academic studies?

	Position	In your discipline//field	Is this a science position?
PhD Student 1	<input type="text"/>	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>
PhD Student 2	<input type="text"/>	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>
PhD Student 3	<input type="text"/>	Yes <input type="radio"/> No <input type="radio"/>	Yes <input type="radio"/> No <input type="radio"/>

Back Next

Teacher (primary/secondary)  
Post-doctorate  
Research scientist at university  
Lecturer/non-tenure track faculty  
Assistant/associate tenure-track professor  
Private industry  
Public institution (non-university)  
Non-governmental organization  
Start-up  
Continuing in higher education  
Other  
Not working/unemployed  
Don't know

# Overview

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- Client / Server Presentations
- Design Decisions
- Features

## Design Decisions – Supported Modes

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- Division of previous systems
  - Web: PHP, MySQL
  - CATI (Telephone) / CAPI (Face-to-face) / DE (Data Entry) : Cases 5.6
- Originally started as an evolution to our web template
- Wanted to support multi-mode: Web, CATI, CAPI, DE
- CAPI requires offline administration – problematic for a web survey

## Design Decisions – Language

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- Web-based and offline – two options:
  - Locally hosted database and web server
  - or
  - Client-side administration
- JavaScript / HTML5
  - Node.js



# Design Decisions – Devices

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- Web – mobile, desktop, laptop, etc
  - Administered by web browser
- CATI / DE / CAPI – Managed desktop / laptop
  - Administered by web browser
- CAPI – tablet / phone
  - Administered by Cordova-packaged web app

## Design Decisions – Data Storage

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- Can save 5 – 10 MB in HTML5's localStorage
- Security restricts filesystem access outside of browser
  - On controlled devices, can use local node.js server to bypass this
  - Page calls to local node.js server
  - Node.js server triggers file execution / modification

# Design Decisions – JSON Structures and Going Infinite

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- ‘Traditional’ structure: single key-value pair

csid	pnum	kidlist	code	i1_q1	i1_q2	i1_q4	i1_q5
1000	p1231	aws	1100	1	2	997	997

- JSON structure: nested key-value pairs



# Design Decisions – JSON Structures and Going Infinite

- Automatically records date, time, version information, mode, validity, number of changes
- Can easily define any other trackable metadata

```
"csid" : {
  "value" : "9000142"
},
"pnum" : {
  "value" : "p1231prac"
},
"kidlist" : {
  "value" : "aws"
},
"code" : {
  "value" : "1100"
},
"i1_q1" : {
  "onpath" : 1,
  "value" : "1",
  "date" : 1494346172757,
  "version" : 1,
  "accesstype" : "entry",
  "lang" : "eng",
  "mode" : "capi",
  "inum" : 1566,
  "time_itemafterlast" : 2683,
  "change_count" : 1,
  "valid" : true
},
"i1_q2" : {
  "onpath" : 1,
  "value" : "2",
  "date" : 1494346176303,
  "version" : 1,
  "accesstype" : "entry",
  "lang" : "eng",
  "mode" : "capi",
  "inum" : 1566,
  "time_itemafterlast" : 3546,
  "change_count" : 1,
  "valid" : true
},
"i1_q4" : {
  "onpath" : 1,
  "value" : "997",
  "date" : 1494346177231,
  "version" : 1,
  "accesstype" : "entry",
  "lang" : "eng",
  "mode" : "capi",
  "inum" : 1566,
  "time_itemafterlast" : 928,
  "change_count" : 1,
  "valid" : true
},
"i1_q5" : {
  "onpath" : 1,
  "value" : "997",
  "date" : 1494346177983,
  "version" : 1,
  "accesstype" : "entry",
  "lang" : "eng",
  "mode" : "capi",
  "inum" : 1566,
  "time_itemafterlast" : 752,
  "change_count" : 1,
  "valid" : true
},
}
```

# Design Decisions – Core Framework

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- JavaScript-based single page app
- JSON data structure back end
- Works on all modes
- Works on all devices
- Stores data online or offline, if no connection

## Features – Client-side Web

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- Transfers data asynchronously whenever an internet connection is available
- Surveys not delayed by communication time
- Dynamically generated content - fills, skips, answer validation, languages

# Features - Authoring

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- Author specifies core question components
  - Item name, text, answer values, etc.
- System will automatically construct all HTML elements, events, and behavior
- Default layout based on survey best practices from our working group – adapts to mode and device
- Can override layout and use JavaScript / HTML for custom designs



# Features - Authoring

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- Authoring commands are JS based
  - Supports traditional programming tools, parsing

```
var newQ = new Question('q4',page);
newQ.setVarlabels('Outlet Type');
newQ.setBasetext("~id~. Type of outlet");
newQ.category.setType('radio');
newQ.category.setAnswerLabels(["Gas station only", "Convenience with gas",
newQ.category.addSubItem(13);
```

## q4. Type of outlet

- ☐ Gas station only
- ☐ Convenience with gas
- ☐ Convenience with no gas
- ☐ Small food store (deli)
- ☐ Supermarket
- ☐ Drug store/pharmacy
- ☐ Liquor store
- ☐ Discount store
- ☐ Hotel/motel/resort
- ☐ Restaurant
- ☐ Bowling alley
- ☐ Stand alone tavern
- ☐ Other:

# Features - Authoring – Question Library

Run

p1126m

p1156

p1156prac

p3114

p3114c

p4718

p92915

p9998

p9999

code

sessionnumber

sessiondate

lastitem

cmpl\_inum

cmpl\_date

cmpl\_studyversion

studyversion

inum

reset

langtoggle

textonly

textboxes

textboxes\_nongrid

checkboxes\_language

radio

radio\_with\_fill

subitems

selectbox

multi\_categories

horizontal\_layout

ids\_and\_labels

address

text\_with\_validation

number\_with\_minmax

number\_with\_decimals

height

qnoneofabove

random1

random2

random3

roster\_hhnum

roster\_hhnames

hrosterselect

roster\_hh\_gender

roster\_hh\_age

roster\_hh\_health

roster\_hhchores

radio\_flipHeaders

calculated\_value

customcontent

custom\_twobytwo\_grid

otherspec\_1

otherspec\_single\_input

otherspec\_multi\_cat

phone

multi\_cat\_custom

qend

wrongID

wrongID\_back

confirm2

depassselect

confirm1


```
var newQ = new Question("langtoggle","surveypage1");
newQ.category.setType("button");
newQ.category.setAttributes({"value":"Toggle Language","onClick":"(dataobject.getParam('lang')== 'eng') ?
dataobject.setParam('lang','es') : dataobject.setParam('lang','eng'); conditionaltext();});

var newQ = new Question("radio","surveypage1");
newQ.setBasertext("~id~. This is a radio question that triggers a skip on the next item! Also has a default
answer value of 2.");
newQ.category.setType("radio");
newQ.category.setAnswerLabels(["Yes","No"]);
newQ.category.setDefaultAnswer("2");

var newQ = new Question("checkboxes_language","surveypage1");
newQ.setBasertext("~id~. This is a checkbox question with a language alternative!","{lang: 'eng'}");
newQ.setBasertext("~id~. No habla English!","{lang: 'es'}");
newQ.setQuestionLabels(["First","Second"],{"lang": "eng"});
newQ.setQuestionLabels(["Uno","Dos"],{"lang": "es"});
newQ.setQuestionIDs(["q2a","q2b"]);
newQ.setVersion(2);
newQ.category.setType("checkbox");
```

Questions

Result

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Toggle Language

radio. This is a radio question that triggers a skip on the next item! Also has a default answer value of 2.

☐ Yes

☐ No

checkboxes\_language. This is a checkbox question with a language alternative!

First ☐

Second ☐

Return to Selector

# Features – Question Library

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- Tracks source code
- Used to construct data documentation
- Stores question information for every question version

# Features – Authoring – Question Functions

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- Bulk question generation

```
var qtext = ["boring", "thought provoking", "a white knuckle thrill ride"];
for (var i = 0; i < qtext.length; i++) {
  var newQ = new Question('bulk' + (i+1), page, "agreedisagree");
  newQ.setBasetext("~id~. Do you feel that this presentation is...\n" + qtext[i] + "?");
}
```

**bulk1. Do you feel that this presentation is... boring?**

- ☐ Strongly Agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly Disagree

**bulk2. Do you feel that this presentation is... thought provoking?**

- ☐ Strongly Agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly Disagree

**bulk3. Do you feel that this presentation is... a white knuckle thrill ride?**

- ☐ Strongly Agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly Disagree



# Features – Authoring – Question Functions

- Randomization

```
var newQ = new Question('random1',page,"yn");
newQ.setBasetext("~id~. Randomized question #1!");
newQ.category.setType("radio");
newQ.category.setAnswers({ '1': 'Yes' , '2': 'No' , '-1': 'Don\'t Know'});

var newQ = new Question('random2',page,"yn");
newQ.setBasetext("~id~. Randomized question #2!");

var newQ = new Question('random3',page,"yn");
newQ.setBasetext("~id~. Randomized question #3!");

randomizer.addGrouping(["random1", "random2", "random3"]);
```

random2. Randomized question #2!

- 1 Yes
- 2 No
- 1 Don't Know

random3. Randomized question #3!

- 1 Yes
- 2 No
- 1 Don't Know

random1. Randomized question #1!

- 1 Yes
- 2 No
- 1 Don't Know

# Features – Authoring – Question Functions

- Language variation

```
var newQ = new Question('langchange',page);
newQ.category.setType("radio");
newQ.setBasetext("~id~. Do you speak English?", { 'lang': 'eng' });
newQ.setBasetext("~id~. Habla usted español?", { 'lang': 'es' });
newQ.category.setAnswerLabels(["Yes", "No", "Don't Know", "Refused"], { 'lang': 'eng' });
newQ.category.setAnswerLabels(["Si", "No", "No Sabe", "Rehuso"], { 'lang': 'es' });
```

langchange. Do you speak English?

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ Refused

langchange. Habla usted español?

- ☐ Si
- ☐ No
- ☐ No Sabe
- ☐ Rehuso

Toggle Language

```
var newQ = new Question('langtoggle', page);
newQ.category.setType('button');
newQ.category.setAttributes({ 'value': 'Toggle Language', 'onClick': "(dataobject.getParam('lang')== 'eng') ? \
dataobject.setParam('lang','es') : dataobject.setParam('lang','eng'); conditionaltext();" });
```

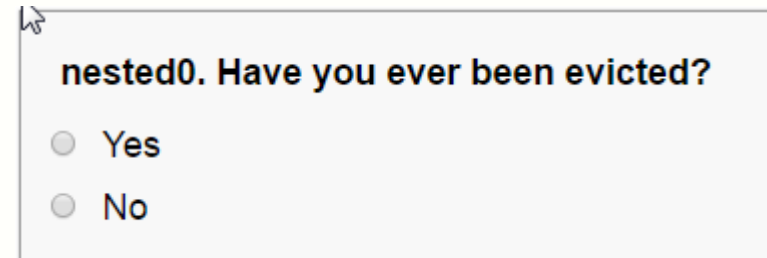
# Features – Authoring – Question Functions

- Nested followups

```
var newQ = new Question('nested0', page);
newQ.setBasetext("~id~. Have you ever been evicted?");
newQ.category.setType("radio");
newQ.category.setAnswers({ '1': 'Yes', '2': 'No' });

var newQ2 = new Question(null,null);
newQ2.setBasetext("When were you last evicted?");
newQ2.category.setType("date");

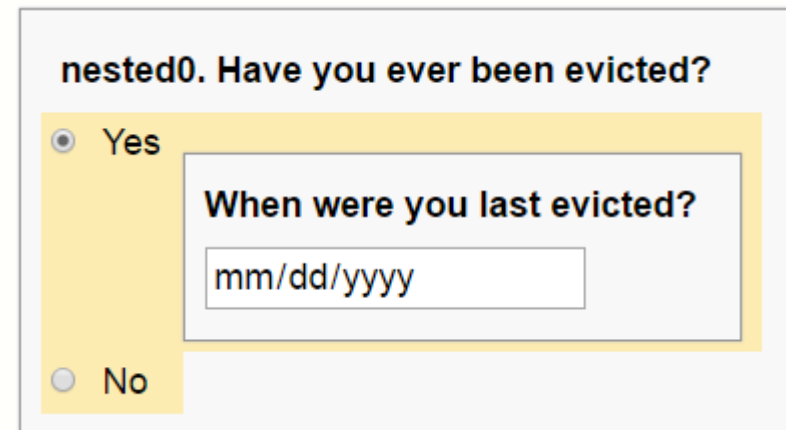
newQ.category.addSubItem(1, newQ2);
```



nested0. Have you ever been evicted?

☐ Yes

☐ No



nested0. Have you ever been evicted?

☒ Yes

When were you last evicted?

☐ No

# Features – Authoring – Question Functions

## • Rosters

```
var newQ = new Question('roster_hhnum',page);
newQ.setBasetext("hhnum. Enter number of people in your household:");
newQ.category.setType("number");
newQ.category.rosterLengthDefine('hhroster');
```

```
var newQ = new Question('roster_hhnames', page);
newQ.setBasetext("~id~. Enter the name of each HH member:");
newQ.category.setType("text");
newQ.category.setAttributes({ 'class': 'hhname' });
newQ.setRoster('hhroster',true);
newQ.setDynamic(['roster_hhnum']);
newQ.dynamic = function () {
    this.items = [];
    this.setQuestionLabels('hhroster');
};
```

```
var newQ = questionRosterDropdown('hhroster', page);
newQ.setDynamic(['hhnum']);
```

```
var newQ = new Question('roster_hh_gender',page);
newQ.setBasetext("~id~. What is ~roster_hhnames~'s gender?");
newQ.setRoster('hhroster');
newQ.category.setType("radio");
newQ.category.setAnswerLabels(['Male', 'Female']);
```

```
var newQ = new Question('roster_hh_age',page);
newQ.setBasetext("~id~. What is ~roster_hhnames~'s age?");
newQ.setRoster('hhroster');
newQ.category.setType("text");
newQ.category.setMinMax(0, 130);
```

hhnum. Enter number of people in your household:

roster\_hhnames. Enter the name of each HH member:

1

2

hhroster: 1 ▼

roster\_hh\_gender. What is Bob's gender?

- ☐ Male  
☐ Female

roster\_hh\_age. What is Bob's age?



# Features – Authoring – Question Functions

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- Multiple-pass data entry and verification

```
dataobject.setParam('mode', 'de', true);  
dataobject.setItemValue('depases', 2, true);
```

# Features – Case Selection and Synchronization

- Front end for interviewers
- Contains interviewer's assigned case load and server sync
- Can enter existing cases, spawn new cases or request case from server
- Allows editable fields stored within case
- Selecting addresses launch navigation link

Inum:1566

Study:p1231prac

Enter caseid

Sync: 4-11-2017 14:42

Show10entries

Search:

Caseid	Code	Ordering	Type	Hours	Phone	Name	Address	City	Zip	Notes
9000079			Cigarettes	11am-10pm	608-123-4567	Fake Business Mart	475 N Charter St	Madison	53706	
9000100			Cigarettes	11am-10pm	608-123-4567	Fake Business Mart	475 N Charter St	Madison	53706	
9000121			Disposable E-Cigs	11am-10pm	608-123-4567	Fake Business Mart	475 N Charter St	Madison	53706	
9000142			Cigarettes	11am-10pm	608-123-4567	Fake Business Mart	475 N Charter St	Madison	53706	
9000163			Smokeless tobacco	11am-10pm	608-123-4567	Fake Business Mart	475 N Charter St	Madison	53706	
9000184			Cigarettes	11am-10pm	608-123-4567	Fake Business Mart	475 N Charter St	Madison	53706	
9000205			Disposable E-Cigs	11am-10pm	608-123-4567	Fake Business Mart	475 N Charter St	Madison	53706	
9000226			Cigarettes	11am-10pm	608-123-4567	Fake Business Mart	475 N Charter St	Madison	53706	
9000247			Disposable E-Cigs	11am-10pm	608-123-4567	Fake Business Mart	475 N Charter St	Madison	53706	
9000268			Cigarettes	11am-10pm	608-123-4567	Fake Business Mart	475 N Charter St	Madison	53706	

Showing 1 to 10 of 39 entries

Previous

1

2

3

4

Next

# Features – Mobile-Specific

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- Easy generation with Cordova
- GPS and Navigation App Integration
- Push notifications
- Swipe navigation
- Auto-updating APK

# Conclusion

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- Offline single page app survey administration system
- Adapts format and tools to any mode or device
- Author with JS source or question library
- For more information:  
August.salick@wisc.edu



# Tech Showcase – Session 10F

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- For hands-on demonstration, check out the Tech Showcase!

3:15 pm – 4:30 pm