



## IMPLEMENTATION GUIDE

This document gives a complete overview on setting up a system similar to *Voix des Kivus (Vdk)*. Such a system can be set up anywhere in the world – as long as there is phone coverage. As you will see, implementing a system to receive high quality messages in real time is fast and (very) cheap.

We recommend that before reading this implementation guide first please read the 4-page information document on *Voix des Kivus*. More [here](#).

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# 1 Requirements

## Required hardware

- Desktop, laptop or notebook (from now onwards netbook) with Microsoft Windows 98 or later;
- A cellphone that can be connected with this netbook via USB. Any cellphone compatible with FrontlineSMS will do. Please see [here](#) for a list of compatible phones.
- *Voix des Kivus*: makes use of a \$250 Asus netbook and a \$50 Motorola PEBL phone.

## Required software:

- FrontlineSMS (FLSMS) is one of the pillars of VdK. The program that collects and saves SMS messages. It is free, easy to use, and powerful. In addition, the FLSMS forum is available for any questions about the software and is a great resource if you need a swift response. To find more information and download the program, please visit their site [here](#). There are a few other programs that work similar to FrontlineSMS, like RapidSMS and SlingshotSMS, though we at VdK do not have experience with them.
- VdK uses the program R to create figures from the raw data – the messages sent by the phone holders. R is freely available [here](#).
- VdK also uses LaTeX to combine the figures with text to create bulletins and reports in PDF format. LaTeX is also freely available. There are a couple different versions of the software, but following the steps [here](#) will guide you through the installation.
- *Voix des Kivus*: VdK has thus spent a total of zero dollars on software. We did invest time in creating a computer code for R and LaTeX. However, this code is now freely available [here](#).

## Required staff and authorizations:

- Needless to say, somebody has to implement the project. It is wise to have a person that can manage the project phone and laptop.
- In addition, any project of course needs authorization from local authorities before starting. As a result, authorities at each level in the province of South Kivu was visited.

- Once the above is in place: you are ready to go.

### Making maps

While not necessary, it is definitely useful to indicate on a map where your holders or their villages are located. A GPS device or smartphone with gps-locator capabilities are available for purchase for under \$100 (see, for example [here](#)). Moreover, while VdK used the program ArcGIS that is not freely available, maps indicating the location of the phone holders or their villages can be created for free in Google Maps or in R.

# 2 Hardware

Setting up the hardware is surprisingly simple.

- Turn on the laptop and download FrontlineSMS.
- Place a simcard in the cellphone, turn it on, and connect it to the laptop.
- Open FrontlineSMS and after a few second it will have found the cellphone and that is it.
- You're ready to go.

## 3 Software

Receiving SMSs from the phoneholders:

- Once the hardware is up and running the phone holders (and you and everybody else) can send SMSs to the project phone and this will be directly stored in FrontlineSMS.
- Within FrontlineSMS there is the possibility to export the data, which will then be saved as a CSV file.
- The CSV file is a database that contains all the different SMS messages you have received (as rows) and a lot of information (in columns) such as the date the message was sent, who sent it, the message content, etc.

### Frontline SMS

FrontlineSMS looks deceptively simple at first; in truth the program is very powerful. With the right code FrontlineSMS can do almost anything. For example, a code can be written to automatically send information back to phone holders, to automatically reimburse phoneholders, etc. The possibilities are endless. See the [forum](#) for more information.

Creating tables and figures:

- One of the major contributions of *Voix des Kivus* is the creation of a data cleaning, verification, and tabulation computer code that can be used in the software program R.
- With one push of a button this code does two things. First the information in the CSV document is cleaned. The code takes out duplicate messages. It also takes into account that an event reported by the same people in the same village within an hour likely talk about the same event.
- Second, the computer code creates nice-looking tables and figures. In total two tables and one figure are created. One table is a summary of all the messages sent in the last

month. Another table combines the English and French text messages that have been received in the last week. A final figure shows the development over time of the violence and nonviolence-related messages received from the different areas (villages or higher level entities). These tables and figures can be found in the bulletin [here](#).

- An interesting feature of the figures is internal validation. Because there are three phone holders per village we make a distinction between messages that are sent by one person in a village, and those confirmed by more than one person in the village. The code takes this into account and illustrates this in the figures.
- The computer code is freely available online [here](#) under the name **Code\_to\_Create\_Figures.R**. It has been written in such a way that with minimal adjustments it can be adapted to your project and preferences.

Create bulletins:

- Another contribution of *Voix des Kivus* is a yet another computer code for the software program LaTeX.
- With one push of a button this code combines the tables and figures created by R, and place these in a Tex document. To this it automatically adds and formats text and then saves this as PDF document that is ready to be shared.
- This computer code – under the name **Code.To.Create.Bulletin.tex** – is freely available online [here](#).

### *Voix des Kivus* Bulletins

Each week VdK sends out a Bulletin to the development community in Eastern Congo summarizing the messages received the week before. After receiving the CSV file, the R and LaTeX codes are run with two pushes of a button (one for each code). This creates –fully automatic –a PDF document with figures, tables and text in a matter of minutes. It requires only two manual activities:

1. One has to indicate in the first line of the code from which day to which day one would like to see the information.
2. VdK, in addition to creating codes, also receives text-messages in Swahili. These messages are translated into English and French before the code is run.

A detailed discussion of how to set up the code structure can be found below.

## 4 Villages

A large advantage of a crowd-seeding system (like *Voix des Kivus*) over a crowd-sourcing system is the confidence one can have in the quality of the data. Please see the four-page information document on *Voix des Kivus* for more information. In order for the data to be truly representative, however, villages must be selected randomly.

### *Voix des Kivus* and TUUNGANE

Columbia University is also engaged in the evaluation of a major development program in Eastern DR Congo with a population coverage of approximately 1.8 million people. The development program, called TUUNGANE, is implemented as a randomized control trial where half of all villages in Eastern DR Congo are randomly chosen to receive the programming. A baseline survey was conducted in summer of 2007, and final surveys and measures will be collected in 2010-2011. *Voix des Kivus* has been layered on top of TUUNGANE. More information about the TUUNGANE evaluation can be found [here](#).

Randomized selection can make use of various criteria. If a project works in several provinces, for instance, one might want a certain number of random villages in each province. This *stratification* approach was used in *Voix des Kivus*

## 5 From Office to Field

Once the hardware and software is set up and villages are selected, it is time to move the project from the office to the field.

### 5.1 Personnel

In addition to overall management and technical support in New York City at Columbia University, *Voix des Kivus*, had two people working for the project in Eastern DR Congo: 1) a technical coordinator, and a 2) field coordinator.

Technical coordinator:

- Part-time: one day per week
- Responsible for the project phone, the netbook, and reimbursement of phone costs to the phone holders.
- The protocol in French can be found [here](#) under the name **PROTOCOL\_TC**.

Field coordinator:

- Full-time: five days per week
- Responsible for launching the project in the field and troubleshooting.
- The protocol in French can be found [here](#) under the name **PROTOCOL\_FC**.

### 5.2 Authorization

Any project of course needs authorization from local authorities before starting.

Given the sensitive nature of the project, *Voix des Kivus* requested from the provincial authority (*VdK* operates only in South Kivu), the Congolese National Intelligence Service, and the authorities at the Territoire, Chefferie, Groupement, Locality and Village levels. The letters used to obtain this information can be found [here](#) under the names:

- **LETTER AU ANR**
- **LETTER AU SUD KIVU**
- **LETTER AU TERR CHEF GROUP LOC VILL**

### 5.3 Phone holders

For a project that has as goal to collect high-quality data in real-time the most important asset are its phone holders.

**Selection:**

- In total three phone holders were selected per village for the *Voix des Kivus* pilot project: 1) the chief of the village, 2) the head of the women's association, and 3) a democratically elected person.
- The reason for choosing the chief of the village and the head of the women's association is that they are likely to be centers of information within a village.

**Consent:**

- Consent not only at the village level and higher is important. Also consent was obtained at the level of the phone holder. These documents can be found [here](#) under the names:
  - **FICHE D'IDENTIFICATION**
  - **FICHE DE CONSENTEMENT\_FR**
  - **FICHE DE CONSENTEMENT\_SW**

**Training :**

- The most important part of the project's launch in a village was the phone holder training.
- The documents used for this can be found [here](#) under the names:
  - **GUIDE ET LIVRE DE CODE\_FR**
  - **GUIDE ET LIVRE DE CODE\_SW**
  - **CODEBOOK\_EN**

### 5.4 Security

Security is an important concern especially in places where a system like *Voix des Kivus* is most useful. Measures *Voix des Kivus* took to ensure security included:

- giving holders control over the privacy and circulation of any message sent
- sharing village level identifier information only with trusted users (individual level information was never shared)
- being reachable for holders whenever there were concerns of any form.

## 6 Creating Your Own Bulletins

There are two main documents necessary to create bulletins: one to create the figures, and one that places these figures together into one bulletin.

### 6.1 Creating Database and Figures

**Code\_to\_Create\_Figures.R** is a code written for the freely available computer program R. It takes the raw data and in addition to a cleaned database creates figures that illustrate the data.

There are only a few lines that have to be changed each time, these are indicated under the header “# Parameters to change” where you indicate:

- The final date of interest
- The name of the raw database
- The place where the figures are saved on your computer.

#### Data

There are two main sources of data: the export as it is obtained from FrontlineSMS and the translated SMS messages. Both are in the easy to use CSV-format. The following two dummy documents can be found in the folder “\_data”. These documents contain fake information and serve as example:

- FLSMS.export.csv
- textmessages.csv

#### FLSMS Export

You can indicate in FrontlineSMS what data (columns) you would like to export. The three important pieces of information for us are: “Message Date”, “Message Content” and “Contact Name”. The latter is important because the first five numbers indicates the village and the last number indicates which person the message came from, where 1 = chief, 2 = head of the women’s association, 3 = democratically elected person.

Note that it is good practice to place a date indication (YYYYMMDD) at the start of the document

name for two reasons: 1) it is likely that the project will receive multiple datasets over time. Having a date indication will keep the folder organized, and 2) the data will sort itself automatically in the folder. If you plan to receive data several times a day, a time indication would also be necessary and the name could start with: YYYYMMDDHHMM.

#### Translations

Phoneholders also sent textmessages in Swahili and the local languages. *Voix des Kivus* translates these to French and English. In the document, “report” indicates whether the information should be reported at all. “sensitive” indicates whether it should be included in the sensitive bulletin only. Also note that there are two columns of English and French translations. The second set has location information blanked out. For example “Bukavu” in message 1 is blanked out to [\*\*\*\*]. This second set of translations is included in the nonsensitive bulletins. Finally, it is possible that a message is too long and has to be cut into pieces. Message 2, for example, is such a message. It now has been copied unto two lines and the English and French sentences are cut. Note that the second line starts with “CTDZ” this tells the code to see it as the second line of

#### Code

In the folder “\_code” there are the following documents:

- VDK.functions.R
- VDK.global.variables.R.

These documents are called up by

**Code\_to\_Create\_Figures.R**. It is not necessary to change anything in these documents.

There are three more documents in the folder “\_code”, each of them again in the easy to use .csv-format:

- **messages.csv**

- `vill.csv`
- `dropfile.csv`

The first document (`messages.csv`) gives an overview of the different pre-coded messages the report can potentially send. Note that this document corresponds to the *Voix des Kivus* codebook that has been shared with the phoneholders. For your own project this is where you write your pre-coded messages and how you want them to appear in figure 1 of the bulletin.

The second document (`vill.csv`) gives an overview of the different villages the projects works in. “CODE” gives the five numbers that are uniquely assigned to each village. If “started” is equal to zero it indicates the project has not yet started in that village and the code will not take this village into account when creating bulletins. For example, the sub-village “SVA” will not be taken into account in the bulletin. For your own project, this is thus where you list the villages of operation.

Finally the document (`dropfile.csv`) makes it possible to indicate from which village and what dates you do not want the data to be included in the bulletin. At the start of *Voix des Kivus* project in a new village the phoneholders first spend several days training how to send SMS messages to the system. As a result, these messages are fake and should not be taken into account for the bulletins. To give an example. The bulletin will not take into account messages from the village with code 10009 that were sent on October 28 and 29, 2010.

## Output

`Code_to_Create_Figures.R` will create two different types of output that are both placed in the folder “output”: the databases and the figures.

Four sets of databases are created:

1. `data_dup_to_date.dta`
2. `data_dup_to_date_keep.dta`
3. `data_to_date.dta`
4. `data_to_date_keep.dta`

“Keep” indicates that the database has each copy of an event sent by multiple people. “Dup” indicates that the database contains the duplicate observations only.

In addition, nine different figures are created. Each bulletin has three figures. However, much information received by *Voix des Kivus* is sensitive and as a result there are three different bulletins – each with a different level of sensitivity. Therefore, there are also three different sets of figures:

1. `n_fig1.png`
2. `n_fig2.png`
3. `n_fig3.png`
4. `s_fig1.png`
5. `s_fig2.png`
6. `s_fig3.png`
7. `ss_fig1.png`
8. `ss_fig2.png`
9. `ss_fig3.png`

The different letters indicate their level of sensitivity:

- **nonsensitive (n):** The information is at the chefferie level and all the location information in figure 3 has been blanked out.
- **Sensitive (s):** The information is at the village level and the location information in figure 3 has not been blanked out.
- **Supersensitive (ss):** The information is at the reporter level.

## 6.2 Creating Bulletins

After the figures have been created, one more step has to be taken. The figures have to be placed together in one document, text has to be added and all this should be converted to a PDF document. Of the three different levels of sensitive we only shared two: the nonsensitive and the sensitive bulletins. The following two codes create these two PDF documents:

- `Code_to_Create_Bulletin_Nonsensitive.tex`

There are only small things that have to be changed in this code each time a new bulletin is created:

- The “Date Covered” has to be changed
- The date at which the bulletin was created has to be changed
- In addition, figure 3 – the table with the English and French messages – might be bigger or smaller depending on the number of textmessages received. As a result, the size of the table might have to be increased or decreased.