



Sampling Methods and Systems for Rare Populations

Ronaldo Iachan, Deirdre Middleton, Tonja Kyle, David
Radune

Prepared for:

FedCASIC 2014

3/20/2014

Outline

- **Define Hard to Reach Populations**
- **Review Sampling Methodologies and Associated Data Collection Systems**
 - Respondent Driven Sampling (RDS)
 - Coupon Manager
 - Venue Based Sampling (VBS)
 - Venue Day/Time Sampling System

Hard To Reach Populations

- **Rare and/or elusive**
- **No natural and efficient sampling frames**
- **Possible social stigma**
- **Example populations**
 - Homeless
 - Runaway youth
 - Injection drug users
 - Sex workers

Studying Hard To Reach Populations

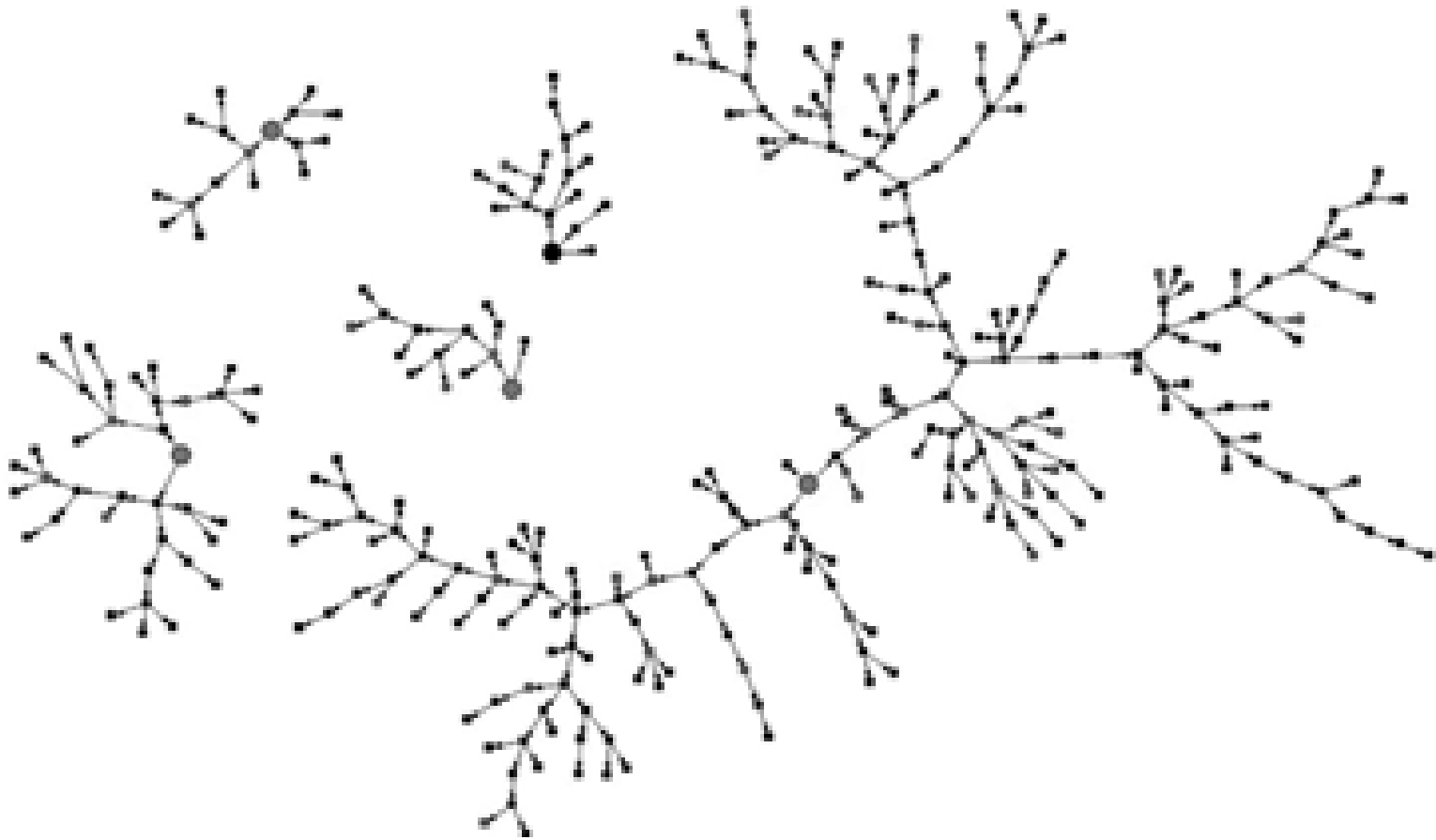
Given the challenges with identifying or enumerating individuals from these populations, studies must adopt non-traditional sampling methods:

- **Respondent driven sampling (RDS)**—
 - Coupon Manager
- **Venue based sampling (VBS)**—
 - VDTS

Respondent Driven Sampling (RDS)

- **Finding subjects through their social networks**
- **Respondents become recruiters for the study**
- **Combines aspects of:**
 - Snowball sampling
 - Probability sampling
- **When is RDS appropriate**
 - No sampling frame
 - Members can identify each other
 - Population socially connected

Recruitment Chain



WIRTZ, A., JUMBE, V., TRAPENCE, G., KAMBA, D., UMAR, E., KETENDE, S., BERRY, M., STRÖMDAHL, S., BEYRER, C., BARAL, S.. HIV among men who have sex with men in Malawi: elucidating HIV prevalence and correlates of infection to inform HIV prevention. **Journal of the International AIDS Society**, North America, 16, dec. 2013. Available at: <http://www.jiasociety.org/index.php/jias/article/view/18742/3360>. Date accessed: 10 Mar. 2014.

Coupon Manager



- **Software allows for anonymous tracking of:**
 - Participants
 - Recruitment
 - Incentives for participation and recruitment


- **Designed for work in the field:**
 - Does not require internet access
 - No need for names or contact information


Coupon Manager Dashboard

Dashboard


Manage Coupons and Recruitment

 Process Incoming Coupon
 

 Look up a Coupon

 Process Recruiter Payment

Example ID: MEAD0278MW

 Swap Coupon Numbers
 and

View Reports

Coupons submitted/issued: 0 / 0

Interviewed: 0
Not completed: 0
In process: 0

Search

Enter all or part of a number, ID or word.

Coupon Number:

Recruiter ID:

Physical Marks:

Quick Searches:

-
-
-
-
-

Entering a Seed



Coupon Detail

Status

- Submitted
- Outstanding
- Expired
- Void

Coupon issued by

This Coupon is a seed

Interviewed?

- In Process
- Eligible
- Interview not completed

Interviewer ID: 10

Interview Date: 5/9/2012

Physical Marks:

Coupon Notes

Click on view icon to view coupon note

view	User	Date	Note	Link to
	Admin	5/9/2012	PAID \$10.00 for HIV Test	
	Admin	5/9/2012	PAID \$25.00 for Interview	

Add a Note

Set/Remove Flag

Connect Coupons

Recruiter ID

Make Recruiter

Interviewer SAY: Now I am going to create a Recruiter ID. I may also ask you about any physical marks you have. When you return to get your incentives for distributing these coupons, I will search for this number and your physical marks in the computer to make sure that you get paid and that we pay the right person. I will need some information from you to create that number. I might be repeating some questions you were asked before.

Interviewer: Ask the recruiter for the following information and enter into each field:

1. What are the first 2 letters of YOUR LAST name?
2. What is the first letter of YOUR FIRST name?
3. What is the first letter of your MOTHER'S FIRST name?
4. In which MONTH were you born? (enter 2 digits)
5. What are the LAST 2 digits of your YEAR of birth?
6. What is your gender? Male (M) Female (F) Transgender (T)
7. What racial/ethnic group or groups do you consider yourself to be in?
 Black/African/American (B) Hispanic/Latino (H)
 White (W) Asian (A) Other (O)

Or type in the Recruiter ID: Example: HASI0172MW

Recruiter Detail

Dashboard 0001 EVKA280MB X

Recruiter Detail: EVKA280MB [Edit ID](#)

Recruiter Coupon Number: 0001 [View Coupon Detail](#)

Coupons Assigned

Date of Assignment: 5/9/2012

Click on view icon for coupon to view detail

View	Coupon	Status	Interview	Unlink

Number of coupons assigned: Default-5

Assign a coupon: [Add](#) Assign a range of coupons: to [Add](#)

Physical Marks:

Comments:

[Void Outstanding Coupons](#)

Amount owed: \$0

Amount Paid: \$
On this date: 5/9/2012

Amount already paid: \$ 0

To remove a payment, enter a negative number.

Recruiter Questions

Status: Complete

Date last updated: 5/9/2012

[Update Questions](#)

[Save Detail](#)

Recruiter Notes

Click on view icon to view a note

View	User	Date	Note

[Add a Note](#)

[Set/Remove Flag](#)

Internet Connection

Recruiter Payments

Home Search Database

Dashboard Process Incoming Coupon Look up a Coupon
Process Recruiter Payment Swap Coupon Numbers

Dashboard Coupon

Dashboard Recruiters Found EVKA280MB X

Coupons Assigned

Date of Assignment: 5/9/2012 15

Click on view icon for coupon to view detail

View	Coupon	Status	Interview
	1001	Submitted	Eligible
	1002	Submitted	Eligible
	1003	Outstanding	
	1004	Outstanding	
	1005	Outstanding	

Amount owed: \$20

Amount Paid: \$

On this date: 5/9/2012 15

Amount already paid: \$ 0

To remove a payment, enter a negative number.

Recruiter Questions

Status: **Incomplete**

Date last updated: 5/9/2012

Update Questions

Internet Connection

Outline

- Define Hard to Reach Populations
- Review Sampling methodologies and associated Data collection Systems
 - Respondent Driven Sampling (RDS)
 - Coupon Manager
 - Venue Based Sampling (VBS)
 - Venue Day/Time Sampling System

Venue-based Sampling (VBS)

- **Recruitment at venues where population of interest gathers**
- **We will review the system we developed for constructing a frame of venue-day time periods (VDTs) and selecting regular samples of VDTs**
 - Sampling frames of venues and VDTs updated at a regular interval
 - Computer program generates random samples according to the research design

Overview of VBS Sampling Design

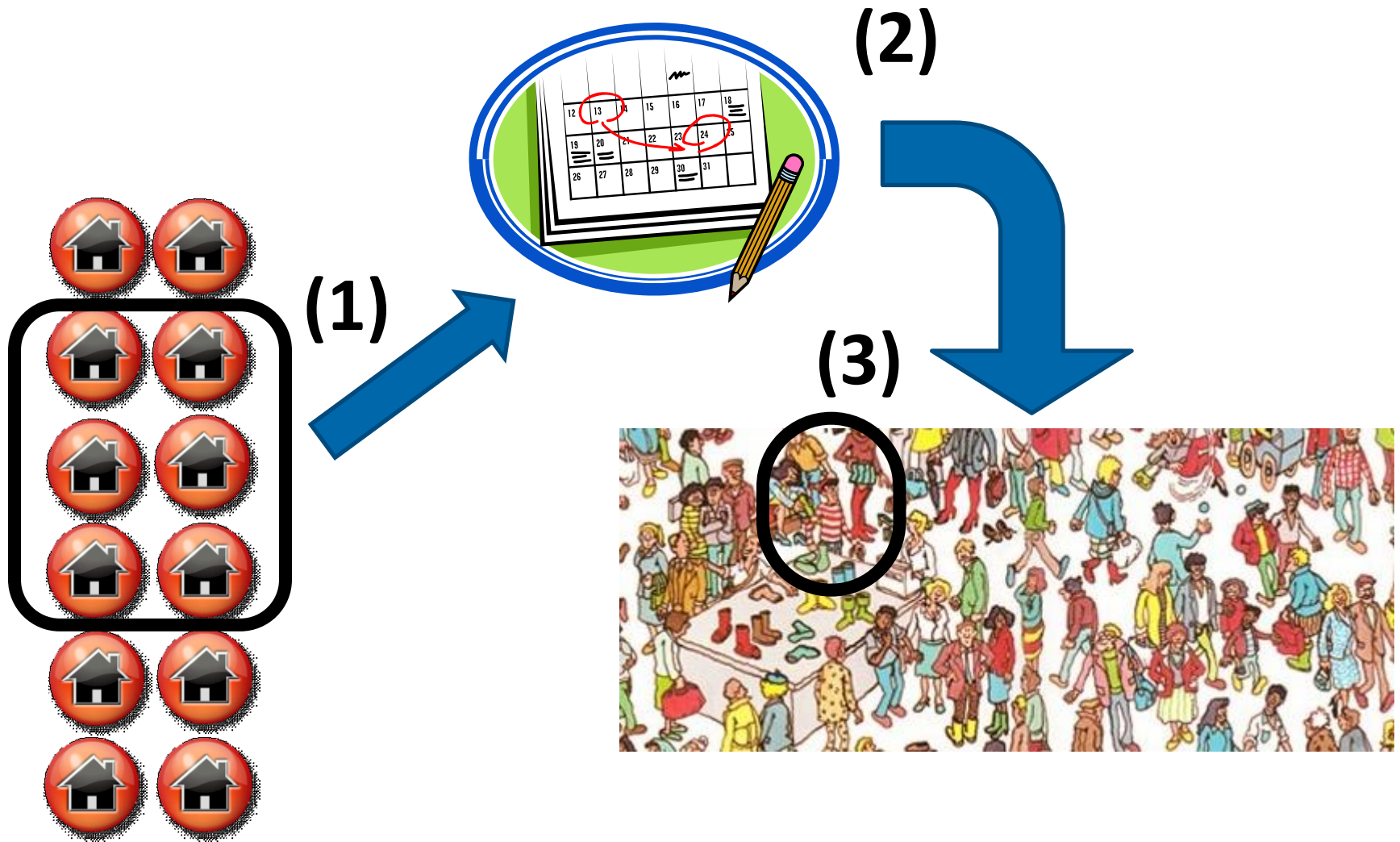
Three-stage samples are selected independently for each month of data collection

1) Primary Sampling Units: Venues

2) Within Venues: Day-Time periods (VDTs)

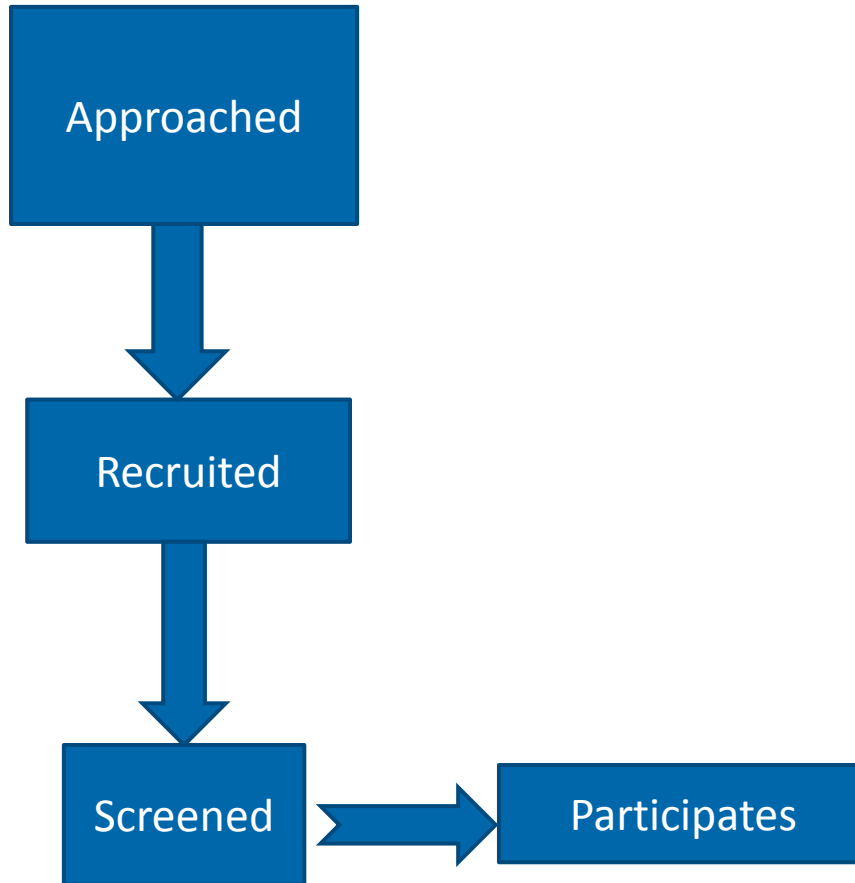
3) Within Day-Time periods: visits and potential respondents

VBS sampling



Survey Steps During VDT

18



Strengths and Weaknesses of VBS

■ Strengths

- Direct access to target population
- Probability sampling design → population-based estimates

■ Weaknesses

- Coverage: Not all population members may attend venues
- Multiplicity
 - Persons attend venues at different frequencies
- Frame construction may demand intensive work

VDTs System

- **Internet based**
- **Flexible enough to accommodate frequently changing frames and data collection circumstances**

VDTs Dashboard

Venue Home Venue Management Day-Times Scheduling Calendar Outcomes

Cycle 1 --All Months-- --All Venues--

Cycle 1 Venue Sampling Home

Unique Venues Visited: 3
Total Events Conducted: 3

To Do for February 2014

[Enter Outcome Reports](#)

Complete

To Do for March 2014

[Select and Schedule VDTs](#)

To Do

Options

- [Venue Management](#) — Manage universe of venues
- [Day-Times](#) — Manage day-times for all venues
- [Scheduling](#) — Select and schedule events for each month
- [Calendar](#) — View events on a calendar
- [Outcomes](#) — Enter outcomes for scheduled events

February 2014

Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27	28	29	30	31	01
02	03	04	05	06	07	08
09	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	01
02	03	04	05	06	07	08

4 events scheduled in February 2014

[View Schedule](#) | [View Calendar](#)

VDTs Venue Detail

Venue Home

Venue Management

Day-Times

Scheduling

Calendar

Outcomes

Cycle 1

--All Months--

Apple Bar (B001)

Cycle 1 Venue Detail

Apple Bar (B001)

Statistics

Number of events conducted:

Number of times scheduled:

Date venue record was created: 02/22/2014

Venue Information

Edit venue information

Delete venue

Venue Type : (B) Bar

Website : <https://www.venue1.com/>

Address : 1234 Main Street, Anytown, MD 12345

Comments : This is a venue.

Contact Name 1 : John Doe

Contact Phone 1 : 123-456-7890

Contact Email 1 : jdoe@icfi.com

Contact Name 2 : Mary Doe

Contact Phone 2 : 789-123-3454

Contact Email 2 : mdoe@icfi.com

VDTs Venue Management

Venue Home | Venue Management | Day-Times | Scheduling | Calendar | Outcomes

Cycle 1 ▼ | --All Months-- ▼ | --All Venues-- ▼

📅 Cycle 1 Venue Management

Click on a Venue Code or Name to view venue details.
Hover over a Venue Name to see address and other summary information.

Page 1 of 1 page(s)

Add New Venue

Venue Code	Type	Name	# of Day-Times	# of times scheduled	# of times visited
B001	Bar	Apple Bar	4	1	1
C001	Cafes/Restaurants	Orange Cafe	1	0	0
B002	Bar	Venue Kiwi	3	0	0
P001	Parks/Beaches	Beach, The	1	1	1
O001	Social Organizations	Social Club, The	6	1	1
R001	Retail Businesses	A Store	1	1	1
B003	Bar	Mango Bar	2	0	0
C002	Cafes/Restaurants	Main Street Cafe	5	1	1
S001	Street locations	South and Main Streets	1	0	0
B004	Bar	A Bar	3	0	0
Z001	Other	An Other Place	1	0	0

Add New Venue

Total number of venues: **11**

[Export Venue list to Excel](#)

VDTs Day Times

Venue Home
Venue Management
Day-Times
Scheduling
Calendar
Outcomes

Cycle 1 ▾
--All Months-- ▾
Apple Bar (B001) ▾

Cycle 1 Day-Time Periods for Apple Bar (B001)

Page 1 of 1 page(s)

LEGEND: = contains non-random event(s) = non-random event

Total specifications: 4

Add a Day/Time

View Dates

View Day-times

Edit	Non-random Events	Venue Code	Venue Name	Day of Week	Monthly Frequency	Start Time	End Time	Start Date	End Date	Ocurrences
Edit		B001	Apple Bar	Wednesday	Weekly	08:00 PM	12:00 AM	02/01/2014	01/31/2015	52
Edit		B001	Apple Bar	Thursday	Weekly	08:00 PM	12:00 AM	02/01/2014	01/31/2015	52
Edit		B001	Apple Bar	Friday	Weekly	08:00 PM	12:00 AM	02/01/2014	01/31/2015	52
Edit		B001	Apple Bar	Saturday	Weekly	08:00 PM	12:00 AM	02/01/2014	01/31/2015	53

Add a Day/Time

View Dates

View Day-times

VDTs Day Time Editor

Venue Home
Venue Management
Day-Times
Scheduling
Calendar
Outcomes

Cycle 1
--All Months--
Apple Bar (B001)

Cycle 1 Day-Time Period Worksheet

*= required field

Venue

Add new venues on the Venue Management tab

Venue Name: Apple Bar (B001)

Venue Comments: This is a venue.

Schedule

*** Day of Week:** Wednesday

*** Monthly Frequency:** 1 time 3 times 2 times Weekly

Non Random:

*** Start Date:** 02/01/2014

*** End Date:** 01/31/2015

*** Start Time:** 8 :00 PM

*** End Time:** 12 :00 AM

Day-Time Period Comments:

Number of occurrences: 52 (Active: 51)

Date	Inactive?
Wednesday, Feb 05	<input type="checkbox"/>
Wednesday, Feb 12	<input checked="" type="checkbox"/>
Wednesday, Feb 19	<input type="checkbox"/>
Wednesday, Feb 26	<input type="checkbox"/>
Wednesday, Mar 05	<input type="checkbox"/>
Wednesday, Mar 12	<input type="checkbox"/>
Wednesday, Mar 19	<input type="checkbox"/>
Wednesday, Mar 26	<input type="checkbox"/>
Wednesday, Apr 02	<input type="checkbox"/>
Wednesday, Apr 09	<input type="checkbox"/>
Wednesday, Apr 16	<input type="checkbox"/>
Wednesday, Apr 23	<input type="checkbox"/>
Wednesday, Apr 30	<input type="checkbox"/>
Wednesday, May 07	<input type="checkbox"/>
Wednesday, May 14	<input type="checkbox"/>
Wednesday, May 21	<input type="checkbox"/>
Wednesday, May 28	<input type="checkbox"/>

OCCURENCE LEGEND:

Over-lapping: Set to "Inactive" before Saving or modify specification causing overlap

Inactive

Save Record
Delete Record
Reset All Fields
Cancel

VDTs Frame Management

Venue Home | Venue Management | Day-Times | **Scheduling** | Calendar | Outcomes

Cycle 1 | February 2014 | --All Venues--

Warning: Venue Day-Times for this month have changed since the last frame was created.

Cycle 1 Step 1: Sorted Frames for February, 2014

Status: ■ Complete

[Return to Scheduling Table](#)

[Step 2: Schedule Events](#) ➔

Create Sorted Frame

Save Changes

In Use	Frame	Date/Time Sorted	Submit	Next Step	Total # of Venues	Total # of Day-Times	Sorted By	Comments	Current Frame
<input type="radio"/>	Frame 1 Sorted Unsorted	2/22/2014 11:37:07 AM	<input type="checkbox"/>		8	23	John Doe		
<input checked="" type="radio"/>	Frame 2 Sorted Unsorted	2/22/2014 11:41:11 AM	<input type="checkbox"/>	Enter Outcomes	9	24	John Doe		

Create Sorted Frame

Save Changes

VDTs Sorted Frame

Venue Home | Venue Management | Day-Times | **Scheduling** | Calendar | Outcomes

Cycle 1 | March 2014 | --All Venues--

Cycle 1 Sorted Frame for March, 2014 Status: ● Complete

Frame 1

[Return to Scheduling Table](#)

Comments:

Venue Code	Venue Name	VDT Pick Order	Start Day	Monthly Frequency	Start Time	End Time
B004	A Bar	1	Wednesday	Weekly	8:00 PM	12:00 AM
		2	Tuesday	Weekly	8:00 PM	12:00 AM
		3	Monday	Weekly	8:00 PM	12:00 AM
S001	South and Main Streets	1	Saturday	1 time	11:30 AM	3:30 PM
B002	Venue Kiwi	1	Wednesday	2 times	11:30 AM	1:30 PM
		2	Friday	2 times	11:30 AM	1:30 PM
		3	Monday	2 times	11:30 AM	1:30 PM
Z001	An Other Place	1	Friday	Weekly	7:00 PM	10:00 PM
B001	Apple Bar	1	Thursday	Weekly	8:00 PM	12:00 AM
		2	Wednesday	Weekly	8:00 PM	12:00 AM
		3	Friday	Weekly	8:00 PM	12:00 AM
		4	Saturday	Weekly	8:00 PM	12:00 AM

		2	Wednesday	2 times	6:00 PM	8:30 PM
		3	Tuesday	2 times	6:00 PM	8:30 PM
		4	Thursday	2 times	6:00 PM	8:30 PM
		5	Saturday	2 times	6:00 PM	8:30 PM
		6	Monday	2 times	6:00 PM	8:30 PM
C001	Orange Cafe	1	Saturday	3 times	11:30 AM	2:30 PM
R001	A Store	1	Wednesday	1 time	4:30 PM	6:30 PM
B003	Mango Bar	1	Tuesday	Weekly	9:30 PM	12:30 AM
		2	Thursday	Weekly	9:30 PM	12:30 AM
C002	Main Street Cafe	1	Tuesday	1 time	11:30 AM	12:30 PM
		2	Thursday	1 time	11:30 AM	12:30 PM
		3	Wednesday	1 time	11:30 AM	12:30 PM
		4	Monday	1 time	11:30 AM	12:30 PM
		5	Friday	1 time	11:30 AM	12:30 PM

VDTs Primary Schedule

Venue Home | Venue Management | Day-Times | **Scheduling** | Calendar | Outcomes

Cycle 1 | March 2014 | --All Venues--

Cycle 1 Frame 1 - Step 2: Select and Schedule Events for March, 2014 Status: ● Complete

← Step 1: Sort Frame Return to Scheduling Table Step 3: Schedule Alternates →

Random Events:

Reserve Venues:

[Update Random and Reserve Counts](#)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
23	24	25	26	27	28	01
02	03	04	05	06	07	08
09	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

Venue Code	Venue Name	# of VDTs	Repeat?	VDT Pick Order	Start Day	Monthly Frequency	Start Time	End Time	Scheduled?
S001	South and Main Streets	1		1	Saturday	1 time	11:30 AM	3:30 PM	March 29 Edit Staff:
B002	Venue Kiwi	3		1	Wednesday	2 times	11:30 AM	1:30 PM	Add to schedule
				2	Friday	2 times	11:30 AM	1:30 PM	Add to schedule
				3	Monday	2 times	11:30 AM	1:30 PM	March 10 Edit Staff:
B004	A Bar	3		1	Wednesday	Weekly	8:00 PM	12:00 AM	Add to schedule
				2	Tuesday	Weekly	8:00 PM	12:00 AM	Add to schedule
				3	Monday	Weekly	8:00 PM	12:00 AM	Add to schedule

Venue Code	Venue Name	# of VDTs	Repeat?	VDT Pick Order	Start Day	Monthly Frequency	Start Time	End Time	Scheduled?
Z001	An Other Place	1		1	Friday	Weekly	7:00 PM	10:00 PM	Add to schedule
B001	Apple Bar	4		1	Thursday	Weekly	8:00 PM	12:00 AM	March 20 Edit Staff:
				2	Wednesday	Weekly	8:00 PM	12:00 AM	Add to schedule
				3	Friday	Weekly	8:00 PM	12:00 AM	Add to schedule
				4	Saturday	Weekly	8:00 PM	12:00 AM	Add to schedule

VDTs Primary Schedule Popup

Cycle 1 Frame 1 - Step 2: Select and Schedule Events for March, 2014

Status: ● Complete

← Step 1: Sort Frame

Step 3: Schedule Alternates →

Venue Kiwi

Venue Code: B002

Address:

Comments:

Time: Monday, 11:30 AM - 1:30 PM

Available Dates:

March 3

March 10

March 17

March 24

March 31

Unable to schedule

Clear selection

This is a non-random event

Staff (optional):

Comments (optional):

! Overlapping event scheduled

Sun	Mon	Tue	Wed	Thu	Fri	Sat
23	24	25	26	27	28	01
02	03	04	05	06	07	08
09	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	01	02	03	04	05

Save Changes

Cancel

Non-random Events

Venue Code
P001

Random Events (2 s

Venue Code	Venue
S001	Sou
B002	Ve

ri	Sat
28	01
07	08
14	15
21	22
28	29
04	05

Scheduled?
March 8 Edit Staff:




















Scheduled?
30 PM March 29 Edit Staff:
30 PM Add to schedule

VDTs Scheduling Status

Venue Home | Venue Management | Day-Times | **Scheduling** | Calendar | Outcomes

Cycle 1 | --All Months-- | --All Venues--

Cycle 1 Scheduling Status Table



Month	Step 1: Sort Frame	Step 2: Select and Schedule VDTs	Step 3: Select Alternates	Step 4: Print Schedule	Step 5: Report Event Outcomes
February, 2014	 Complete	 Complete	 Complete	 Print	 Complete
March, 2014	 Complete	 Complete	 To Do	 Print	
April, 2014	 To Do				
May, 2014	 To Do				
June, 2014	 To Do				
July, 2014	 To Do				
August, 2014	 To Do				
September, 2014	 To Do				
October, 2014	 To Do				
November, 2014	 To Do				
December, 2014	 To Do				
January, 2015	 To Do				

VDTs Calendar

Venue Home | Venue Management | Day-Times | Scheduling | **Calendar** | Outcomes

Cycle 1 | March 2014 | --All Venues--

LEGEND:

- Event outcomes report needed
- Report completed
-  Report in progress
-  Comment exists



[Print all events for this month](#)

Calendar

Cycle 1 Frame 1 - March 2014

[See this month's schedule as a list](#)

VIEW: **Month** | Week | Day | Show alternates | < Previous | Next >

Sun	Mon	Tue	Wed	Thu	Fri	Sat
Feb 23	Feb 24	Feb 25	Feb 26	Feb 27	Feb 28	Mar 01
Mar 02	Mar 03	Mar 04	Mar 05	Mar 06	Mar 07	Mar 08 P001 The Beach 02:30PM - 06:30PM <input type="checkbox"/>
Mar 09	Mar 10 B002 Venue Kiwi 11:30AM - 01:30PM <input type="checkbox"/>	Mar 11	Mar 12	Mar 13	Mar 14	Mar 15

VDTs Outcomes

Venue Home | Venue Management | Day-Times | Scheduling | Calendar | **Outcomes**

Cycle 1 | --All Months-- | --All Venues--

Cycle 1 Event Outcome Report for Thursday, March 20, 08:00 PM-12:00 AM

[Report Event Outcomes](#)

Status: ■ Event outcomes report completed. Comments on this report:

Venue Outcomes

Venue Level	Venue	Outcome	Event No.	Number counted at this event	Add intercept form
Primary	B001 Apple Bar	Conducted ▼	23	50	<input type="button" value="+"/>
Alternate 1	B003 Mango Bar	Not Conducted ▼		0	

Add Other Venue

Edit	Event ID	Venue	Recruiter ID	# approached	# screened	# Yes	# No	# Don't Know	# Refused	# PEAs scheduled	# PEAs interviewed	Delete?
Edit	23	B001 Apple Bar	5	25	0	12	7	1	5	0	0	<input type="button" value="X"/>
Edit	23	B001 Apple Bar	6	5	0	2	2	0	1	0	0	<input type="button" value="X"/>

VDTs Outcomes Form

Venue Home Venue Management Day-Times Scheduling Calendar Outcomes

Cycle 1 ▼

Intercept Form for the event: 23 - Apple Bar (B001)
on March 20, 08:00 PM - 12:00 AM

* = required

* Recruiter ID :

* Number approached :

Previous Participation

* Number Yes :

* Number No :

* Number Don't Know :

* Number Refused :

Note: the sum of "Yes," "No," "Don't Know," and "Refused" must equal the number approached.

Number PEAs scheduled :

Number PEAs interviewed :

Number screened :

Save Form Delete Form Cancel

VDTs Outcomes Main

[Venue Home](#)
[Venue Management](#)
[Day-Times](#)
[Scheduling](#)
[Calendar](#)
[Outcomes](#)

Cycle 1 ▼
 March 2014 ▼
 --All Venues-- ▼

Cycle 1 Frame 1 - Step 5: Report Event Outcomes for March 2014












[← Step 4: Print Schedule](#)

[Return to Scheduling Table](#)

[Export to Excel](#)

[Show all reports](#)

[Show incomplete reports](#)

Status	Date	Day	Start Time	End Time	Scheduled Primary Venue	Alternate/Other Events	Staff	# of Events	# of Completed Events
 Complete	03/20/2014	Thursday	08:00 PM	12:00 AM	 B001 Apple Bar	 B003 Mango Bar		2	1
 In Progress	03/10/2014	Monday	11:30 AM	01:30 PM	 B002 Venue Kiwi	 C002 Main Street Cafe		2	1
 To Do	03/08/2014	Saturday	02:30 PM	06:30 PM	 P001 The Beach			1	0
 To Do	03/29/2014	Saturday	11:30 AM	03:30 PM	 S001 South and Main Streets	 C001 Orange Cafe		2	0

Review

- **Hard to Reach Populations**
- **Respondent Driven Sampling**
 - Coupon Manager Software
- **Venue Based Sampling**
 - VDTs Software

Questions?
Deirdre.Middleton@icfi.com

