

EXPERIMENTING WITH BIG DATA AND ARTIFICIAL INTELLIGENCE TO SUPPORT PEACE AND SECURITY



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“

...Online social networking lets us find like-minded people around the world, enlarging free speech and human creativity. But it also amplifies hate speech, contributes to ethnic and political polarization, and facilitates terrorist recruitment... ”.

United Nations Secretary-General's
Strategy on New Technologies.

EXECUTIVE SUMMARY

Sustainable development is built on the foundations of a peaceful, just and inclusive society and institutions¹. New types of war, conflict and violence challenge traditional ways of doing analysis to support peace and security efforts. Small data and methods of analysis used with small data cannot respond to these new challenges. We need to strengthen our analytical capacities, use new types of data and develop new methods.

UN Global Pulse has been working - through its lab in Kampala - with partners using big data to support progress on SDG16: Promote Just, Peaceful, and Inclusive Societies. We explored the utility of analysing data from social media and public radio broadcasts to extract insights to feed early warning systems and inform peace and security processes. The experimentation process led to producing technology tools to analyse people's voices. The application of the technology tools resulted in the development of new methods of analysis.

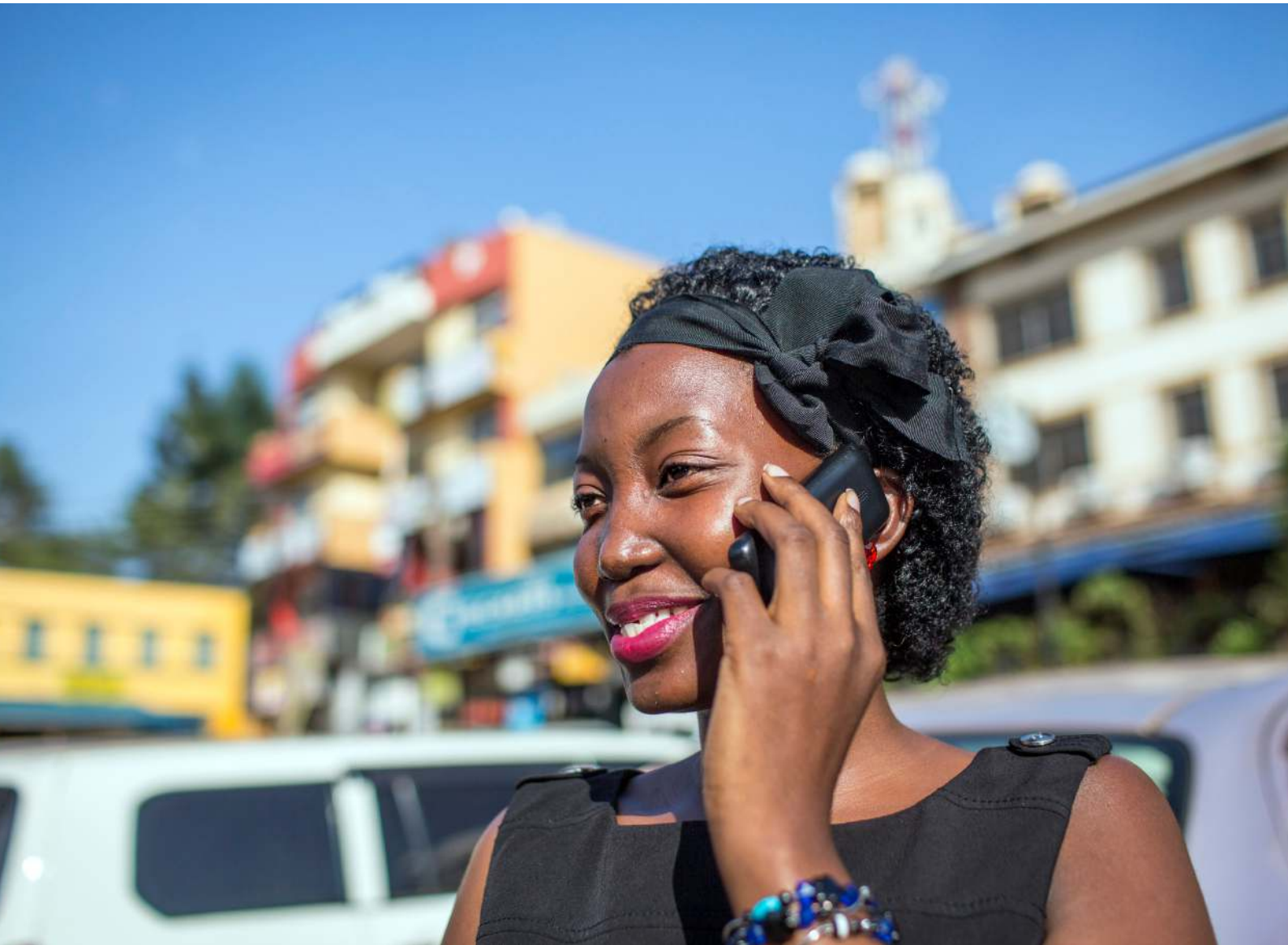
This report outlines the experimentation process, methods of analysis, results and lessons learned from two test cases. The first test case used data mined from social media, namely posts from public Facebook pages and groups, to analyse how influencers and fake news might be shaping discussions among online users in Somalia and to identify trending topics relevant to SDG 16. The second test case analysed public discussions on radio broadcasts to detect instances of rumors and misconceptions, social tensions and testimonials that cause social alarm in Uganda.

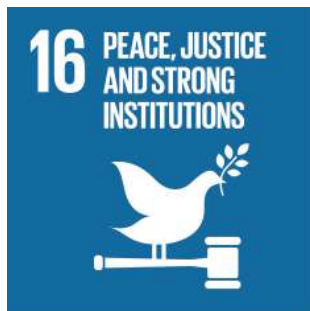
The report also details the functionalities of a new tool, named QataLog, developed by UN Global Pulse to help extract, analyse and visualise data from public social media and radio shows. The tool can be used in different scenarios, including to inform humanitarian and peace efforts.

¹ United Nations Development Programme (2017).

New technologies and new digital applications, if used responsibly, hold tremendous potential to help us achieve the 2030 Agenda for Sustainable Development. More and more compelling examples illustrate the value of technology to improve early warning systems and inform policy and programmatic response. Yet, as adoption of big data and artificial intelligence (AI) increases and technology evolves, so do the potential risks and issues that need to be resolved.

The final section of the report outlines the data privacy, data protection and ethics principles that guide the work with big data and AI at UN Global Pulse, from conceptualization to development of technology and implementation.





ANALYSING PEOPLE'S VOICES TO ACHIEVE PEACE AND SECURITY

The 2030 Agenda states that *'there can be no sustainable development without peace and no peace without sustainable development'*². The definition of SDG16 breaks new ground in articulating and emphasizing the purpose and outcomes of good governance in development. Sustainable development is built on the foundations of a peaceful, just and inclusive society and institutions³.

“

...Preserving peace has become more complicated because of an increase in violence no longer perpetrated exclusively by national security forces and conventional armed oppositions but also by an increasingly wider and assertive range of hybrid actors...their impact is so significant that the violence resulting from these unconventional players exceeds that of many ongoing civil wars and must be added to the role of revolutionary mass movements such as the popular uprisings in the Arab region...”

Conflict Analysis Handbook. A Field and Headquarter Guide to Conflict Assessment⁴.

New types of war, conflict and violence challenge traditional ways of doing analysis to support peace and security efforts. Small data and traditional methods of analysis commonly used with small data are no longer sufficient to respond to these new challenges. We need to strengthen our analytical capacities, use new types of data and develop new methods that can provide more granular, real-time and comprehensive information.

Quantitative and qualitative traditional means for gauging public sentiment, such as surveys, focus group discussions and informant's interviews, often require a great amount of resources and time and as a consequence, people's sentiments might have long changed by the time that insights are actioned by policy makers. In addition, security constraints in conflict or post conflict areas limit the movement of analysts that stay confined in secured locations with reduced capacity to interact with the local population. Also, analysts frequently encounter language barriers in these contexts and have limited capacity to correct the biases introduced by interpreters and translators. All these result in data gaps.

² Transforming our world: the 2030 Agenda for Sustainable Development.

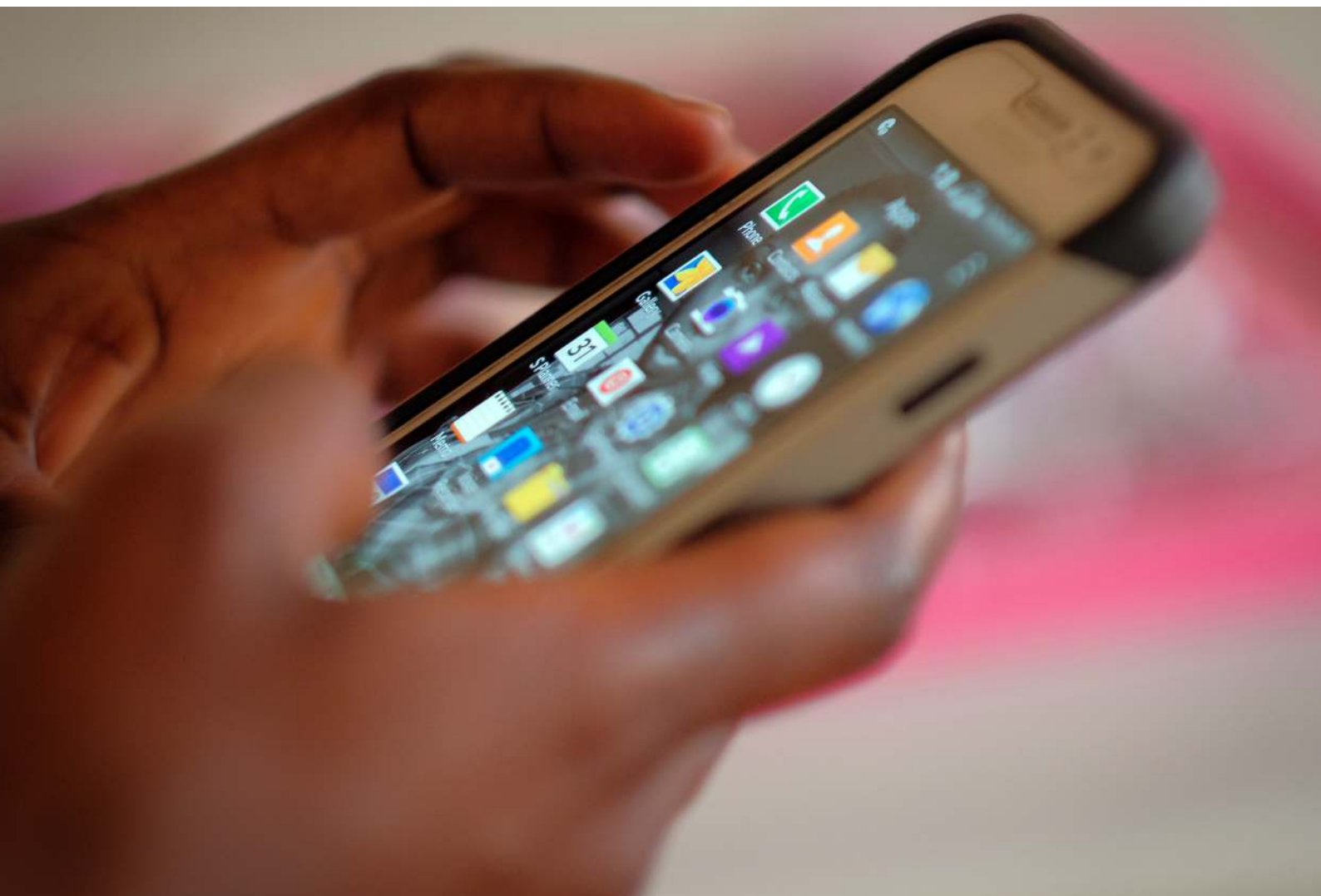
³ United Nations Development Programme (2017).

⁴ F. Oliva and L. Charbonnier (2016).

Effective prevention and conflict mitigation measures rely on timely information to identify trends as they emerge and to monitor contexts as they evolve. Public social media and radio discussions can fill some of these data gaps and supplement official reporting when data quality is insufficient⁵.

UN Global Pulse worked with partners to understand whether data from social media, namely Facebook, and public radio shows (radio remains the most widespread means of communication for most communities across Africa) can provide insights on SDG16.

The following sections present the results of the research process and the lessons learned in the definition of new methods of analysis developed with experimentation in 2 test cases: [mining social media in Somalia](#) and [analysing data from radio broadcasts in Uganda](#).



⁵ Transparency, Accountability and Participation for 2030 Agenda (2017).



TESTING NEW METHODS OF ANALYSIS

EXPERIMENTING WITH SOCIAL MEDIA MINING IN SOMALIA

Social interactions have changed due to the adoption of technology with people worldwide being constantly inter-connected. Media platforms allow actors to reach out, influence and mobilize parts of society at scale in unprecedented ways. A variety of opinion-makers⁶ have emerged and with them, new patterns of social mobilization. In recent years, analysts have witnessed the significant role of social media to drive social movements – during the Arab Spring uprisings and with increasing online recruitment efforts from various extremist groups.

In the private sector, companies use a myriad of social media mining techniques to provide business intelligence⁷ and increase revenue. Specialized companies offer a variety of data mining services to track brand perception, campaign performance and detect market trends. Also, an increasing number of companies are providing analysis of real time information on social media and breaking news alerts to inform financial markets.

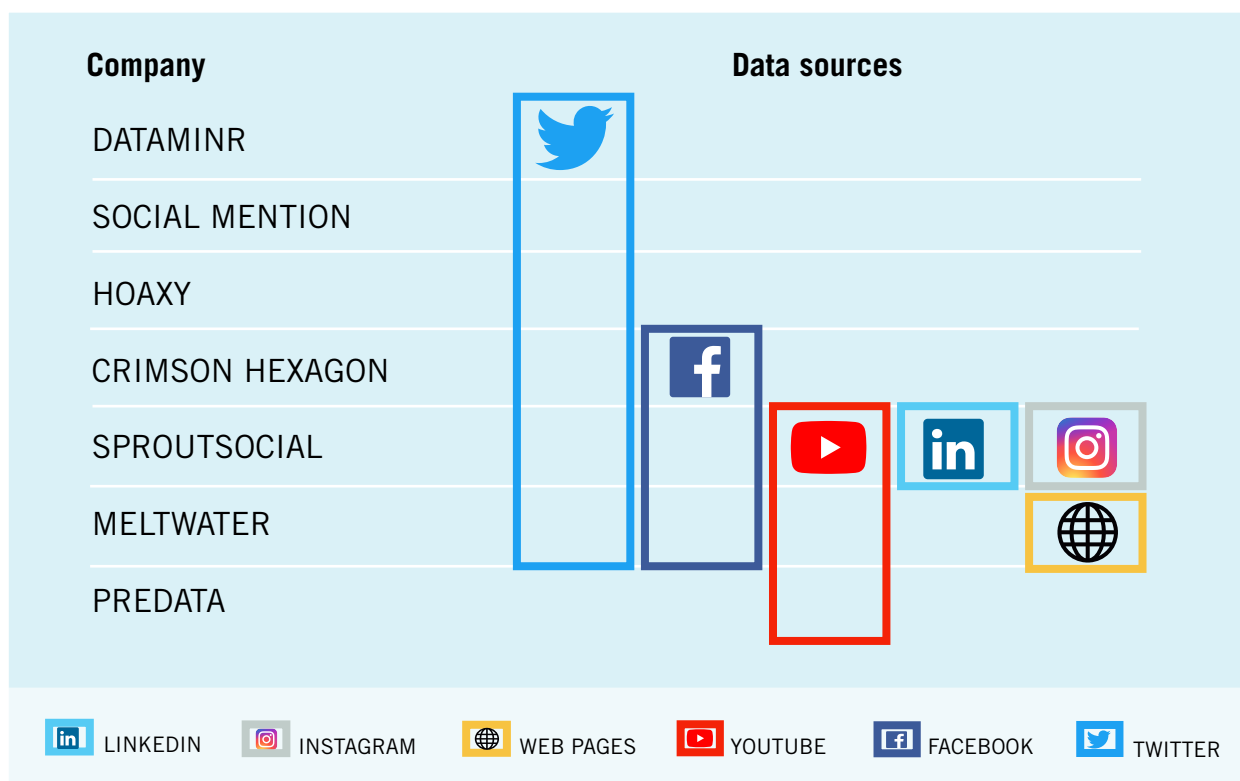


Figure 1. Data mining of social media: Overview of companies, services and data sources. By Pulse Lab Kampala.

⁶ F. Oliva and L. Charbonnier (2016).

⁷ United Nations Global Pulse (2013).



Using techniques similar to those developed by private sector companies, UN Global Pulse experimented analysing social media data from public Facebook groups to understand people's perceptions of various topics related to peace and security issues in Somalia. The experimentation process resulted in the analysis of: [influencers](#), [fake news](#) and [trending topics](#).

Data mining process

The following combination of human and machine-learning processes were implemented:

Development of the software to stream information from public Facebook groups using Facebook's Graph Application Programming Interface (API).



Machine analysis of 2,300 public Facebook groups for analysis conducted with software based on the group or location name and high number of participants.



Manual analysis of additional 200 Facebook groups that were not identified with the software. Groups were selected based on name, location and a high number of participants.



Development of a taxonomy of keywords related to the topic of analysis to filter 3 categories of data identified: a) public posts, b) comments and c) reactions to comments.



Definition of a query of analysis based on the defined taxonomy and defined timeframe of analysis.



Filtering of comments based on the query.



Aggregation of results preserving the anonymity of individuals posting in public forums.



Categorization of filtered posts by gender (based on group name) and other defined categories.



Representativeness and biases

There are an estimated 1.2 million users of Facebook in Somalia (around 8% of the total population⁸). Facebook users are literate and it is expected that the majority of users are male, young and live in urban areas. The analysis results reflect only on the interactions on public social media groups of this portion of the population.

An analysis of the biases of the data was conducted to inform the methods of analysis and the interpretation of the results. The following biases were identified:

- It is expected that the Facebook groups are created by people living in Somalia and by Somali diaspora, but it is not possible to distinguish them.
- It is expected that individuals or groups create more than one Facebook group or an unknown number of fake groups.
- Translators might introduce biases during the translation from Somali to English of public posts.
- Commonly, Facebook posts include emoticons and these are lost during the translation process.
- The machine and manual targeting processes of Facebook groups might leave out an unknown number of groups.
- The analysis conducted did not distinguish between public posts posted by one or different users.

The influencers analysis

“...The group (Al-Shabaab’s) uses Facebook, Twitter, YouTube and websites like alfurqan.net and somalimemo.net, as well as Radio Andalus to spread its rhetoric locally ...”

Countering Al-Shabaab Propaganda and recruitment mechanisms in South Central Somalia⁹.

The radicalization of young people is a source of deep concern for countries around the world, especially regarding the risk of being recruited into terrorist groups. Violent extremism in Africa threatens prospects of achieving the SDGs¹⁰. Social media is a vehicle used by power groups to spread ideologies online and create opinions.

⁸ InternetWorldStats (<https://www.internetworldstats.com/africa.htm>).

⁹ United Nations Assistance Mission in Somalia (2017).

¹⁰ United Nations Development Programme Regional Bureau for Africa (2017).



A social media influencer is a user who reaches a large audience and has a certain credibility for that audience and therefore, has the potential to influence or persuade it. According to research, terrorist groups have systematically used social media platforms to spread propaganda and recruit young people in Africa.

The team explored how data from social media can help identify groups that might be influencing the opinions of other online users. To test the hypothesis, the project used the topic of corruption.

To identify influencers relevant to the topic, the project team first identified all the groups that had posted anything related to the subject matter. Then, the groups were ranked according to the following variables: a) number of posts, b) number of comments posted and c) the number of shares of content posted and the number of followers. As the number of followers is not available through the API, the team excluded this variable.

Results

A total of 114 out of the 2,500 public Facebook groups analysed (from January to December 2017) included content related to corruption.

The top 5 influencers under each variable were news agencies, with only one exception, the *Barcelona fc somalian fans*.

Number of comments



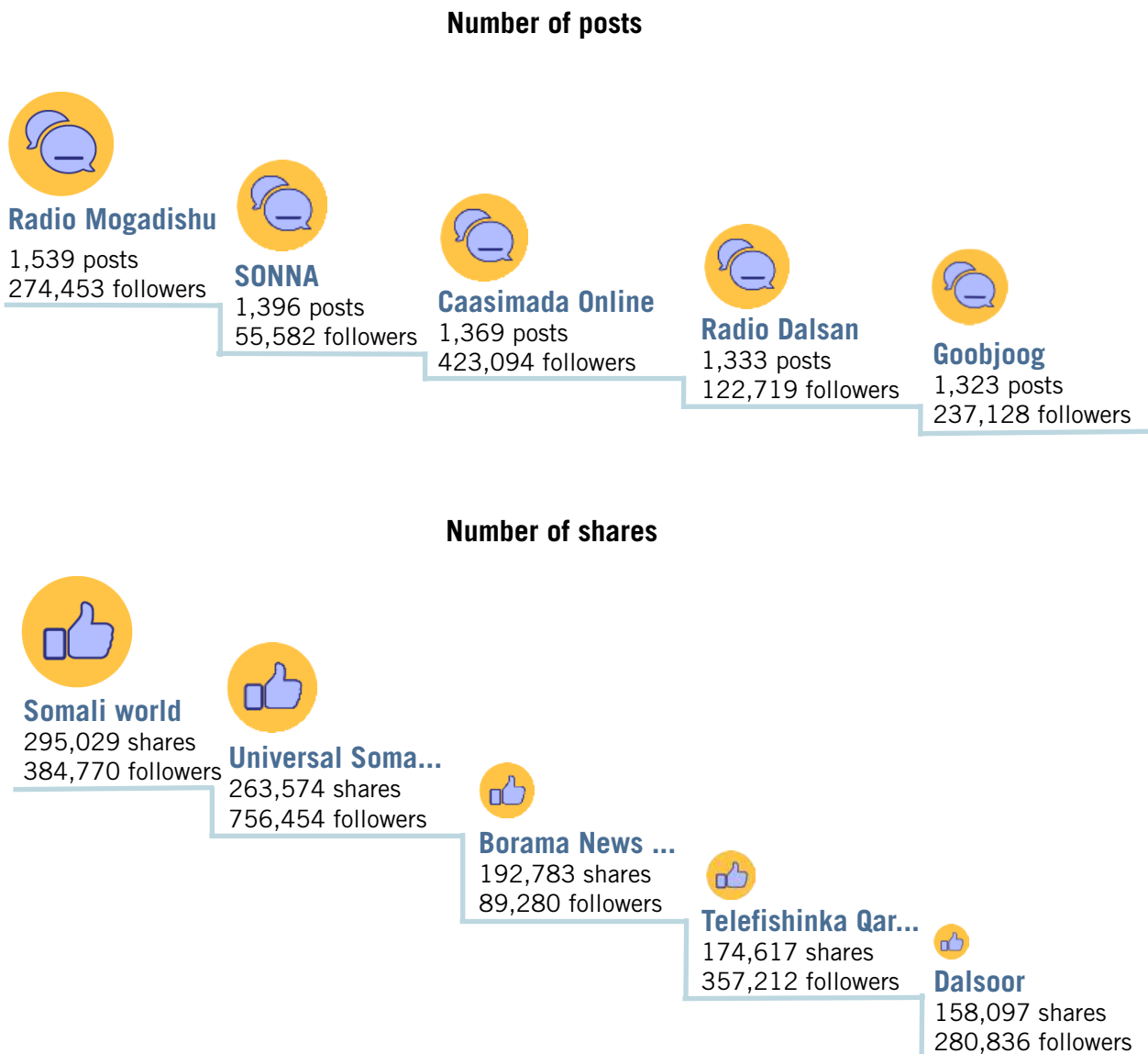


Figure 2. Ranking of public Facebook group influencers on the topic of corruption. By Pulse Lab Kampala.

The analysis of fake news

Fake news can cause social alarm, generate opinions, contradict governmental channels of communication or manipulate people's perceptions of events. The use of fake news at scale can influence electoral results, gear social tensions or mobilize social rage towards a common target with violent acts.



Identifying fake news in real time can support efforts to counter the groups that are disseminating them. In this test case, the project team detected fake news and then identified patterns that can guide the machine-automatic identification of both fake news and the groups that promote them.

Results

The analysis was conducted on the 2,500 Facebook groups for content posted from January 2017 to May 2018.

Patterns in fake Facebook posts

All posts mentioned senior level government officials in the Government of Somalia such as the Prime Minister and line ministers.

All posts were posted up to 20 times from 3-4 different accounts within 1-2 minutes. Most posts contained the words *sir* (secret) and *culus* (big).

All posts were almost 1 page long while non-fake posts are normally brief (a few lines maximum).

Examples of fake news

Translation from Somali: "Today's News 28 November 2017 Big Secret! Who can hide the truth today? Today's Questions: Why did President Mr. Mohamed Abdullahi Farmaajo nominate individuals to the highest office, whose corrupt practices have been exposed and documented by the UN Somalia and Eritrea Monitoring Group."

Patterns in fake Facebook groups

Out of the 100 Facebook groups with more number of posts, 15 groups were fake.

Most used the name of real media outlets (for example Radio Mogadishu, Villa Somalia or SONNA) and popular public figures such as politicians, journalist, bloggers or activists.






The number of followers of some fake groups is significant in comparison to the number of followers of the genuine groups, see example in the next page.

Translation from Somali: "Emirate military barrack (military training academy use to managed by UAE) of Gen. Gordan in Hodan District of Mogadishu has been looted today".



Examples of fake Facebook groups

The team found 15 Facebook groups with the name of the President of Somalia, Mohamed Abdullahi Farmaajo, these are the top 5 in terms of number of followers:

 Maxamed Cabdullaahi Farmaajo 59,141 likes 59,628 followers	 Farmaajo 30,118 likes 30,285 followers
 Madaxweyne 27,182 likes 27,454 followers	 Mohamed abdullahi mohamed farmaajo 15,988 likes 16,375 followers
	 Maxamed C/laahiFarmaajo 3,079 likes 3,133 followers

NOTE: The official Facebook group of the President of Somalia had 344,394 likes and 356,693 followers in May 2018.

While there is no official Facebook group of the former President of Somalia, Sheikh Sharif Sheikh Ahmed, the team found 5 fake groups with his name:

 Sharif Sheikh Ahmed Sharif 69,402 likes 72,069 followers	 Sheikh Sharif 291 likes 295 followers
	 Sheikh Ahmed Official Page 90,602 likes 91,745 followers
 Sheikh Sharif Sheikh Ahmed Ahmed 7,471 likes 7,427 followers	 President Sheikh Sharif Sheikh 5,571 likes 5,559 followers

	Mohamed Abdullahi Farmaajo ✓ 370K like this · Politician Mohamed Abdullahi Mohamed (Farmaajo) is the 9th and current Presi...	
	Mohamed Abdullahi Farmaajo 13K like this · Politician Mohamed Abdullahi Mohamed (Farmaajo) is the 9th and current presid...	

Image 1. Example of genuine and fake Facebook groups. The genuine group has a verification mark next to the group name. By Pulse Lab Kampala.



The analysis of trending topics

“...If we are to counter terrorists’ manipulative messages, we must engage with young people on their terms...”.

Statement of António Guterres, UN Secretary-General¹¹.

Facebook is the most popular social media platform around the world. The number of subscribers in Africa reached 177 million¹² in 2017 and increases exponentially every month because of the increase in mobile phone penetration. A trending topic on social media is a subject that experiences a surge in popularity for a limited duration of time. Private sector conducts analysis of trending topics to understand what holds consumer interest.

The analysis of trending topics among social media users can guide policies to support peace and security efforts. The team developed software to conduct this process automatically.

The software detects terms that are most repeated in a defined timeframe (last 48 hours). To identify them, the software uses an algorithm based on the information retrieval technique, term frequency–inverse document frequency (TF-IDF), to calculate the weight of each word in a text corpus (in this case all public Facebook group discussions within the specified timeframe). The weight is calculated based on 2 dimensions: term frequency (TF) that measures the frequency of a word in the text and the inverse document frequency (IDF) that measures how significant that word is in the text. The software excludes *stop words* that are used to connect words like *the*, *and* or *but* in English and identifies the top 20 most frequent words.

Examples of how the software works

The software identifies trending terms in the last 48 hours, for example: the trending terms in all the Facebook groups selected (2,500) for the 48 hours prior to November 14, 2018 (5:30pm) were: *alpha*, *at the fair*, *ereteriya (name of country)*, *corners*, *communication*, *master*, *wine*, *Radio Mogadishu*, *republic* and *theatre*¹³.

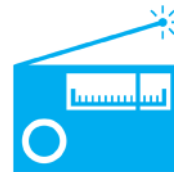
The software identifies terms most associated to keywords selected, for example: we selected *dagaal* as the keyword (that means war) and we did a query to select all posts from the target Facebook groups (2,500) containing the term *dagaal* in 2017. The query results showed 4,225 retrieved posts. Then, the software identified the most frequent terms associated with the word *daagaal* in these posts. These terms were: *mosque*, *shed*, *courage*, *longer*, *agree*, *virtual*, *shere (name of place)*, *financial*, *he is sick*, *moods*, *opposition*, *is enough*, *conference*, *boom*, *book*, *horjeesaty (name)*, *no money* and *proud*¹⁴.

¹¹ Statement delivered at the UN forum “Investing in Youth to Counter Terrorism” (12 April 2018).

¹² InternetWorldStats (<https://www.internetworldstats.com>).

¹³ Translated to English from Somali.

¹⁴ Translated to English from Somali.



EXPERIMENTING WITH RADIO CONTENT ANALYSIS IN UGANDA

“...Radio gives voices to women and men everywhere...”

Irina Bokova, Director-General of UNESCO at the World Radio Day 13, February 2017.

The 2030 Agenda agreed by 193 countries to address challenges of today's world has a central commitment: leaving no-one behind. With technology, unprecedented large volumes of data are now available in real-time to ensure that people's voices are heard, even those who are normally categorized as disconnected from digital devices.

According to United Nations Education Scientific and Cultural Organization (UNESCO)¹⁵, radio is the most reliable and affordable medium of accessing and sharing information in Africa. Radio shows are a channel to influence behavioral change on topics like hygiene, violence against women or AIDS. At the same time, as recent history in Rwanda¹⁶ showed, radio is also used to create opinion and mobilize large population groups.

Three years ago, UN Global Pulse started an experimental programme in Uganda to analyse people's voices from radio broadcasts. The research revealed that analyzing radio data captures testimonials, people's sentiments and reports that are not gathered from other sources¹⁷. This can inform early warning systems to prevent violence, conflict and social tensions from escalating in support of peace and security efforts.

Qualitative information is as valuable as quantitative information in an early warning systems as their ultimate goal is to provide alerts. Unsolicited testimonials expressed on public radio are a valuable source of information showing various dynamics in societies, which can help inform early warning systems.

The test case explored the detection of: [rumors and misconceptions](#), [social tensions](#) and [testimonials that cause social alarm](#).

Data mining process

UN Global Pulse developed a toolkit that uses AI technology to analyse large amounts of information from public radio broadcasts. There are hundreds of hours of content, in the form of raw data, that the toolkit streams everyday. By using convolutional neural networking technology to create Automated Speech Recognition (ASR) toolkits for African languages, these large and unstructured datasets become smaller and more manageable.

¹⁵ World Radio Day 2017.

¹⁶ Radio was used to incite the genocide in Rwanda. Reference: BBC News article: The impact of hate media in Rwanda (<http://news.bbc.co.uk/2/hi/africa/3257748.stm>).

¹⁷ United Nations Global Pulse (2017).



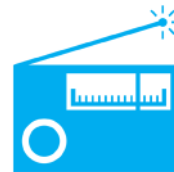
The toolkit includes the following components:

- **Software to filter content out.** Out of 24-hour radio programmes, around 50% consists of music. The software identifies and filters out clips with more than 70% of music content. A second filter is then applied to select audio files from radio programmes relevant for analysis that were targeted manually by an analyst as for example, radio shows with people phoning in.
- **Speech recognition software.** The software transforms speech to text automatically for Luganda and Acholi (vernacular languages of Uganda). Pronunciation dictionaries were created for those languages showing the commonest sequences of sounds people make as they say each word. With the dictionaries and transcribed recordings, acoustic models were built. The acoustic models reflect all the sounds people utter as they talk about topics of interest. The team worked on language modelling, which is an analysis of how different words in the target languages are related. For example, if the word *flood* is uttered, the system determines the probability of the next word, e.g. *destroy*. This needs to be done to help the system identify keywords of interest based on the context of the words being said in the same sentence¹⁸.
- **Keyword spotter software *Spock*.** A new system for speech recognition was developed with deep learning methods to identify keywords. The system requires less transcribed speech recordings as the software learns words in the new language instead of the entire dictionary. The advantage of this software is that the deployment for new languages is much faster than the previous version. The disadvantage is that the accuracy is lower as the system can no longer search for a set of keywords, nor rely on the context to ensure the right word has been identified.
- ***Goldie* software.** The software distributes the computing resources so that they are used for the most relevant radio content targeted in the ranking of radio content. An interface allows analysts to identify, tag and translate audio clips.

To facilitate the data mining process, the team at the Lab mapped out the programmes of 92 radio stations. It is estimated that there are 292¹⁹ operational FM radio stations in Uganda, which means that the team analysed the content of one third of them. The team organized them in the following categories:

¹⁸ John Quinn, Artificial Intelligence advisor at UN Global Pulse.

¹⁹ Uganda Communications Commission (UCC).



- *Gold list* includes programmes with grassroots discussions and public participating by phoning the radio studio.
- *Silver list* includes programmes with radio studio discussions with grassroots, local/national/ regional officials and public participating by phoning the studio.
- *Bronze list* includes programmes of news reports.
- *Black list* includes programmes on sports, celebrity gossip, strictly musical shows or similar.

To reduce the amount of data to be processed and increase the speed and accuracy of the final results, radio programmes in the *Bronze* and *Black* lists were excluded from analysis using machine filtering.

Representativeness and biases

The team estimated that every day, an average of 20,000 to 25,000²⁰ people voice their opinions and share reports on radio shows in Uganda. It is presumed that people who participate in radio shows are outspoken members of society, who can afford airtime for a local call, and that the majority of these people are men.

An analysis of the biases of the data was conducted to inform the methods of analysis and the interpretation of the results. The following biases were identified in the data:

- The accuracy of the transcription software is not 100%. As a result, relevant content might be missed out.
- Intermittent or weak radio signal might reduce the accuracy of the transcription software.
- Radio call-in shows might be sponsored by international assistance, NGOs, or government, which might introduce a bias in the selection of public opinions to be aired.
- While radio presenters moderate public discussions, it is expected that their personal agendas might influence the public discourse.
- The translation process into English might introduce interpretation of the public discourse.

²⁰ Estimation by Pulse Lab Kampala/UN Global Pulse based on analysis of radio content in a sample size of 92 radio stations (2017).



Results

To foster peaceful, just and inclusive societies which are free from fear and violence, we need to better identify changes in the behavior of population groups that might pose a threat to others in time. The proposed method is to use qualitative reports from public radio discussions to feed early warning systems in near real time. The type of content identified as valuable to feed these systems was categorized under the following categories: [rumors and misconceptions](#), [social tensions](#) and [testimonials that can cause social alarm](#).

Detecting rumors and misconceptions

Many challenges for sustainable peace are the result of collective reactions powered by rumors and misconceptions. Social tensions can rise as a result of rumors that spark them, and early identification is essential to be able to effectively address them. These are some examples:



A community leader (Northern Region, September 2017) explained on radio: *"...now you notice that there is increased murder in Uganda especially of women... So, all of the refugees have run into Uganda. Uganda has opened all its borders just for anyone to come in. For this reason, we do not know the people that we are living with in our surroundings. If you look at this tribe X (name of a South Sudanese tribe), their population is way beyond already in Uganda. At this moment, this is a security threat to all of us..."*.

A listener (Central region, September 2017) explained: *"...I was actually tempted to think that the source of the anthrax outbreak in West Nile was due to the animals that entered our country (to refugee settlements) without being screened..."*.

A government official (Central Region, September 2017) said:

"...now South Sudan, there is a war and you see that many refugee seekers come here in Uganda. And when every person walks, he walks with his diseases and problems...and you see that puts us on alert. Now we also see, that there are some districts which have not immunized... now reports show us that we have almost 200,000 children who are not immunized. Now, if those children stay there when they have not been immunized they became dangerous to others. It can be the source of the disease spreading to other areas...".

A listener explained (West Nile, October 2017) to the audience: *"...It may not have been refugees, but we are already seeing stock out of ARVs, of recent we also saw stock out of anti TB drugs... we are even so scared that whether the government will be able to meet the cost or buy more of these ARVs for the refugees..."*.



Detecting social tensions

Social tensions usually have long-term historical, cultural or religious roots and build up over time. Sudden changes in contexts affecting societies might spark these tensions and also create new ones that will again leave a print in the collective memory. Identifying emerging social tensions and the circumstances that spark them is critical to respond promptly.



A community leader (Central Region, July 2016) explained: *“... over 300 Ugandans have been able to run from the country of South Sudan after an internal war erupt again inside that country... the leaders in the parts of Moyo also expressed worry because of the illegal guns that are continually being brought into their region and the all country as well...it led to the residents especially the Madi to come out and complain to the security, showing that there are guns that enter in their regions in unlawfully ways...”*.

A radio presenter (West Nile, December 2017) explained: *“...leaders in Arua district are appealing to the various institutions like the church schools and the individuals to partner with the government to restore the environment that has been destroyed by the presence of refugee in the district. The refugees who have settled in West Nile and northern region negatively contributed to the destruction of trees and road network...”*.

A community leader (Northern Uganda, September 2017) expressed: *“...now if we are to ask ourselves, what could be the reason for insecurity within the country? You are going to find out that Uganda has become a regional hub for thugs and all the thieves within the region...”*.

Two radio presenters (m) (Northern Uganda, September 2017) discussed: *“...(m1) when refugees are coming, we should be assured that there could be other risks that result from their coming as refugees. (m1): Yes, we have for examples of diseases. (m2): Not only that, you know that these refugees come with their culture and this culture is not in Uganda here and you are aware that in South Sudan, these people have guns and the whole community too. (m1) So, they are familiar with the gun. (m2) Yes, for that reason we fear that they will enter with their guns into Uganda...”*.



Detecting reports that can cause social alarm

Individual testimonies can cause social alarm when they touch upon underlying structural issues affecting societies in a negative way. Collective reactions to alarming testimonials might occur in a peaceful way or with violence.

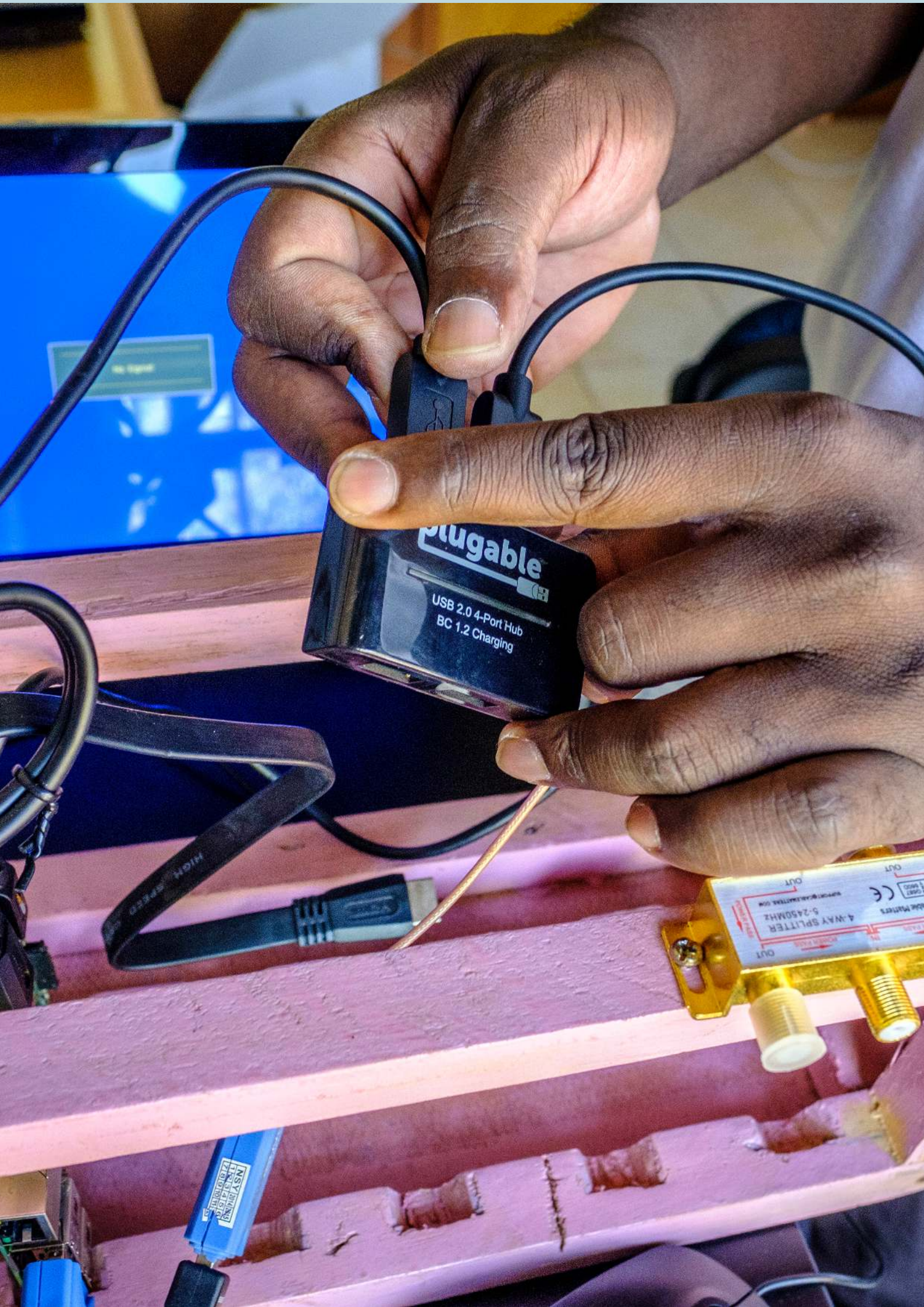


A listener (West Nile, November 2017) shared with the audience: *"...she delivered...and she recognized the sex of that baby, a baby girl...how comes that you people bring a dead boy? I need my daughter. Then from there shortly that doctor explained to her that now if you want me to go and look for that baby, give me 20,000 (Ugandan Shillings), so that I am in position to go and look for your baby. The woman said she is a refugee-she can't afford 20,000 (Ugandan Shillings)-where will she get that money from? She started to cry..."*.

An official explained (West Nile, November 2017): *"...3 men, calling themselves (XYZ names) had come to recruit clandestinely the youth by promising them jobs, money, all that.... the man arrested confessed to recruiting youth to participate in rebel activities in South Sudan... Two of the youths gave in their statement, confessing that truly they escaped from that training ground..."*.

A radio presenter informed (West Nile, October 2017): *"...number of refugees now in Imvepi refugee camp is around 133,000. X(name) who is the field officer for Arua said that the reason why this is happening is because more names than people are being written (registered)..."*.

A listener (p) and a community leader (Lo) (West Nile, October 2017) explained: *"... (p) - In the past, level one registration was done at collection points, which promoted a malpractice of one person registering many times levying burden on the Aid Agencies...(Lo): We are trying to help each other with Office of the Prime Minister and government to make sure the systems are well established to address double registration here..."*.





DEVELOPING A NEW GENERATION OF ANALYSIS TOOLS: QATALOG

UN Global Pulse developed a data mining tool that UN personnel and partners can use to inform development, humanitarian and peace efforts, called QataLog. The tool allows users to extract, analyse, and visualize data from social media and radio broadcasts. The interface is built using D3, a JavaScript visualization library and database management tool. QataLog stands for:

Functionalities

Q	Query	Users define the parameters for the extraction of public content for analysis. Elements of the query include: timeframe of analysis and keywords. To facilitate the selection of keywords on social media, trending terms are identified automatically. Also, terms mostly associated with the keywords selected are automatically identified.
A	Assign	Users can work in groups and assign tasks or content to be analysed by team members.
T	Tag	Users define their own tags and use them to organize the content in categories to facilitate the analysis.
A	Analyze	Users access raw data that has the parameters selected. To facilitate analysis, the following functionalities are available: a) through an integration with Google Translate, rough text translations are automatically generated for social media content; b) automatic geotagging of social media posts assigning a location tag to posts containing place names is done automatically; c) raw data extracted for analysis can be transferred to a spreadsheet and d) basic visualization of analysis results (volume and trends over time) is available.

Limitations

Data mining applied to low-resource languages presents a challenge and affects the accuracy of the analysis tool. In some cases, false matches are identified during the mining process. For example, *refugee* in Acholi is translated as *luring ayela*, the literal meaning of which is *runners of problems*. As a result, discussions about athletes and problems in general are selected with the English keyword *refugee*. Another example is the term HIV/AIDS that is translated in Lugbara as *two jonyo*, that is literally translated as *slimming disease*²¹. As a result, conversations about disease or slimming in general are selected automatically. To correct this bias, manual analysis is required to identify false matches.












²¹ John Quinn, Artificial Intelligence advisor at UN Global Pulse.



















Benefits analysis

QataLog allows users to conduct analysis of big data from social media and radio content at a large scale to inform humanitarian and peace efforts, among others. The exciting aspect is that it captures people’s voices from places where traditionally very sporadic and unreliable data is collected at a lower cost than other means of doing analysis

BENEFITS OF QATALOG FOR RADIO AND SOCIAL MEDIA

TOOL		NO TOOL
TARGETING RADIO CONTENT		
 <p>An analyst automatically targets all relevant content on a given topic from unlimited stations</p>		 <p>An analyst manually listens to radio stations to extract relevant content on a given topic</p>
FILTERING OUT MUSIC CONTENT		
 <p>Music on the radio is automatically filtered out</p>		 <p>It is not possible to filter out music on the radio</p>
MULTIPLE RADIO STATION ANALYSIS		
 <p>An analyst can analyse more than 10 radio stations in real-time</p>		 <p>An analyst can analyse a maximum of 1 radio station in real-time</p>
REAL TIME TRANSCRIPTION OF CONTENT		
 <p>Easier, faster and more reliable transcriptions</p>		 <p>Transcription is limited because the analyst has to rely on note-taking and memorisation</p>
ACCESS TO RADIO BROADCAST		
 <p>Radio broadcasts can be accessed from remote locations</p>		 <p>Analysts have to physically be in the same location as the radio station</p>

TOOL	f	NO TOOL
ANALYSIS OF FACEBOOK GROUPS		
 <p>An unlimited number of groups are analysed daily</p>		 <p>A limit of 20 to 30 groups are analysed daily</p>
GEOLOCATION OF POST		
 <p>An unlimited number of posts are geolocated daily</p>		 <p>A limit of 20 to 30 posts are geolocated daily</p>
TRANSLATION FROM SOMALI TO ENGLISH		
 <p>One single click is required to translate the text</p>		 <p>Open up GoogleTranslate from the browser, copy and paste the source text for translation</p>
FACEBOOK COMMENTS		
 <p>One click is needed to download an unlimited number of Facebook comments to a spreadsheet</p>		 <p>Each Facebook comment must be individually copied and pasted into a spreadsheet</p>
ANALYSIS OF TRENDING TOPICS		
 <p>Feeds with reoccurring words within the last 48 hours suggests trending topics</p>		 <p>Posts are selected manually. Reoccurring hashtags, likes and replies suggests trending topics</p>
ANALYSIS OF TRENDS		
 <p>500 messages are selected and tagged per day</p>		 <p>50 messages are selected and tagged manually per day</p>
STATISTICS ON SELECTED MESSAGES		
 <p>Automatically counts total tagged messages per day</p>		 <p>Manually counts up to 50 tagged messages per day</p>
TARGETING COMMENTS		
 <p>Automatic targeting of posts and comments containing keywords</p>		 <p>Manual search of keywords using the facebook search function & comments reviewed one at a time</p>



INTRODUCING ETHICS TO ANALYSE PEOPLE'S VOICES

New technologies and new methods of analysis pose challenges to policy, legal frameworks and ethics. The UN Secretary-General's Strategy on New Technologies calls for overcoming these challenges and reconciling interest on ethics to use frontier technologies.

Although privacy norms have been long established to protect personal data from misuse and ensure individual privacy in the digital world, ethics has become an additional tool in AI applications used to protect fundamental human rights.

A recent example in which ethics was included in the United Nations (UN) policy is the *Guidance Note on Big Data for the achievement of the 2030 Agenda*²² adopted by the UN Development Group. The note, which UN Global Pulse helped develop, contains a set of principles to ensure that data ethics is included as part of standard operating procedures for data governance.

UN Global Pulse also builds ethical considerations into its data practices by conducting a *risks, harms, and benefits assessment*, which helps identify anticipated or actual ethical and human rights issues that may occur during a data innovation project. The assessment considers the proportionality of potential benefits compared to risks of harm from data use. If the risks outweigh the benefits, the project does not proceed.

To conduct the analysis of public Facebook and radio content, the team applied the following data privacy principles:

Objective of the analysis

A common concern from stakeholders is the potential misuse of data and tools. UN Global Pulse applies a *Purpose of Use* principle to all its projects: *we access, analyse or otherwise use data for the purposes consistent with the United Nations mandate and in furtherance of the Sustainable Development Goals.*

To protect from risks and harms that can occur to individuals and groups, UN Global Pulse applies the principle of *Data Security*: *we ensure reasonable and appropriate technical and organizational safeguards are in place to prevent unauthorized disclosure or breach of data.*

Informed consent

A common question from partners is whether the analysis conducted on Facebook is done on personal pages or if people calling into talk shows have given consent for their opinions to be analysed.

²² United Nations Development Group (2017).



When users create a group on Facebook, they can choose between 3 privacy settings: public, closed or secret. Public groups are visible to everyone and people who join that group agree to the chosen privacy setting. In the case of public radio talk shows, these conversations are public. UN Global Pulse applies the *Right to Use* principle: *we access, analyze or otherwise use data that has been obtained by lawful and fair means, including, where appropriate, with the knowledge or consent of the individual whose data is used.*

Anonymity and re-identification

In some cases, the identity of people expressing opinions on public social media or radio could be identified via voice or names mentioned. To ensure that this does not happen, the data we use is anonymised to the extent possible. UN Global Pulse also applies the principle of *Individual Privacy*: *we do not access, analyse or otherwise use the content of private communications without the knowledge or proper consent of the individual. We do not knowingly or purposefully access, analyse, or otherwise use personal data, which was shared by an individual with a reasonable expectation of privacy without the knowledge or consent of the individual. We do not attempt to knowingly and purposefully re-identify de-identified data and we make all reasonable efforts to prevent any unlawful and unjustified re-identification.*



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