Crowdseeding: Using Cellphones to Collect and Distribute Information

Peter van der Windt
Motivation

- Evaluation of a large development program in Eastern Congo
Introduction
From Crowdsourcing to Crowdseeding
Voix des Kivus
Research Applications
From a Research to an Activist Agenda
Conclusion
Motivation
Overview Presentation
Peter van der Windt
Crowdseeding
Motivation

- Interested in whether development program $\rightarrow$ conflict $\downarrow$
Motivation

- Interested in whether development program → conflict ↓
  1. Is it causal?
Motivation

- Interested in whether development program → conflict ↓
  1. Is it causal? **YES** *(Treatment randomized)*
Interested in whether development program → conflict ↓

1. Is it causal? **YES (Treatment randomized)**
2. How to measure conflict?
Motivation

- Interested in whether development program → conflict ↓
  1. Is it causal? **YES (Treatment randomized)**
  2. How to measure conflict? **Voix des Kivus**
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- Interested in whether development program $\rightarrow$ conflict $\downarrow$
  1. Is it causal? **YES (Treatment randomized)**
  2. How to measure conflict? **Voix des Kivus**

OBJECTIVES:
Motivation

- Interested in whether development program → conflict ↓
  1. Is it causal? **YES (Treatment randomized)**
  2. How to measure conflict? **Voix des Kivus**

**OBJECTIVES:**

1. “Can cellphones be used to gather high-quality conflict event data in real-time from hard-to-access areas?”
Interested in whether development program $\rightarrow$ conflict $\downarrow$

1. Is it causal? **YES (Treatment randomized)**
2. How to measure conflict? **Voix des Kivus**

**OBJECTIVES:**

1. “Can cellphones be used to gather high-quality conflict event data in real-time from hard-to-access areas?”
2. Development program $\rightarrow$ conflict $\downarrow$?
Overview Presentation

- From Crowd-sourcing to Crowdseeding
- *Voix des Kivus*
- Research applications
- Reflections
Crowdsourcing

- Let’s use cellphones
Crowdsourcing

- Let’s use cellphones

- Crowd-sourcing: task is outsourced to an undefined public
  1. Reach a large number of people cheaply
  2. “wisdom of the crowd” (X Prize foundation)
Crowdsourcing

- Let’s use cellphones

- Crowd-sourcing: task is outsourced to an undefined public
  1. Reach a large number of people cheaply
  2. “wisdom of the crowd” (X Prize foundation)

- In Eastern Congo?
Illustration
Illustration

[Images of a muddy road and a landscape]
From Crowd-sourcing to Crowd-seeding

<table>
<thead>
<tr>
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Isolation ➔ No knowledge of the project
From Crowd-sourcing to Crowd-seeding

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Isolation → No knowledge of the project
From Crowd-sourcing to Crowd-seeding

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From Crowd-sourcing to Crowd-seeding

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Poverty → No means to participate in the project
From Crowd-sourcing to Crowd-seeding

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In Congo:
- A is a very small “crowd”
From Crowd-sourcing to Crowd-seeding

means

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In Congo:

- A is a very small “crowd”
- A is not representative of A+B+C+D
From Crowd-sourcing to Crowd-seeding

Crowdseeding combines ICT with standard survey research techniques:
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1. Distribute phones & Phonecredit
Crowdseeding combines ICT with standard survey research techniques:

1. Distribute phones & Phonecredit
2. To a randomly selected sample of the population
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From Crowd-sourcing to Crowd-seeding

Crowdseeding:

1. Reach a larger part of the crowd
From Crowd-sourcing to Crowd-seeding

Crowdseeding:

1. Reach a larger part of the crowd
2. Representative subset of the total population
Crowdseeding:

1. Reach a larger part of the crowd
2. Representative subset of the total population
3. Builds relationship!
Area of Operation
How Voix des Kivus Works

- Pilot project in eighteen villages
- August 2009 to January 2011
How Voix des Kivus Works

- Pilot project in eighteen villages
- August 2009 to January 2011
- Each village had 3 representatives
How *Voix des Kivus* Works

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- $200 Netbook with FLSMS and a cellphone in Bukavu
How *Voix des Kivus* Works

- Pilot project in eighteen villages
- August 2009 to January 2011
- Each village had 3 representatives
- Distributed a code-book & extensive training
- Technical Rep and Field Rep
- $200 Netbook with FLSMS and a cellphone in Bukavu
- Incentives ($1.5 plus reimbursement)
Illustration
Cellphone Coverage
Cellphone Coverage
The Data

4,783 non-empty SMS messages about 5,293 events
1,244 were text-messages
4,623 were unique events
The Data

- 4,783 non-empty SMS messages about 5,293 events
- 1,244 were text-messages
- 4,623 were unique events
No reporting fatigue
## The Text-messages

<table>
<thead>
<tr>
<th>Date</th>
<th>Translated Message(EN)</th>
<th>Traduction du SMS (FR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010-11-27</td>
<td>Two men were kidnapped in [***] and were killed in an unknown place.</td>
<td>Deux hommes ont été enlever à [***] et ont été tué dans un endroit inconnue.</td>
</tr>
<tr>
<td>2010-11-27</td>
<td>MONUC cars passed through the village.</td>
<td>Les vehicules de la MONUC sont passé par le village.</td>
</tr>
<tr>
<td>2010-11-28</td>
<td>Pillaging in [***].</td>
<td>Pillage à [***].</td>
</tr>
<tr>
<td>2010-11-28</td>
<td>Pillaging in [***].</td>
<td>Pillage à [***].</td>
</tr>
<tr>
<td>2010-11-28</td>
<td>MONUC passed through the village.</td>
<td>La MONUC est passée par le village.</td>
</tr>
<tr>
<td>2010-11-28</td>
<td>A bullet was fired by an unknown armed group.</td>
<td>Une balle a été tirer par un group armé inconnue.</td>
</tr>
<tr>
<td>2010-11-28</td>
<td>Failure of banana crop due to drought.</td>
<td>Echec de production de bananes causé par la secheresse.</td>
</tr>
<tr>
<td>2010-11-29</td>
<td>FARDC helicopter hovered above the village.</td>
<td>L'Hélicopter des FARDC a survolé le village.</td>
</tr>
<tr>
<td>2010-11-29</td>
<td>Two MONUSCO helicopters hovered above the village.</td>
<td>Deux hélicopters de la MONUSCO ont survolé le village.</td>
</tr>
<tr>
<td>2010-11-29</td>
<td>FARDC passed by the village doing patrols.</td>
<td>Les FARDC sont passées par le village en patrouille.</td>
</tr>
<tr>
<td>2010-11-30</td>
<td>We were visited by UOB students here in [***].</td>
<td>Nous avons été visiter par les étudiants de l'UOB ici à [***].</td>
</tr>
<tr>
<td>2010-12-01</td>
<td>Burial ceremony in [***] of the two watchmen who got missing since three weeks. They were buried in the plantation.</td>
<td>Enterrment de deux sentinelles portées disparus depuis trois semaines à [***]. Ils ont été enterrer dans la plantation.</td>
</tr>
</tbody>
</table>
The Collected Data

Combination with other data
For measurement

Notes:
Standard errors, clustered at the village level, are provided in parentheses. One, two or three asterisks indicate, respectively, significance levels at the 90%, 95% and 99%. Conflict event (code): Attack (23+24), Civ. death (31+32+33), Sex. violence (64), and Kidnapping (51+52).
## The Collected Data

<table>
<thead>
<tr>
<th>Presence</th>
<th>Attack</th>
<th>Civ. death</th>
<th>Sex. violence</th>
<th>Kidnapping</th>
</tr>
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<tbody>
<tr>
<td>MONUSCO</td>
<td>0.09***</td>
<td>-0.01</td>
<td>-0.02</td>
<td>-0.06***</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.03)</td>
<td>(0.01)</td>
<td>(0.02)</td>
</tr>
<tr>
<td></td>
<td>-0.07***</td>
<td>-0.08</td>
<td>-0.02***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.07)</td>
<td>(0.01)</td>
<td></td>
</tr>
<tr>
<td>MONUSCO (Lag)</td>
<td>-0.01</td>
<td>-0.08</td>
<td>-0.02***</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
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<td>(0.01)</td>
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<tr>
<td>FARDC</td>
<td>0.01</td>
<td>-0.03</td>
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<td></td>
<td>(0.06)</td>
<td>(0.11)</td>
<td>(0.02)</td>
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<td>FARDC (Lag)</td>
<td>-0.01</td>
<td>-0.01</td>
<td>-0.01</td>
<td>-0.11</td>
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<tr>
<td></td>
<td>(0.05)</td>
<td>(0.06)</td>
<td>(0.01)</td>
<td>(0.10)</td>
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<tr>
<td>REBEL</td>
<td>0.53**</td>
<td>0.34</td>
<td>0.00</td>
<td>1.19***</td>
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<td></td>
<td>(0.23)</td>
<td>(0.43)</td>
<td>(0.10)</td>
<td>(0.40)</td>
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<tr>
<td>REBEL (Lag)</td>
<td>-0.16**</td>
<td>0.99</td>
<td>-0.03</td>
<td>-0.33***</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(1.09)</td>
<td>(0.06)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>DEP. VAR. (Lag)</td>
<td>0.03</td>
<td>0.39*</td>
<td>0.11</td>
<td>0.55***</td>
</tr>
<tr>
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<td>(0.11)</td>
<td>(0.19)</td>
<td>(0.08)</td>
<td>(0.06)</td>
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<tr>
<td>N:</td>
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Combination with other data

- UN patrol routes
- Satellite info and weather patterns
- Location of election booths
Introduction
From Crowdsourcing to Crowdseeding
Voix des Kivus
Research Applications
From a Research to an Activist Agenda
Conclusion

The Collected Data
Combination with other data
For measurement
Introduction

From Crowdsourcing to Crowdseeding

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For measurement

Peter van der Windt  Crowdseeding
Conflict Impact of Development Aid
Conflict Impact of Development Aid

Three-month Moving Averages Treatment Effect
Conflict Impact of Development Aid

Cumulative Treatment Effect

-60 -40 -20 0 20 40 60

Aug09 Oct09 Dec09 Feb10 Apr10 Jun10 Aug10 Oct10 Dec10 Feb11 Apr11 Jun11
Conflict Impact of Development Aid

CGM Wildboot Clustered Errors

August 2009 to June 2011

Peter van der Windt
Crowdseeding
Conflict Impact of Development Aid

Excluding the First Four Villages

The collected data
Combination with other data
For measurement

Peter van der Windt
Crowdseeding
Conflict Impact of Development Aid

Randomization Inference

The collected data
Combination with other data
For measurement
Results
Results

1. Development project $\rightarrow$ conflict $\downarrow$
Results

1. Development project → conflict ↓
2. Timing of measurement is very important!
From a Research to an Activist Agenda

Peter van der Windt

Crowdseeding
The need (obligation) to move beyond data collection → Bulletins
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- R and \LaTeX
- Info by location
- Info over time
- Data and text-messages
- Internal validation
From a Research to an Activist Agenda

- The need (obligation) to move beyond data collection → Bulletins
  - R and \texttt{\LaTeX}
  - Info by location
  - Info over time
  - Data and text-messages
  - Internal validation

*Voix des Kivus* received a lot of interest.
NOT from a Research to an Activist Agenda
NOT from a Research to an Activist Agenda

1. Researchers acting as censors:
NOT from a Research to an Activist Agenda

1. Researchers acting as censors:
   - With whom to share the data?
NOT from a Research to an Activist Agenda

1 Researchers acting as censors:
   - With whom to share the data?
   - What to share?
Researchers acting as censors:

- With whom to share the data?
- What to share? Dissemination codes only partially helped
NOT from a Research to an Activist Agenda

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   - Moved ‘bits’ not ‘atoms’
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NOT from a Research to an Activist Agenda

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4. Stunted network development
NOT from a Research to an Activist Agenda

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4. Stunted network development
   - Hierarchical system
Conclusion

Benefits of crowdseeding:

1. Reach a larger part of the population
2. Information is representative of the population
3. Building a relationship with the phoneholders
4. Real-time data on conflict events
5. Development project had a causal negative impact on conflict
6. Timing of the measurement is very important
Conclusion

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- Reach larger part of the population
Conclusion

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Results of research:
Conclusion

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Results of research:

1. It is possible to obtain high quality data on conflict events in real-time
2. The development project had a *causal* negative impact on conflict
3. Timing of measurement is very important
Conclusion

Emphasize limitations of *Voix des Kivus*:

1. Censuring of the shared data
2. Information not acted upon
3. Project not scaled up
4. No use of phones beyond project

But:

- Implemented by a university from the other side of the Atlantic
- The topic is very security-sensitive
- Relationship scale-risk might be hump-shaped
Conclusion

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Conclusion

Crowdseeding particularly useful if:

- Where populations can't participate in ICT-enable systems (isolated or poor areas)
- Quality of the data is particularly important
- In less-sensitive areas

Other applications:
- System to relay information (e.g., price information)
- Phone surveys
- As treatment: Does monitoring lead to less military abuses?
Conclusion

Crowdseeding particularly useful if:

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- Phone surveys
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Conclusion

Thanks!
petervanderwindt.com

See http://cu-csds.org/projects/event-mapping-in-congo/ for:

- Working paper discussing data quality from the *Voix des Kivus* system and using the data for a downstream experiment to assess the conflict effects of international aid;
- Summary information about *Voix des Kivus*;
- Reflections on the implementation and ethical considerations of this project.
# Code-book 1/3

<table>
<thead>
<tr>
<th>Code</th>
<th>Event</th>
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<tbody>
<tr>
<td></td>
<td>PRESENCE OF MILITARY FORCES</td>
</tr>
<tr>
<td>11</td>
<td>Presence of MONUSCO</td>
</tr>
<tr>
<td>12</td>
<td>Presence of men in uniform</td>
</tr>
<tr>
<td>13</td>
<td>Presence of other armed groups</td>
</tr>
<tr>
<td></td>
<td>ATTACKS</td>
</tr>
<tr>
<td>21</td>
<td>Attacks on village by MONUSCO</td>
</tr>
<tr>
<td>22</td>
<td>Attacks on village by men in uniform</td>
</tr>
<tr>
<td>23</td>
<td>Attacks on village by rebel group</td>
</tr>
<tr>
<td>24</td>
<td>Attacks on the village by unknown group</td>
</tr>
<tr>
<td></td>
<td>DEATHS RELATED TO ARMED COMBAT</td>
</tr>
<tr>
<td>31</td>
<td>Civilian deaths (man)</td>
</tr>
<tr>
<td>32</td>
<td>Civilian deaths (woman)</td>
</tr>
<tr>
<td>33</td>
<td>Civilian deaths (child)</td>
</tr>
<tr>
<td>34</td>
<td>MONUC deaths</td>
</tr>
<tr>
<td>35</td>
<td>FARDC deaths</td>
</tr>
<tr>
<td>36</td>
<td>Other rebel group deaths</td>
</tr>
</tbody>
</table>
## Code-book 2/3

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOCAL VIOLENCE AND PROPERTY LOSS</strong></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Rioting</td>
</tr>
<tr>
<td>42</td>
<td>Looting/ property damage</td>
</tr>
<tr>
<td>43</td>
<td>Violence between villagers</td>
</tr>
<tr>
<td>44</td>
<td>Violence between villagers due to a land conflict</td>
</tr>
<tr>
<td>45</td>
<td>Domestic violence</td>
</tr>
<tr>
<td>46</td>
<td>Ethnic violence</td>
</tr>
<tr>
<td>47</td>
<td>Forced labor by men in uniform</td>
</tr>
<tr>
<td>48</td>
<td>Forced labor by other army groups</td>
</tr>
<tr>
<td><strong>DISPLACEMENT</strong></td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>Kidnapping by men in uniform</td>
</tr>
<tr>
<td>52</td>
<td>Kidnapping by rebel group</td>
</tr>
<tr>
<td>53</td>
<td>Arrival of Refugees or IDPs</td>
</tr>
<tr>
<td>54</td>
<td>Departure of villagers as IDPs</td>
</tr>
<tr>
<td>55</td>
<td>Disappearances</td>
</tr>
<tr>
<td>56</td>
<td>Villagers were forced to move</td>
</tr>
<tr>
<td>57</td>
<td>Villagers decided themselves to move</td>
</tr>
<tr>
<td><strong>HEALTH</strong></td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>New outbreak of disease</td>
</tr>
<tr>
<td>62</td>
<td>Civilian death due to disease</td>
</tr>
<tr>
<td>63</td>
<td>Civilian death due to natural causes</td>
</tr>
<tr>
<td>64</td>
<td>Sexual violence against women</td>
</tr>
<tr>
<td>65</td>
<td>Sexual violence against men</td>
</tr>
</tbody>
</table>
## Code-book 3/3

### NATURAL DISASTERS

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>Flooding/heavy rain</td>
</tr>
<tr>
<td>72</td>
<td>Large forest or village fire</td>
</tr>
<tr>
<td>73</td>
<td>Earthquake</td>
</tr>
<tr>
<td>74</td>
<td>Drought</td>
</tr>
<tr>
<td>75</td>
<td>Crop failure/plague</td>
</tr>
</tbody>
</table>

### DEVELOPMENT ACTIVITIES/ NGOs

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>81</td>
<td>Complaint against NGO</td>
</tr>
<tr>
<td>82</td>
<td>Practice message (for Voix des Kivus)</td>
</tr>
<tr>
<td>85</td>
<td>Construction, reparation or rehabilitation of a school or health center.</td>
</tr>
<tr>
<td>86</td>
<td>Construction, reparation or rehabilitation of a church or mosque.</td>
</tr>
<tr>
<td>87</td>
<td>Other construction, reparation or rehabilitation (routes, wells, etc.)</td>
</tr>
<tr>
<td>88</td>
<td>Organization of security patrols</td>
</tr>
<tr>
<td>89</td>
<td>Work to improve agricultural productivity.</td>
</tr>
</tbody>
</table>

### SOCIAL

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>91</td>
<td>Funeral</td>
</tr>
<tr>
<td>92</td>
<td>Wedding/Other celebrations</td>
</tr>
<tr>
<td>93</td>
<td>Visit or meeting organized by national or provincial authorities</td>
</tr>
<tr>
<td>94</td>
<td>Visit or meeting organized by territoire authorities</td>
</tr>
<tr>
<td>95</td>
<td>Visit or meeting organized by the chefferie or locality authorities</td>
</tr>
<tr>
<td>96</td>
<td>Visit or meeting organized by the representative of a political party</td>
</tr>
<tr>
<td>97</td>
<td>Visit or meeting organized by the Mwami (king of a chefferie)</td>
</tr>
</tbody>
</table>
Cellphones enable ordinary people to:

1. **Distribute Information**
   - More difficult for policy makers to distort the agenda (2nd image of power)
   - More informed agenda
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2. **Collect and Receive Information**
   - No intermediaries from different sources. Increases knowledge among ordinary people about preferences and options (3rd image of power)
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3. **Create New Forms of Organization**
Internal Validation

Violent Events by Village

Village X

Village Y