RESEARCH ARTICLE

Technology for Peacebuilding[1]

Anne Kahl* and Helena Puig Larrauri†

New technologies are changing how and when we learn about events and choose to respond to them. Mobile phones and the internet have altered how we engage with the world. With technology usage expanding rapidly in the developing world, new avenues of participation, engagement, and accountability are emerging. Globally, more people now have the opportunity to actively make use of these tools to participate in processes that impact their societies. This opportunity for participation is also an opportunity for engaging in new ways with peacebuilding processes. As the field of technology for peacebuilding grows, most attention has been paid to the potential of new technologies for bridging the gap between warning and response. Whilst the focus on the use of technology for early warning and response is important, there is more to this growing field. The empowerment of people to participate in localized conflict management efforts is one of the most significant innovations and opportunities created by new technologies. Technology can contribute to peacebuilding processes by offering tools that foster collaboration, transform attitudes, and give a stronger voice to communities. This article aims to give practitioners two related frameworks to understand how new technologies can enhance peacebuilding. The first section looks at the functions that technology can have in a peacebuilding program as a tool for data processing, communication, engagement, and gaming. We then examine the program areas that new technologies can best contribute to, covering early warning/early response systems, programs that allow citizens to voice their opinions and experiences, collaboration efforts, and programs aimed at transforming attitudes.

New technologies are changing how and when we learn about events and choose to respond to them. Mobile phones and the internet have altered how we engage with the world. With technology usage expanding rapidly in the developing world, new avenues of participation, engagement, and accountability are emerging. Globally, more people now have the opportunity to actively participate and make use of these tools to impact processes that affect their societies.

* Programme Specialist (Conflict Prevention), UNDP, USA
  anne.kahl@undp.org

† Co-founder, YoLab, USA
  hpuiglarrauri@gmail.com

This opportunity for participation is also an opportunity for engaging in new ways with peacebuilding processes. We have chosen to define peacebuilding as the process of transforming conflict dynamics by influencing behavior and attitudes through inclusive dialogue and interaction. Minimizing the risk of an outbreak of violent conflict requires a mix of operational, structural, and systemic measures that seek to build national capacities to manage, prevent, and address conflicts and their underlying dynamics and root causes (Lederach 1997; Kumar & de la Haye 2011). Key features of technology, both new and older, promise to make efforts in peacebuilding more effective.

As the field of technology for peacebuilding grows, most attention has been paid to

the potential of new technologies for bridging the gap between warning and response (Mancini 2013: iv). In initiatives aiming to prevent the outbreak or escalation of violent conflict, new technologies can allow people to report and react more rapidly. Citizens can also use technology tools to engage and connect at the local level to mitigate conflict or call upon decision-makers at regional and national levels if larger interventions are required to sustain peace.

Whilst the focus on the use of technology for early warning and response is important, there is more to this growing field. The empowerment of people to participate in localized conflict management efforts is one of the most significant innovations and opportunities created by new technologies. Technology can contribute to peacebuilding processes by offering tools that foster collaboration, transform attitudes, and give a stronger voice to communities. In order to better understand how new technologies can contribute to peacebuilding, it is useful to clarify the functions that new technologies can perform in conflict prevention and peacebuilding projects that go beyond early warning and response programs.

In exploring the application of technology to peacebuilding, it is important to keep in mind that technologies are *not* neutral. The Do No Harm framework (CSC 2012) provides a useful guide for practitioners to assess the risks of introducing technology into peacebuilding programing. As *enablers and connectors,* technologies can be used as important transformative tools for enhancing sustainable human development and preventing violent conflict. But technologies can also become *dividers* in a conflict context. Each initiative should undertake its own context-specific 'do no harm' assessment, but here are the main issues to watch out for in our view:

1. *The bias of connectivity*: Technology tools are often seen as a means for reaching out to more people, but not everyone has equal access to all types of technology. Practitioners must assess whether some groups are more able than others to access and use a given technology. For example, in many countries certain technologies are used more by those who are young, urban, and better off economically. More importantly, practitioners must keep in mind whether access to certain technologies can be manipulated, particularly in repressive political contexts.

2. *Designing for empowerment*: Some uses of technology can render participation meaningless to those most affected by conflict. Practitioners should analyze whether the introduction of information and communication technologies (ICTs) fosters positive action from all groups and people, or promotes some groups over others. Further, practitioners should assure that the design of a technology-enabled intervention does not foster passivity ('clicktivism') over active engagement from any group. Sending in information but receiving no feedback, clicking a 'like' button but not changing attitudes, discussing an issue online but failing to take action offline – are all examples of passivity resulting from technology use. Similarly, practitioners must also assess whether the introduction of ICTs could create unrealistic expectations.

3. *Ethics, privacy, and security*: Exchanges of information over the internet and over mobile phones are easy to track. Practitioners must assess the extent to which the ICTs they use are secure and private. More importantly, practitioners have an ethical responsibility to ensure that people are aware of the risks they take in sharing information over a particular technology.

With these issues and restrictions in mind, this article aims to provide practitioners

with two related frameworks that will help them understand how new technologies can enhance peacebuilding. The first section looks at the functions that technology can have in a peacebuilding program, as a tool for data processing, communication, engagement, and Gaming. We then examine the program areas that new technologies can best contribute to, covering early warning/early response, participation in dialogue, collaboration and attitude transformation.

Each section provides an analytic framework supported by examples from the field, but does not elaborate on any case study in detail. The emphasis is on providing an overview to inspire practitioners entering the field of technology for peacebuilding and help them navigate their options. By offering two ways of understanding how new technologies can be used, we hope to contribute to ongoing growth, development, and collaboration in this field.

How can technology contribute to peacebuilding?

Peacebuilding practitioners who begin to think about possible uses of technology are often overwhelmed by the options. We propose a simple taxonomy of functions that new technologies can have in peacebuilding.

1. Data processing: improving data collection, organization, and analysis processes
2. Communications: providing new avenues for sharing information and stories
3. Gaming: introducing elements of gaming that can provide alternative incentives for action
4. Engagement: creating new ways for people to influence or take action in their communities

Data Processing
There are many new technologies that can assist with collecting, organizing, and analyzing data relevant to a conflict context.

Much attention has been focused on crisis mapping initiatives, particularly projects that deployed the Ushahidi[2] platform to collect and map data. A number of other tools for mapping data have also been developed recently, including Google Crisis Map,[3] CaerusGEO,[4] and MapsData.[5] Emphasis on mapping has sometimes eclipsed other useful data processing software that allow practitioners to collect data via SMS (FrontlineSMS[6]) or smartphones (Magpi,[7] KoBoToolbox[8]), to capture social media data (Geofedia[9]), or to process vast amounts of data, often referred to as 'big data' (AIDR[10]). Many of these tools are free, open source, and increasingly user friendly.

The most evident application of these tools is to help collect better data for conflict early warning systems. A number of recent initiatives have used a combination of SMS data collection and mapping tools to crowdsource information on conflict incidents at times of increased tensions. For example, Egypt's U-Shahid[11] project received information from the public on events during the 2010 Egyptian elections (Meier 2011). Public crowdsourcing is fraught with logistical and ethical challenges, so other projects have used similar tech tools for targeted data collection (or 'crowdseeding') (Martin-Shields 2013). For example, Voix des Kivus[12] in eastern Democratic Republic of Congo used SMS reporting from a network of trusted informants to produce maps of conflict incidents for the humanitarian community. Another flavor of crowdsourcing focuses on the collation of data from both social media and traditional media. Although there are a growing number of tools to automate or semi-automate this process of social media monitoring, one of the earliest uses in a conflict context (the Libya Crisis Map[13]) used hundreds of volunteers to manually collate, clean, and code data from social media at the start of the Libyan crisis.

When digital datasets (including social media data) become very large and require some form of automated collection or pro-

cessing, they are often referred to as 'Big Data.' Big Data requires a different set of tools, typically proprietary and requiring greater technical expertise than crowdsourcing. One way that Big Data can contribute to peacebuilding is by providing a source of information on how people are feeling about a particular topic. UN Global Pulse[14] has piloted a project to analyze perceptions about food and fuel prices expressed on Twitter in Indonesia; CrimsonHexagon[15] has undertaken similar work on sentiment towards electoral issues in Egypt. Although the potential for Big Data in peacebuilding has been explored in these and other pilot projects and in theoretical reviews (Mancini 2013: 4), there are few examples where it has been perused. It has been proposed that Big Data has the potential to serve conflict prevention in three distinct functions: descriptive, predictive, and diagnostic. However, these functions are at very different levels in terms of practice development and further research is needed in order to establish and act upon accurate and reliable prediction and diagnostics of conflict (Mancini 2013: 26). Critics have also pointed out that uses of Big Data are subject to biases and blind spots, and that few robust causal links can be drawn from correlations in big data (Crawford 2013).

Crowdsourcing and Big Data receive a great deal of attention because they provide new information for early warning systems. Previously it was not possible to utilize data from these sources; either the data existed but were too costly to collate, or the technology tools used give voice to a certain population was not yet available to that group. However, an equally important function of data processing with new technology is the ability to aggregate and publish disparate data sources at a lower cost. The UNDP's Crisis Recovery Mapping and Analysis[16] (CRMA) project is a prime example of this approach. The project's hybrid use of analog and digital technologies also provides a useful model for overcoming the digital divide (Mancini 2013: 71). Equally important are uses of new

technologies to digitize traditional data collection processes; MercyCorps has undertaken such a project with its Libya Protection Mapping System.[17] In short, often the best thing that new technologies can offer peacebuilding practitioners is an opportunity to re-engineer existing data information gathering processes, digitize collected data, and produce better analyses by comparing data that was previously held in silos.

It is tempting to over-emphasize the function that new technology can play in collecting data, forgetting that cleaning up and analyzing this data is equally important for peacebuilding. From simple map visualizations, summary tables, and cross-tabs, through to spatial-correlations and regressions, there are also a growing number of tools that peacebuilding practitioners can use to interpret collected data. Although many analysis tools are only available to data scientists, there are nonetheless a growing number of tools that non-technical teams can use to draw some conclusions from their data. For example, Google Fusion Tables gives non-technical teams the ability to quickly generate summary tables, graphs, point maps,[18] and heat maps[19] of their data. Although no statistically robust conclusions can be drawn from this type of data exploration, it does enable a dynamic appraisal of the questions that the data raise and what a team should look into. A similar result can be achieved by creatively using the Ushahidi map interface and combining it with simple data analysis of reports downloaded into a spreadsheet. This is the approach that MercyCorp's Iraq team has taken with regard to data they collect on disputes from a network of Iraqi mediators.[20]

Early warning and early response initiatives are the most obvious areas where the data processing function of new technologies can be applied. However, the same tools and techniques can be extended to the documentation of conflict incidents for advocacy purposes. The Satellite Sentinel Project,[21] for example, collects and analyzes satellite imagery of Sudan to document evidence of

alleged atrocities. Syria Tracker[22] documents human rights violations in Syria via reports received from the public.

Finally, most uses of technology for data processing ignore the effects of their intervention on governance and empowerment. Although technology enables better inputs from communities, data is collected and analyzed for policy making that is done away from communities. Some initiatives have begun to understand that tech-enabled data processes can serve not only to warn of future violence and inform policy, but also To promote resilience to conflict, empowering communities to resist violence and start a local dialogue about peace. In Sudan, for example, the UNDP's CRMA project has found that the process of data collection fostered an open dialogue at the local level. Participatory mapping has become a key tool for communities to engage with local post-conflict recovery (Indreboe Alshaikh 2012: 7).

Communication

There is a growing body of research on the function of digital media as an avenue for creating and sharing alternative discourses and promoting social change. Using digital media to alter a prevailing narrative can play an important role in transforming attitudes. In his exploration of the role of digital media in the Arab Spring, Moran Barkai explains that social change movements have always subversively used the latest media tools to spread alternative discourses. He goes on to highlight how the use of digital media was critical to the process of democratic transformation throughout the Arab Spring (2012).

This process of creating alternative versions of a situation is equally applicable to peacebuilding. Michel Foucault wrote about how society creates a 'game of truth', a certain set of truths that we think is our reality. It engulfs not just the concepts we need to operate in day-to-day life (this pen is green - and we all agree that it is, so we can refer to it as such), but also a certain way of seeing ourselves (Fornet-Betancourt *et al.* 1987). Conflict is the ultimate game of truths, a game of positions that solidifies our subjectivities to the point that we are willing to kill for it. What we do in peacebuilding is to create opportunities for two groups (tribes, communities, etc.) to step out of the game they are in and to create an alternative discourse that makes it possible to build peace (Lederach 1997).

Concretely, we can think of three roles for digital media in fostering alternative discourses. First, digital media can help incorporate more voices into the public domain by offering tools for collaborative media creation. The simplest and most prevalent tools are blogs and wikis used by activists and communities to challenge official narratives. For example, Piggipedia[23] is a wiki run by Egyptian activists to report cases of abuse by the police and the military. Other more complex tools that combine different types of media are also available. For example, MapStory[24] provides online tools and an online community dedicated to empowering people to tell stories about their societies using mapped data. MapStory is premised on the idea that a community has information that they want to make available (in an attractive way) to the public in order to put forth a different version of the 'story.'

Digital media can also be used create a sense of community around the creation of an alternative story. For example, #18daysinegypt[25] is a collaborative documentary project that invites people to share their story of the Egyptian revolution in order to record its history in a community-driven manner.

By bringing in new voices, digital media often (though not always) fulfill a second function: putting out messages that differ from the official (state-sanctioned or socially-normative) narrative. In situations where pro-war or otherwise divisive rhetoric is commonplace, messages that challenge this perspective and instead promote peace can have a powerful impact on a peacebuilding process (Corlazzoli 2013; CGCS 2013). A successful example of this kind of challenge to divisive rhetoric is The Peace Factory.[26] Started by an Israeli graphic designer

with a Facebook post, the Peace Factory first encouraged people to post a simple message of love from Israelis to Iranians and *vice versa*. The campaign quickly expanded to other conflicted pairs (Palestine-Israel, Morocco-Iran, Pakistan-Israel, America-Iran, etc.). The Peace Factory has taken some of the online posts out into the 'real' world, posting copies of these Facebook messages on the sides of buses in Israel.

In challenging prevailing discourses with messages of peace, digital media can serve a third purpose: providing new, creative ways to challenge notions of identity. When a certain type of identity is linked to the conflict dynamic, this can have very positive effects on the peacebuilding process (Hicks 2011). Sometimes it can be as simple as showing the diversity within a group. For example, the organization Search For Common Ground ran a video competition that asked Lebanese youth to 'Shoot [their] Identity'[27]; videos showcasing a diversity of experiences in Lebanon were posted online, with a prize awarded to the best video. In South Africa, Umuzi Photo Club[28] works in under-resourced communities, teaching young people to produce art (mostly photographs) about their environment. Their focus is not simply on sharing the story of a community, but also on the transformative process of producing art and its effect on the young photographers. For example, Umuzi ran an 'I am an Activist' campaign to encourage young people to identify with positive social change. India's 'I Paid a Bribe'[29] campaign takes a similar approach, encouraging people both to report on instances when they paid a bribe (to record this hidden story) and to register as 'Bribe Fighters', thus creating a positive narrative around grassroots opposition to corruption.

Gaming

In a report on the emerging field of mobile and pervasive games for civic change, researchers writing for the International Journal of Learning and Media posit that,

'Games are a form of media that do less to structure facts, and more to structure and shape the player's experience and identity' (Ruiz *et al.* 2012). Other researchers working in policy and social psychology have identified the power of games as a tool for (positive) behavioral change (Bogost 2007; Cummings 2012). In fact, the use of games to encourage healthier behaviors,[30] safer habits,[31] more exercise[32] and a plethora of other positive behaviors is growing. Drawing from this growing practice, we propose three ways in which games can contribute to peacebuilding.

First, games can be designed to challenge attitudes that are damaging to a peaceful society. The Sambaza Peace Game[33] is a digital and mobile game that teaches young people the attitudes needed for non-violent, harmonious living through cartoon scenarios. Other games build on the real actions of people in the world to reveal a new reality through the game. For example, Slavery Footprint[34] offers a survey where individuals report their consumption habits and are told how many slaves have worked to produce these goods. The game then offers a set of actions that people can take to reduce unethical consumption and encourage companies to fight slavery.

Games that challenge attitudes are also similar to games that focus on teaching a set of values and skills that promotes peaceful actions. Country X[35] is a game that simulates nonviolent struggles to win freedom and secure human rights. It teaches skills through complex role playing that models real-world experiences and allows players to devise strategies, apply tactics, and see the results. Peace Maker[36] takes a similar approach, but applied to one specific real-world context: the Arab-Israeli conflict. The game challenges players to take the role of either the Israeli Prime Minister or the Palestinian Prime Minister, and play out decisions based on real events in an attempt to broker peace.

At the cutting edge of mixing the 'real world' with gaming are attempts to 'gamify'

actual peacebuilding processes. We define 'gamification' as the process of introducing the incentive structure and mechanics of games into a real-world interaction. Gamification is widely used for marketing and learning. To date we do not know of any initiative that has tried this approach strictly for peacebuilding programs - and there are certainly ethical concerns about it. Nonetheless, gamification in similar fields shows encouraging results. For example 'Commons' is a mobile game that gives players points for reporting improvements needed in their urban environments, and at the same time forwards these suggestions to local authorities. 'Acts of Kindness' allows players to post acts of kindness that they carry out or observe in their lives. Each post accrues 'cause currency', which is transformed into actual money donated to charities chosen by the highest scoring players. Could something similar be done regarding peacebuilding or promoting peaceful acts?

Engagement

'Digital media can strengthen social cohesion to such a degree that when regular government structures break down, strong social ties can substitute. In other words, if the state is strong but the society weak, information technologies can do a lot to facilitate new forms of governance' (Howard 2013).

Technology can often provide new and more efficient ways to engage citizens in social processes. Many technology tools focus on offering users ways to petition online for policy change (such as Avaaz[37]) or provide feedback on policy in more complex ways (such as LiquidFeedback[38]). Other tools have emerged to help create 'communities of interest' (Ning[39] or Yammer[40]), although many initiatives use existing social network platforms (Facebook) to form online groups. Crowdfunding is quickly emerging as another area for online civic engagement, not just through individual funding campaign platforms (Kickstarter[41] or Indiegogo[42]), but also through platforms that focus on funding

for social causes (Spacehive[43] or Neighbor. ly[44]). Others offer ways to collaborate online to formulate concrete projects or even complete simple tasks (microtasks) that contribute to a social cause (most notably, science research via FoldIt[45] or Zooniverse[46]).

Many technologies applied to improving governance through better citizen engagement could also be used for peacebuilding, although to our knowledge there are as of yet no such initiatives. Concretely, we envisage that initiatives could be developed to encourage online collaboration to provide timely help in response to a spike in conflict. There are precedents to this kind of early response in the context of natural disasters: the Occupy Sandy[47] movement organized online to provide relief to families in New York; the Rynda[48] platform allowed people to ask for help or offer services following the Russian wildfires of 2010 (and later became a wider network for community help).

The application to early response is the most obvious, but perhaps there are other ways that tech-enabled citizen engagement could contribute to peacebuilding. Could online wikis be used to facilitate one-texting on peace agreements? Could communities come together after a mediation to crowdfund for peace dividends? Further functions of technology for peacebuilding could yet be explored.

What peacebuilding programs can new technologies contribute to?

Many peacebuilding practitioners find it easier to engage with the functions offered by new technologies if they can fit them into existing program areas. We propose four main categories of programs where new technology is currently being applied (or could potentially be applied):

1. Early warning/early response programs;
2. Programs fostering contact and collaboration between groups in conflict settings;

3. Programs aiming to promote peaceful attitudes;
4. Programs supporting communities to influence pro-peace policies.

These four categories differ in scope and level of practical development. Out of the four, the most advanced area of application is so far in the field of early warning and response.

Early Warning/Early Response

Conflict prevention and peacebuilding rely on accurate information; if accessed in time, verified, analyzed, and shared with the right actors, information has the potential to prevent violence or stop it from escalating. Although there is limited evidence of cases where technology has improved response times for conflict prevention, examples suggest that there is potential for doing so (Ryan 2012; Bock 2012). Newer technologies are changing the way information is developed, shared, and processed. Tools, such as mobile devices, mapping instruments, and social media, allow for information to be rapidly disseminated, analyzed, and made actionable. Technology thus makes it possible to bridge the divide between 'warners' and 'responders', focusing on direct, localized first-responder interventions (Meier 2009).

The application of technologies to support and link national structures for peacebuilding efforts both vertically and horizontally at the local and national level has proved to be an efficient tool for rapid response and conflict mitigation (Bock 2012). For example, in Georgia along the border with South Ossetia, the Caucasus Research Resource Center and Saferworld, with support from the UNDP,[49] run an early warning project across 18 communities that uses SMS text messaging and Ushahidi mapping. Members of the community report security incidents to the Georgian Ministry of Internal Affairs and the European Union Monitoring Mission in real time. This free service has sped up response times by police and international observers and improved local perceptions of safety.[50]

In early warning initiatives, mobile and social media can help make sure appropriate stakeholders get the right information at the right time, and are empowered to respond. This is proving to be efficient for use in national early warning and response systems, especially for the prevention of electoral violence. One example of this is the Uwiano Peace Platform[51] in Kenya, which was first established for the 2010 constitutional referendum (Ryan 2012). The platform, which is a partnership between national and local actors, uses mobile phones and mapping technology to link local warning and conflict mitigation efforts with a national and localized response system. During the 2010 referendum and the 2013 elections, the UNDP helped establish a toll-free SMS-based service that allows citizens to report perceived security threats. SMS messages were conveyed to a national situation room where they were analyzed and verified; responses were then initiated through partnerships between civil society groups and the police. This gave the police and other responders a level of localized information not previously available to them (Mancini 2013).

Even though newer technology has proved to be effective for collecting early warning information and facilitating localized responses, much more can be done to empower and support localized response mechanisms, especially with a view to boosting existing local conflict management systems and supporting means for rapid information sharing and timely responses. Increased coordination amongst actors using these technologies is also necessary. In Kenya, several competing short-codes[52] existed for the 2010 referendum and 2013 elections, causing confusion and duplication of efforts. This highlights the need for greater coordination and collaboration between different organizations, government institutions, and initiatives using crowdsourcing for early warning - especially if the goal is a coordinated response. In developing a tech-enabled early warning system, practitioners should

pay particular attention to the relationship between governments and telecommunication firms, especially as it affects the distribution of short-codes and control over airtime.

The use of Big Data for conflict prediction and early detection of anomalies is another dimension of newer technology that is currently being explored and developed by academics and practitioners. In 2012, more data was generated than in all of human history combined (Mancini 2013). This data offers new ways of understanding human interactions. As noted in a recent study undertaken by the UNDP together with IPI and USAID, Big Data can provide a real-time, 360-degree view of complex, risky, and traditionally data-poor settings to policymakers and development practitioners (Mancini 2013). It can inform early warning and real-time awareness, and provide an avenue for real-time feedback. While Big Data is increasingly being used in the commercial and defense industries, few efforts have been made to explore how it can be used for conflict prevention by linking current academic research in the field to the work of practitioners on the ground. Although research in the field of natural disasters is working to resolve the problems of endogeneity, oversaturation, and a lack of structure that emerges when using Big Data, very little has been done in this respect in the peacebuilding field (Mancini 2013; Meier 2013). With this in mind, peacebuilding practitioners will have to explore how technology can solve the mathematical and logical problems associated with traditional risk indicators, principally by piloting the use of tools developed for natural disaster Big Data in conflict analysis (Crawford 2013).

Fostering Collaboration

Networking and experience-sharing through online platforms, social media, and mobile technology have changed the way we interact and network in all aspects of life. Virtual communication tools can be applied to enhance dialogue mechanisms for peace practitioners and connect communities to enhance understanding between them. Programs can make use of online platforms to support dialogue and link virtual interaction to offline activities.

In Cyprus, civil society organizations (with the support of UNDP-ACT[53]) are creating an online platform for peace practitioners to exchange knowledge and experience on conflict prevention and peacebuilding from the Cypriot context. The platform - called Mahallae[54] - will capture and digitize knowledge generated over 15 years of peacebuilding, social cohesion, and reconciliation practices to contribute to knowledge sharing and capacity building. It will also offer a space for civil society organizations in the Euro-Mediterranean region to come together to formulate new peacebuilding initiatives.

Indeed, online platforms for collaboration on specific project initiatives are common in other development or social change program areas. The OpenIdeo[55] platform regularly brings together experts and enthusiasts to solve challenging social problems. The closest there is to a similar engagement platform for peace is MasterPeace,[56] a website that targets youths and encourages them to either start or support a peace initiative in their communities.

Combined with offline activities, online networking and communication can be used to promote and foster increased information-sharing and understanding between communities. Virtual communities also provide an opportunity to enhance collaboration and experience-sharing between actors working to promote conflict prevention by strengthening coordination and synergies.

Promoting Peaceful Attitudes

Conflict is a dynamic process in which structure, attitudes, and behavior are constantly changing and influencing one another. In essence, conflict management and peacebuilding is about changing attitudes and behavior to avoid a tense situation escalating into violence (Galtung 1969; Mitchell 1981; Miall 1992). As we have seen in other fields,

newer technology can be an efficient tool in influencing attitudes and behavior.

In conflict management, technologies can be used to promote timely information to change perceptions and transmit peaceful messages before (re)actions become violent. This is the thinking behind Sisi ni Amani's PeaceTXT[57] initiative. PeaceTXT aims to contact people in at-risk areas in order to propose an alternative narrative, a moment of reflection. The PeaceTXT messages are meant to counter potentially violent narratives or reactions at critical times. Their approach (which is not yet fully implemented) is based on work carried out by the NGO Ceasefire[58] to reduce gang violence in Chicago. Ceasefire believes that violence is a disease. Thus, if disease prevention is about behavior change, so is violence prevention. Ceasefire's methodology of treating violence as a disease has been developed over years of practice and validated by an independent report of the National Institute of Justice. Ceasefire projects identify potentially violent incidents, intervening to interrupt them, and designing responses that promote behavioral change through a change in the pervasive narrative of violence.

Technology can help not just transmitting messages instantly, but also in forming longer term narratives that shape identity. Soliya[59] is an example of an initiative using online tools to impact attitudes. The organization aims to empower young adults from different societies to establish more cooperative and compassionate relations between their societies. Initiatives combine the power of constructive dialogue with the reach of new media to shift the way societies resolve their differences from a confrontational and coercive approach to one defined by cooperation and compassion. Their online student exchange program, Exchange 2.0, gives students an opportunity to have a profound cross-cultural experience as part of their education.

The link between changing attitudes and empowering groups to stand up for peace is also important. In Egypt, HarassMap[60] is an initiative aimed at enhancing public safety for women using an SMS reporting system for sexual harassment. Sexual harassment can be reported on the spot by sending an SMS with location and information on what happened to an online system. The report is read, verified, and then mapped on a public website. The SMS reports identify 'hotspots' where extra caution should be taken and help the police know where an increased security presence is needed. HarassMap moreover assists victims by providing them with a list of services, including information regarding how to file a police report, seek legal aid, and get psychological help, as well as information about self-defense classes. HarassMap also organizes peaceful gatherings in 'hotspots'. HarassMap is working with existing advocacy campaigns and has succeeded in building enough public support that the media and the government have taken notice: the Ministry of Justice and the National Council for Women responded with a new bill on harassment, public support has resulted in a successful court case, and the Ministry of Education and the Ministry of Tourism increased awareness of the issue.

As the above examples show, technologies can be applied to initiatives aimed at influencing attitudes and behaviors. More could be done to explore in particular how civil society efforts to change attitudes and behaviors can be leveraged for conflict prevention and peacebuilding, and also how more traditional work such as civil education and awareness-raising can become more innovative.

Influencing Policy

Projects and initiatives aimed at influencing policy using technology in conflict settings are still limited but the following examples could spark ideas as to what could potentially be done, especially in transition settings.

MYWorld[61] is a global survey for citizens led by the United Nations and partners. It aims to encapsulate people's voices, pri-

orities, and views in order to inform global leaders during the process of defining the new development agenda for the post-2015 world. MYWorld anonymously asks individuals to indicate which six of 16 possible issues are the most important in their lives. The sixteen issues have been assembled from priorities expressed by poor people in existing research and polling exercises; they cover the existing Millennium Development Goals, plus issues of sustainability, security, governance, and transparency. MYWorld was launched in December 2012 and since then nearly 600,000 individuals from 194 countries have participated. So far, MYWorld has also mobilized support from over 280 civil society organizations, dozens of corporate partners, and global opinion leaders; over half of these votes have been collected offline, using paper ballots. Just over one third have come through the MYWorld website, and around 12 per cent have come through mobile phone surveys.

Another example of the use of online tools for citizen engagement in policy debates is the world's first 'crowdsourced' constitution. The constitution drew on suggestions provided via Facebook and twitter was sent for referendum in Iceland in 2008. Proposals for a new constitution grew out of a 2008 crisis that saw the collapse of the country's heavily indebted banks. Following the so-called Pots and Pans Revolution, in which Icelanders took their noisy mass protests to the doors of Parliament in the wake of the bank crash, the government chose a panel of ordinary citizens to come up with proposals for constitutional reform. In a country that has one of the highest penetrations of Internet usage - 94 per cent of the 320,000 inhabitants have access to the Web - the panel set up a Facebook page[62] to attract comments and suggestions. Nearly half of the island's 235,000 eligible voters participated and 66 per cent of participants voted in favor of the Constitution drafted by the Council (Euroactiv).

Projects to engage young people in policy dialogues around peace also often use online platforms. For example, the non-profit organization Turning Tables[63] is working to enhance opportunities for marginalized young people in conflict-prone countries to express their grievances, hopes, and dreams through music. Turning Tables has developed an online platform that connects the participants of Turntable Labs in the Middle East, Asia, and the Caribbean. These labs provide creative, independent spaces where marginalized young people can freely express themselves by producing music and videos that reflect their societal and political views. The online platform functions as a virtual community where local artistic and activist output are exchanged, mirrored, and commented on without fear of repression. Thus the virtual platform is meant to instigate intercultural dialogue and provide an outlet for marginalized youth to voice their political vision for their future in a non-violent manner.

Technology has created a great potential for engagement and participation by the larger public to raise their voice and share opinions. Arguably, some of this participation can be quite 'thin', as it does not require much commitment or involvement. Sharing a tweet, liking a Facebook page, or voting on a website are hardly strong ways to engage in policy debate. Nonetheless, the above examples show that if used correctly, technology can support a process that leads to influencing policy. The peacebuilding field could learn from such initiatives.

Conclusion

This article contains much that is aspirational: pilot projects, parallels with other areas of practice, and ideas that could be implemented. It also offers some examples of peacebuilding initiatives that are using new technologies. Here they are in summary, classified both by the function technology takes in the initiative (row) and the program area the initiative falls into (column).

These examples are not a comprehensive review of technological initiatives in the

	Early Warning	Collaboration	Peaceful Attitudes	Policy Change
Data Processing	U-Shahid Voix des Kivus Uwiano peace platform	CRMA Iraq Monitor		Syria Tracker Satellite Sentinel
Communications	Georgia early warning	#18 days in Egypt	Peace Factory Shoot your identity Umuzi Photoclub PeaceTXT	I paid a bribe
Gamification		Country X	Sambaza peace game Slavery footprint Acts of kindness	
Engagement		Mahallae MasterPeace	Soliya HarrassMap	Turning Tables

peacebuilding arena. They serve to point the way. We hope the two frameworks outlined in this article will inspire more peacebuilding practitioners to explore uses for new technologies.

A final note of caution: new technologies have great potential but do not necessarily always result in positive change. The Arab Spring, particularly in Tunisia and Egypt, has been seen as a direct result of the immense power of the new technologies (although this view ignores the deeper socio-economic and political roots and causes of these movements). However, the same technologies that can foster social change and political activism can also be used by a government to control its people, enhance surveillance, and aid groups that promote violent action to achieve their ends (Morozov 2011). Furthermore, as mentioned in the introduction, technologies are *not* neutral; much depends on the governance mechanisms in place that allow for (or hinder) the widespread use and diffusion of technologies.

The examples in this article show that technologies are being applied in many different ways to create social change. There is a great potential to further explore how technologies can best be utilized as important transformative tools for enhancing sustainable human development, including the prevention of violent conflict.

Notes

[1] The views expressed in the article are those of the authors and do not necessarily reflect the views of the United Nations Development Programme.

[2] Ushahidi is an open-source, free platform for information collection and interactive mapping. See: http://www.ushahidi.com/

[3] See:https://support.google.com/crisis-maps/?hl=en

[4] See: http://www.caerusgeo.com/

[5] See: http://www.mapsdata.co.uk/

[6] See: http://www.frontlinesms.com/

[7] See: http://www.datadyne.org/magpi-mobile/

[8] See: http://www.kobotoolbox.org/

[9] See: http://corp.geofeedia.com/

[10] See: http://irevolution.net/2013/10/01/aidr-artificial-intelligence-for-disaster-response/

[11] See: http://www.u-shahid.com/

[12] See: http://blog.ushahidi.com/2011/05/16/voix-des-kivus-a-crowd-seeding-system-in-drc/

[13] See: http://blog.standbytaskforce.com/2011/09/01/libya-crisis-map-report/

[14] See: http://www.unglobalpulse.org/

[15] See: http://www.crimsonhexagon.com/egyptian-social-media-analysis-election/

[16] See: http://www.sd.undp.org/projects/dg13.htm

[17] See: http://letthemtalk.org/2013/04/03/what-the-red-dots-are-for-or-why-we-map-part-2-libya/

[18] A map made up of points and lines, with no colored areas (vector data only, no raster data).

[19] A heat map is a geographic representation of data where the individual values of each point on a map are represented as a color. Heat maps are often used to show temperatures or altitude. Maps where areas (e.g. states or provinces) are colored by the average value of all the points in that area are called choropleth maps.

[20] See: http://letthemtalk.org/2013/02/18/what-the-red-dots-are-for-or-why-we-map-part-1-iraq/

[21] See: http://www.satsentinel.org/

[22] See: http://www.humanitariantracker.org/#!syria-tracker/cj00

[23] See: http://www.flickr.com/groups/piggipedia/

[24] See: http://mapstory.org/

[25] See: http://beta.18daysinegypt.com/

[26] See: http://israellovesiran.com/

[27] See: http://www.theteamlb.com/?p=news&id=32

[28] See: http://umuziphotoclub.blogspot.com/

[29] See: http://www.ipaidabribe.com/

[30] See: http://www.healthgamesresearch.org/

[31] See: http://dumbwaystodie.com/

[32] See: https://www.fitocracy.com/

[33] See: http://www.sambazapeace.org/

[34] See: http://slaveryfootprint.org/

[35] See: http://ccnmtl.columbia.edu/portfolio/political_science_and_social_policy/country_x.html

[36] See: http://www.peacemakergame.com/

[37] See: http://avaaz.org/en/

[38] See: http://liquidfeedback.org/

[39] See: http://www.ning.com/

[40] See: https://www.yammer.com/

[41] See: http://www.kickstarter.com/

[42] See: http://www.indiegogo.com/

[43] See: https://spacehive.com/

[44] See: http://neighbor.ly/

[45] See: http://fold.it/portal/

[46] See: https://www.zooniverse.org/

[47] See: http://occupysandy.net/

[48] See: http://rynda.org/

[49] See: http://europeandcis.undp.org/our-work/cpr/show/8CDCDDD5-F203-1EE9-BFA2613C8679E4BC

[50] See: http://www.youtube.com/watch?v=AbgZLKaVQxU

[51] See: http://www.undp.org/content/kenya/en/home/operations/projects/peacebuilding/uwiano-peace-platform-project/

[52] A short-code is a special phone number, significantly shorter than a normal phone number. For example, 911 is a short-code.

[53] See: http://www.undp-act.org/

[54] See: http://www.mahallae.org/

[55] See: http://www.openideo.com/

[56] See: http://www.masterpeace.org/

[57] See: http://poptech.org/peacetxt

[58] See: http://cureviolence.org/

[59] See: http://www.soliya.net/

[60] See: http://harassmap.org/en/

[61] See: http://www.myworld2015.org/

[62] See: https://www.facebook.com/Stjornlagarad?sk=wall

[63] See: http://turningtables.org/

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