The General Survey System (GSS): A Mobile Technologies System for Collecting and Managing Study Data

Presented by
Donna Medeiros
RTI International, Research Triangle Park, NC

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Authors

- Jay Levinsohn, *RTI International*
- Jennifer Duke, *RTI International*
- Carol Schmitt, *RTI International*
- Francis Stillman, *Johns Hopkins University*
- Patricia Yost, *RTI International*
- Stephen Litavecz, *RTI International*
- Reneé Karlsen, *RTI International*
- Rob Hughes, *RTI International*
- Yuying Zhang, *RTI International*
Today’s Presentation

- GSS Overview
- Technologies and Best Practices
- Point of Purchase Study (Vietnam)
- Recent Innovations
  - GPS
  - Enumeration and Selection
- Lessons Learned, Next Steps
The application of information and communication technologies to improve health in low-resource settings. Technologies include:

- linking disparate sources of data together through natural language processing;
- **use of mobile health technologies for disease surveillance**;
- the use of telemedicine to manage chronic disease;
- the use of digital libraries to increase knowledge and awareness of public health events
Global Health Informatics Best Practices

- **Public Domain software** — Code available. .NET technologies proved adaptable and scalable based on surveillance requirements and international capabilities.

- **Transfer of Technology** — trained country IT staff for ownership. They ran the survey — key to sustainability and capacity building. Ideally country staff should program and maintain. Remote support available if needed.

- **Sustainable System** — For repeated use. *Somewhat* scalable, adaptable — used for other case based studies. Solid documentation.

- **Stakeholder Involvement** — Collaborative environment, engaged countries and agencies early.

- **QC** — Routine monitoring and evaluation must take place for quality of data and to ensure timeliness. Identifies trends and issues before too large.
The General Survey System — GSS

- Developed by RTI for US surveys using mobile devices, now in use globally: 13 countries, 30 languages

- Components:
  1. Windows PC based Developer’s Environment
     - Designed by the World Health Organization
  2. Handheld (iPAQ/Windows Mobile)

- Forms-based system that allows users to develop forms and logic to manage data capture process

- Extendable and scalable – supports n # of languages, n # regions/states
GSS Use

Highly Mobile Data Capture system

- Household doorway screening and interviewing
- Vendor listing and vendor surveys
- Intercept surveys
- Hospitals surveys
- Inventories

WHO, Bangladesh
Global System Use

Global Adult Tobacco Survey (GATS) Coverage

Bangladesh, Brazil, China, Egypt, India, Indonesia, Mexico, Pakistan, Philippines, Poland, Russian Federation, Thailand, Turkey, Ukraine, Uruguay, Vietnam
Technology: Handheld Equipment

- **HP iPAQ** — handheld computer, Windows Mobile, SQL CE

- **SD card** — inserted into the iPAQ, stores data externally

- **GPS Receiver** — inserts into the iPAQ and used during enumeration
Capabilities

Developed in Microsoft Visual Basic.net and supports

- a wide variety of data types, range and validity checking
- GPS capture
- dynamic sample selection in real time
- complex data capture logic and sequences
- case management and status recording
- large capacity data storage
- a PC-based developers environment: for instrument development and data processing
- data file generation: usable by statistical software
- internationalization: unicode fonts
Survey System Implementation Steps

1. Questionnaire Design and Programming

2. Data Management (Transfer and Aggregation)

3. Data Processing
Development Environment

- PC Windows based development system
  - Uses MS Access databases to store metadata
- Visual developers environment for preparing questionnaire files
- Converts MS Access database files to the Windows CE compact SQL format (SDF) for use on the handheld
GSS Developers (IDE) Main Menu

GATS Developer Tools

GLOBAL TOBACCO SURVEILLANCE SYSTEM
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**Question Text**

**Language 0:**
What is the year of your date of birth?

[IF DON'T KNOW, ENTER 7777
IF REFUSED, ENTER 9999]

**Language 1:**
您的出生年份？

[如果不知道，输入“7777”
如果拒答，输入9999]

**Skip or Compute Logic**

if (A02a) = "77" or (#A02b) = 7777 or (A02a) = "99" or (#A02b) = 9999 then goto A03;
set {HH4c} = {A02a};
set {HH4cYear} = {A02b};
call ValidateBDay;
DATA MANAGEMENT:
TRANSFER AND AGGREGATION
Data Management: Web-based

- FIs
- Project Web Site
- Case Assignments
- Status Reports
- Internet / phone line
- National Data Center
- Data Aggregated
- Reports and Files Produced
Case Management System — iPAQ

Select Case

Thu, Jun 25, 2009  Battery: 100%

101 Kenmore Road Apt 1
Chapel Hill, NC 27101

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</table>

Record of Calls

- Start Interview
- Edit Address
- View Address Changes
- Case Notes

Transmit

Action | Admin View Sort Exit
Vietnam Point of Purchase Project (VPOP)

- Purpose: Collect point of purchase sales baseline data for countries that have signed the WHO Framework Convention on Tobacco Control. Pilot in Vietnam.

- Collaboration between RTI, JHU School of Global Public Health, Hanoi Medical University, Vietnam General Statistical Office

- Key info/Research questions:
  - **Density of Sales, pricing, where and how much is being sold, industry presence, advertising**
VPOP Technology Advancements

**Relied on Technology:**

- **GPS**
  - Field staff area ‘locator’ during counting and listing
  - Recorded vendor location

- **Enumeration and Selection**
  - Counting and listing of Vendors
  - Dynamic selection for purchases

*Hanoi Medical University*
GPS

- System outputs Coordinates such as 21 02.69' N, 105 48.36' E
- For use in maps and analysis
Lessons Learned

- Hardware choice is effective for this kind of survey
  - Good battery life
  - Works well in mobile environments
  - Well received by interviewing staff
  - But…iPAQ is going away!

- PC Visual Development Environment needed
- System is robust and can be taught to interviewers in a few days training
- Data File generation important for QC and analysis
Current Next Steps

- Porting to platforms:
  - PC (Windows 7) and Netbook - done
  - Smart phones
    - Android
    - Windows Phone 7
    - Perhaps iOS (iPhone & iPAD)
  - Cell based data transmission
  - Perhaps Web enabled forms
Acknowledgements

GSS Team
Led by: Dr. Jay Levinsohn
Back Row, Left to Right: Rob Hughes, Steve Litavec, Jay Levinsohn, Patricia Yost
Front Row: Paul Kizakevich, Reneé Karlsen, Donna Medeiros, Yuying Zhang
Questions?

Contact info: djm@rti.org 919.541.8788