TECHNOLOGY FOR EVALUATION IN FRAGILE AND CONFLICT AFFECTED STATES:

AN INTRODUCTION FOR THE DIGITAL IMMIGRANT EVALUATOR

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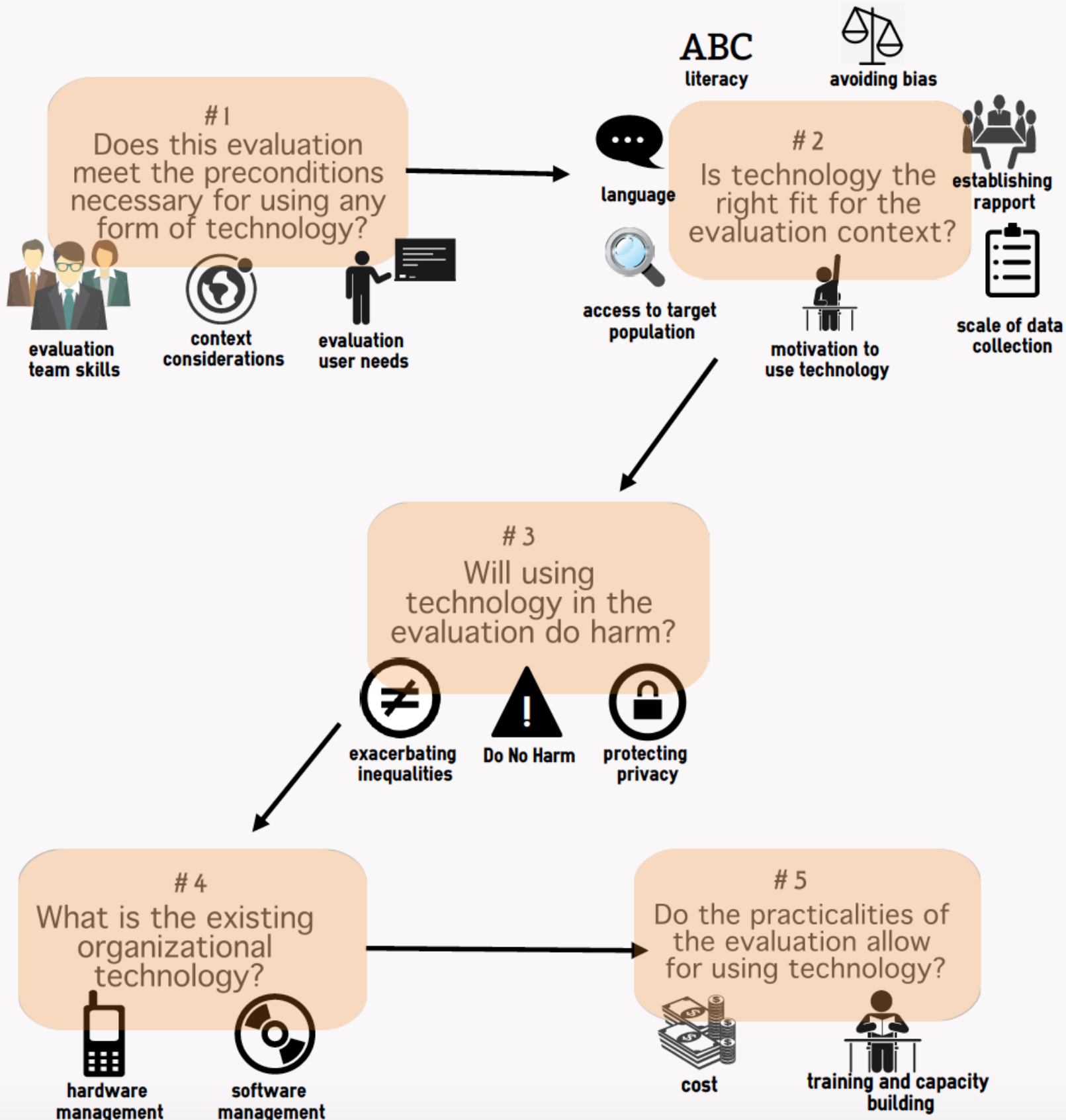Over the years, the Hitachi Center has helped to promote Fletcher's mission of teaching, research, and service through its support and promotion of internships, research on important issues of global technology management, international finance, and international economic integration, conferences bringing together scholars and policy-makers, and other educational activities.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Technology offers great benefits throughout an evaluative process when integrated appropriately. This 5-step decision filter provides seasoned evaluators a process to ascertain if and when to best use technology in fragile and conflict affected states.

#1
Does this evaluation meet the preconditions necessary for using any form of technology?

evaluation team skills

context considerations

evaluation user needs

ABC
literacy

avoiding bias

language

establishing rapport

#2
Is technology the right fit for the evaluation context?

access to target population

motivation to use technology

scale of data collection

#3
Will using technology in the evaluation do harm?

exacerbating inequalities

Do No Harm

protecting privacy

#4
What is the existing organizational technology?

hardware management

software management

#5
Do the practicalities of the evaluation allow for using technology?

cost

training and capacity building

INTRODUCTION

Technology is the new normal. Whether one works in humanitarian response to conflict, good governance, anti-corruption or peacebuilding, technology is being incorporated in ever increasing and innovate ways. A 2014 Devex study found that 84% of development professionals believe that, in 10 years, the technology, skills and approaches used in international development will be significantly different from the skills they currently have.[1] But where does technology fit into the field of evaluation in fragile and conflict affected contexts? What are the opportunities and pitfalls that an evaluator needs to be aware of? How does an evaluator who has seldom used technology in an evaluation learn where to begin?

This paper addresses these questions specifically with the "digital immigrant"[2] in mind. It targets experienced evaluation managers and seasoned evaluators[3] who work in fragile and conflict affected contexts and are not fluent in the application of technology to their evaluation practice. Called "digital immigrants" because they have adopted technology later in their professional lives,[4] they may even be "digital refugees," who are forced to engage in technology because their job increasingly requires it. Although the vast majority of evaluations use technology (broadly defined) in some manner today—whether by using laptops, email, scanners, or Skype—many do so for evalua-tion management more so than as an integrated part of the evaluation purpose, process or product.

The paper is structured as follows: it presents four different aspects of evaluation in which technology can be the most useful, followed by a table summarizing the most frequently used technologies for evaluation. The table links to explanations of each type of technology, examples for how it can be put into practice, and resources to learn more. With this context in mind, a "decision filter" then helps guide evaluators in thinking through whether technology is a good choice for their evaluation. To a degree, the decision filter challenges a common assumption in today's world that using technology is always a good choice. It helps evaluators determine the benefits of using technology in an evaluation, and where it is useful to consider using it in combination with other, non-technological, tools.

Where available, readers are guided towards resources on how to select a specific technology product within a category; but the details of how to choose between different software packages, for instance, are beyond the scope of this paper.

Methodology

This paper is based on an extensive literature review that spanned the fields of technology, peacebuilding, humanitarian, development, and monitoring and evaluation. One of the key gaps identified was how to introduce technology to an experienced evaluator who is also a digital immigrant or refugee. There is plenty of available content about technology and evaluation in fragile states; however, it is rarely framed through the lens of an evaluation.

Several monitoring and evaluation guides offer guidance on using technology to assist with data collection, but do not focus on explaining how to integrate technology beyond data collection and into the rest of the monitoring and evaluation cycle. A portion of the content is also inappropriately pro-technology; it does not sufficiently examine context or consider the pros and cons of using technology when dealing with vulnerable populations.

This paper fills the gap by amalgamating expertise from various fields in order to provide a comprehensive overview of what an evaluator needs to keep in mind when using technology. The literature amalgamation was put through a series of expert reviews from individuals in both the evaluation and technology fields.

Key Terms

Technology: The broad term "technology" is used to refer to the various kinds of electronic or digital infrastructure, hardware, software, new and traditional media (the umbrella term of "new media" encompasses labels such as "new technologies", "ICT" or "mobile phones"[5]) that when appropriately put together, form a system that creates, disseminates and manages information to realize a specific end.

Program Evaluation: Evaluation is "the systematic use of social science data collection methods to investigate the quality and value of a [program or policy]... [It is] a methodological area that is closely related to, but distinguishable from more traditional social research. It utilizes many of the same methodologies used in traditional social research, but because evaluation takes place within a political and organizational context, it requires group skills, management ability, political dexterity, sensitivity to multiple stakeholders and other skills that social science research in general does not rely on as much."[6]

Fragile and Conflict Affected Contexts: As defined by the World Bank, fragile and conflict affected contexts are characterized by "weak state policies and institutions, undermining the countries' capacity to deliver services to their citizens, control corruption, or provide for sufficient voice and accountability; and are at risk of conflict and political instability."[7]

WHERE IN THE EVALUATION PROCESS CAN TECHNOLOGY CONTRIBUTE?

Evaluators need a broad understanding of how technology can fit into various aspects of an evaluation before starting to think through what might work best for a particular evaluative process. Digital technologies can make routine tasks cheaper, faster, and more convenient, but all evaluations also require human judgment and intuition.[8] It cannot be stressed enough that technology should be seen as an enabler of good evaluation, not a solution to every evaluation challenge. For instance, digital survey technologies can help streamline the data collection process, but need strong research and survey design skills to be used effectively.

There are various aspects of an evaluation, such as achieving the evaluation purpose; helping with evaluation design; promoting the use of evaluation findings; and evaluation management – and technology can play a critical role in each. Each of these potential uses is described in greater detail below and included into Table 1, which offers a comprehensive review of how different forms of technology aid evaluation.

For those who would benefit from more description of what each technology entails, please see Appendix 1, which offers concise explanations and references to additional resources. Not every conceivable technology has been included in this paper. Technologies were screened to take into consideration factors such as cost, technological complexity, effort required, and utility to an evaluation. The variance in digital infra-structure from region to region was also taken into account.

How can technology contribute to achieving the evaluation purpose?

Technology can support learning and accountability in evaluations by offering multiple channels of outreach, and providing various platforms through which to communicate and interact with people virtually.

If the evaluation purpose has a strong learning component, such as building the evaluation capacity within the program team, technology could be put to use to expand the training options. For evaluation teams that are not in the same location as the program team, podcasts could be sourced, simple training videos could be found on YouTube, or both could be produced tailored to the specific monitoring and evaluation (M&E) competency needs and context of the program team. This could extend the reach of capacity building beyond when the evaluation team was physically present in-country.

Free software, such as Jing, is available to capture on-screen content and audio to create short videos. Simple messages can be filmed as videos on mobile phones. Online conferencing and screen-sharing software such as WebEx or Adobe Connect offer numerous built-in training functions, such as chat boxes or polling. If training in a specific tool is required, another technique is to have trainees share their screens (for example,

through services such as Skype's screen sharing capability) while they click through the tool e.g. a virtual survey, so that their process can be supervised in training before they go live. These sessions can be recorded for future use as well. Though none of these are equivalent to a stand-alone, in-person capacity-building effort, these technologies offer convenience in terms of conveying basic concepts, and efficiency in that they can be recorded and saved for future use.

> "It cannot be stressed enough that technology should be seen as an enabler of good evaluation, not a solution to every evaluation challenge."

If the evaluation purpose is more accountability-driven, technology could make useful contributions to fulfilling this purpose by helping evaluators verify information. For evaluations that are focused on the compliance side of accountability, numerous technological advances can be integrated. For instance, satellite imaging or remote sensors can help ensure that the program is complying with its stated aims by photographing evidence of program implementation. Technology can similarly be used to ensure quality and increase transparency of the evaluation process. More on these options may be found in #2, Evaluation Design.

Another exciting potential use for technology is in evaluations that emphasize downward accountability.[9] Technology increases options for program participants and stakeholders to participate in an evaluation by developing feedback loops that are timely, framed in the right language, and pitched at an appropriate level. This is particularly helpful for conflict contexts, where stakeholders might be hard-to-reach populations that are constantly on the move, or where security concerns prohibit frequent access to the region.

For example, the evaluation team could use SMS to notify stakeholders of the existence of the evaluation report or invite them to a presentation of the findings. Call-in radio shows also offer an integrated means of explaining the findings and providing a channel for feedback. Combinations are also possible; for example, if the evaluation team created videos of the evaluation findings, they could employ social media (e.g. Twitter, Facebook) or SMS to enable feedback. This creates a communication channel with stakeholders who might otherwise just have been recipients of a written document, thus closing the "feedback loop"[10], which recent research has found to be critical in ensuring that development programming is truly effective.

How can technology be integrated into the evaluation design to better answer evaluation questions?

Perhaps the most obvious role technology can play in an evaluation is at the evaluation design stage, where technology can be incorporated into data collection, analysis, and visualization methods. The bulk of the available literature focuses on using technology in these ways.

Data collection

There are several ways in which technology can be used to collect quantitative and qualitative data such as digital surveys, SMS polling, geo-spatial mapping, photographs, videos and satellite imagery. Technology is already quite widely used for data collection in evaluations—the most common example being enumerators using smartphones or tablets loaded with digital surveys to collect data from program participants.

An approach that is often referenced when it comes to technologically-enabled data collection is "crowdsourcing". Crowdsourcing itself is not a technology, but a data collection method in which various technologies are used to-

gether for a specific purpose. It refers to data collection from a large 'crowd' of people who volunteer their own data. For instance, people could Tweet in feedback about a program, or post their location coordinates on Facebook. The evaluation could send out bulk SMS messages in order to collect input from a 'crowd'. This assumes that the evaluation has the capability (financial and logistical) to acquire the connectivity and talent necessary to gather and analyse such large datasets.

Crowdsourcing is commonly seen combined with other technologies such as geospatial mapping, where large numbers of individuals collect and send in geographical data (such as locations where protests are taking place) that can be collated in a central database and used to generate a "live" map of an unfolding event. Crowdsourcing enables an evaluation to receive information on-demand directly from hundreds or thousands of people.

Data analysis

Most evaluators already utilize some form of basic technology for data analysis, whether Microsoft Excel, statistical software (e.g. SPSS, STATA) or other software (e.g. NVivo) specific to analyzing qualitative data.

Data visualization

Data visualization can serve as an excellent means of communicating information creatively and succinctly. It can draw attention to key facts, communicate to visual learners more effectively and depict complicated findings in a simple fashion. It can be particularly useful when an audience has differing literacy levels, if used creatively and in a culturally appropriate manner, e.g. to incorporate images and icons. Guidebooks have compiled several resources for data visualization tools, including ones that go beyond charts and graphs to provide interesting infographics, animations, and other creative ways to present and share your data.[11]

Combinations

Many new software packages offer complex features that integrate digital data collection, analysis and data visualization. With this integration, evaluators can use visualization features in the analysis process with the evaluation team, or as part of a participatory analysis process with stakeholders. Consider an evaluation in a conflict region that is using a household survey and has transitioned from paper to a tablet-based digital survey. This data uploads directly into a cloud-based database that the evaluation team lead can periodically review for quality regardless of location. The software that runs the survey and database also allows for the data to be analyzed and visually depicted using graphs and charts. Once all the data is in hand, the evaluation team can go back to the community and visually depict different data sets to generate its meaning.

How can technology help drive the use of evaluation findings?

All members of the Use branch of the evaluation theory tree[12] know that perhaps the most difficult part of conducting an evaluation is ensuring that its findings are used. Issues that prevent evaluation use commonly include in-

> "Technology can help through the incorporation of creative, low-cost and highly scalable ways to share evaluation findings."

sufficient funds or time budgeted to engage in dissemination, inability to reach back out to stakeholders, and/or resistance to challenging conclusions and change.[13] Though the challenges to catalyzing use are many, technology does offer a solution to some of them.

Consider the time and cost of disseminating evaluation findings to key stakeholders or project participants spread throughout a region. Technology can help through the incorporation

of creative, low-cost and highly scalable ways to share evaluation findings. For instance, conveying key evaluation conclusions is possible through a podcast (which can be as simple as recording a series of engaging and creative audio files on a computer, which can then be downloaded by the recipient), single page infographics, or videos. Infographics and slide-docs[14] offer two highly visual and concise ways of communicating with a variety of audiences, who perhaps might be unable or unwilling to read a long report.

How can technology assist in evaluation management?

Technology can play a central role in evaluation management. Program management tools, such as software that helps manage documents and workflow, can help an evaluation team move away from relying on disparate documents in various folders. Cloud-based tools such as Google Drive, Box, or Dropbox allow storing and sharing documents collaboratively, a particularly useful feature for evaluation teams that are spread across regions. Several cloud-based tools also work when offline, enabling evaluators to continue to function in contexts with limited connectivity, and offer relatively secure means of working with a remote team.

Communication within the evaluation team and with the evaluand can be supported through video enabled platforms, such as Skype or Google chat. As evaluators who work across countries know, the ability to be visible while discussing the evaluation is a significant asset. Trust-building is a key component of any evaluation relationship, either within a team that the commissioner has brought together or with the evaluand. Though not as powerful as in-person meetings, the multi-party video conference call offers an important step forward in breaking down resistance and fear of the evaluation process.

In terms of real-time communication there

are a number of texting apps that offer free international texts (that require access to a data plan or Wi-Fi) such as WhatsApp, which can be used to create a texting group dedicated to the evaluation team. This can be a cost-effective option for communicating short factual pieces of information, particularly when spread out in-country doing data collection. Tools such as WhatsApp are also end-to-end encrypted, which means that they are protected from government surveillance. Having a mobile data plan on a smartphone or via a dongle[15] also enables an internet connection (or "hotspot") to a computer in the event that there is no accessible Wi-Fi.

Technology can also assist with managing accountability within an evaluation, for example by tracking the geo-location of a phone when a survey is submitted to ensure that the enumerator was actually at the correct location.[16]

The table below provides a concise summary of the roles that technology can play in the various aspects of an evaluation and the associated old or new media, software and hardware that would be required. It should be used as an illustrative reference tool that helps the digital immigrant link the different technologies to evaluation. The table should be read across—so for each evaluation aspect (such as supporting the evaluation purpose), the different roles that technology can play are listed (such as accountability). The applicable technology is then listed against the role including the corresponding traditional media, new media, software, or hardware that is needed. For example, under the role of data collection, digital survey technology is a software that can be used. Corresponding hardware requirements include tablets, laptops or smartphones.

Often, the same technology can play multiple roles, making it challenging to create a comprehensive list of technologies organized by their use—for instance, social media can be used to encourage accountability, to collect

data, and to communicate with stakeholders. Where practical how-to guides were found, these may be reached by clicking on the hyperlinks that will take the reader directly to the appropriate section of the paper.

The authors opted to omit some technological approaches such as Big Data, the Internet of Things, 3D printing, or Artificial Intelligence, that were felt to be beyond the average evaluation. Although all these technologies hold great potential for the field of evaluation, they are typically too specialized, costly, and beyond the reach of the average evaluation team. By focusing on more "basic" technologies, the intention of this paper is to be practical and useful for the average evaluation in conflict contexts.

TECHNOLOGY MATRIX

Evaluation Aspect	Technology's Role	Technologies			
		Traditional Media	New Media	Software	Hardware (other than computer/laptop)
1. Supporting Evaluation Purpose	Accountability	Videos, photos			Camera or phone, ability to share or upload content
			Social media	Applications and services such as Facebook and Twitter	Smartphone
			Blog posts		
		SMS		Bulk SMS survey software	
	Learning (e.g. Capacity Building)	Videos, photos			Camera or phone, ability to share or upload content
			Podcasts	Audio recording software; cloud service to host the audio files	Smartphone, digital recorder
			Blog posts		
				Web conferencing and screen-sharing	

Evaluation Aspect	Technology's Role	Technologies			
		Traditional Media	New Media	Software	Hardware (other than computer/laptop)
2. Integrating into Evaluation Design	Data Collection	SMS polling		Bulk SMS survey software	Mobile phone
			Social media		Tablets, smart-phones
				Mobile data collection software such as digital surveys and questionnaires	Tablets, smart-phones
				GIS software	GPS units, satellites
				Interactive Voice Response (IVR) Systems	Mobile phones or smartphones, depending on the service used
	Data Analysis			Transcription software	
				Qualitative data analysis software	
				Quantitative data analysis software	
	Data Visualization			Visualization software	
				Graphics software	
				Statistical software packages (SPSS, STATA)	

Evaluation Aspect	Technology's Role	Technologies			
		Traditional Media	New Media	Software	Hardware (other than computer/laptop)
3. Catalysing Evaluation Use		Audio Video			
			Podcasts	Audio recording software	
				Graphics software	
			Blog posts		
			Digital Resource Library		
			Social Media		
4. Evaluation Management				Messaging applications	Smartphones
				Cloud computing services	

The Decision Filter

The purpose of the decision filter is to help evaluators determine how technology can be most beneficial to an evaluation. The graphic below demonstrates how the Decision Filter is intended to flow:

| 1. Does this evaluation scenario meet the preconditions necessary for using any form of technology? | | 2. Is technology the right fit for the evaluation context? | | 3. Will using technology in the evaluation do harm? | | 4. What is the existing organizational technology? | | 5. Do the practicalities of the evaluation allow for using technology? |
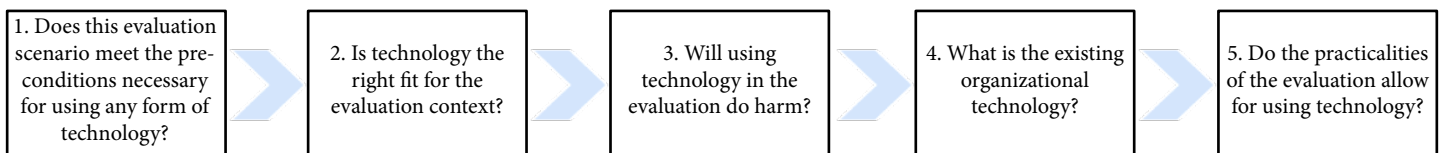
The preceding section offered an overview to orient the digital immigrant to the potential of technology to add value to an evaluation process. However, the realities of evaluation practice—shoestring budgets, rushed timelines, fragile and conflict-affected contexts, and differing evaluation methods—mean that technological options are not always the best choice. In this section, the "decision filter" establishes a process by which evaluators can discern when and how to integrate technology into program evaluations in a manner that increases effectiveness and efficiency of the process, while still being conflict-sensitive.

The decision process proposed here is purposefully simple; comprising five 'filters':

1. Does the evaluation scenario meet the preconditions necessary for using any form of technology?
2. Is technology the right fit for the evaluation context?
3. Will using technology in the evaluation do harm?
4. What is the existing organizational technology?
5. Do the practicalities of the evaluation allow for using technology?

The first question offers a minimum threshold for an evaluator or evaluation manager to decide if they should proceed with a technological option. From there, the framework uses the four additional filters to help the digital immigrant/refugee evaluator think through the appropriateness of technology for an evaluation. Several examples are provided throughout

The American Evaluation Association lists five principles that are intended to "guide the professional practice of evaluators, and to inform evaluation clients and the general public about the principles they can expect to be upheld by professional evaluators.":

1. Systematic Inquiry: Evaluators conduct systematic, data-based inquiries.

2. Competence: Evaluators provide competent performance to stakeholders.

3. Integrity/Honesty: Evaluators display honesty and integrity in their own behavior, and attempt to ensure the honesty and integrity of the evaluation process.

4. Respect for People: Evaluators respect the security, dignity and self-worth of respondents, program participants, clients, and evaluation stakeholders.

5. Responsibilities for General and Public Welfare: Evaluators articulate and take into account the diversity of general and public interests and values that may be related to the evaluation.

the paper along with resources to learn more, where available.

The application of each of the decision filters is informed by the American Evaluation Association's evaluation principles, in order to link them to acknowledged good practice in the evaluation field.

The authors have approached this filter from the position that technology can very rarely serve as a stand-alone solution to common evaluation challenges. Nor will it replace strong research and evaluation skills; used correctly, though, it has great potential to strengthen evaluations in conflict contexts.

Filter #1:
Does this evaluation scenario meet the preconditions necessary for using any form of technology?

Given the current enthusiasm for using technology in development,[17] it may appear that technology can easily be integrated into an evaluation. However, there are several basic preconditions one must have in place in order for the vast majority of technology to be a feasible addition to an evaluation process—failing which, the evaluation should seriously reconsider using technology at all. These conditions pertain to the evaluation team, evaluation context, and evaluation user, as explained below.

1.1 What skills does the evaluation team need in order to use technology?

These conditions are derived from the evaluation principle of competency whereby evaluators must be able to offer competent performance.

a. What is the team lead's comfort with technology?
The lead evaluator needs to have, at minimum, a basic level of comfort with technology in order to be able to appropriately integrate it

into the evaluation process and manage those responsible for it. In other words, everyone on the evaluation team cannot be a digital refugee.

b. Which team member has technological competency, and in which tools?

A member of the evaluation team must have the technical competency to skillfully implement the technology chosen to its full advantage. This competency is essential if the team is to avoid inadvertent mistakes that waste resources, invalidate data or possibly do harm. Ideally, this competency should go beyond effectiveness in a single version/application of a technology as it is wise to have a back-up plan in the event that the specific technology originally chosen has to be abandoned. Someone may be great with a specific software, but if a different one has to be used, do they have the expertise to take it forward?

1.2 Do the contextual conditions of the evaluation allow for technology?[18]

These conditions relate to the evaluation principle of systematic inquiry, because without these fundamental preconditions in place an evaluators ability to ensure their processes were systematic would be extremely difficult.

a. Is there a reliable source of electricity?

If the power grid is not reliable, are there reasonable stopgap measures that can be used, such as solar power or external battery packs? Such measures need to be powerful enough to provide a consistent source of power through the life of the evaluation, stay within the evaluation budget, and be relatively portable. For example, if enumerators were bringing their tablets back to the implementer's office each day to charge, but the office faces frequent power outages resulting in the devices not being fully charged. Can this challenge be overcome by having a set of pre-charged external

battery packs on hand, or is there budget to pay for an additional petrol-powered generator? Or, are the enumerators in locations where they cannot reach the office, and where carrying battery packs would make them vulnerable to theft? If so, is it best to continue with paper-based surveys?

b. How good is the mobile connectivity?

If the evaluation is to take place in a context where there is little to no mobile service, then all technology that requires a mobile phone connection (e.g. SMS-based polling, interactive voice response etc.) might not be a good idea. If the evaluation is national in scope, it should take into consideration the fact that communications infrastructure differs across a given country, affecting connectivity. The type of connectivity available can also differ: for instance, the region could have basic mobile connectivity, but no access to data. If so, relying on systems that use data heavily might not be a feasible option, such as expecting enumerators to upload and sync survey results in real-time.

c. Is there internet connectivity?

Nearly 60 percent of the world's people are still offline[19]; the poor often cannot afford Internet access. For instance, in Central African Republic, one month of internet access in 2015 cost more than 1.5 times the annual per capita income.[20] Consider an evaluation that has multiple sites and would benefit from being able to securely exchange data between sites in real-time. In this instance, a cloud-based system for data storage may be better than relying on software that needs to be installed. However, if there is unreliable internet connectivity which goes out multiple times a day and there are long stretches without functional internet connections, then a cloud server may not offer a real-time solution. Even where there is connectivity per se, poor connection speeds and loading time can still make certain technolo-

gies such as cloud-based solutions unreliable. Separately, one also needs to consider how much control the government has over connectivity. Can it, in times of crisis, shut down the internet - as was done in the DRC in response to opposition violence in 2015, or the in 2016 Uganda election where the government shut down social media? [21]

1.3 How does the evaluation user respond to technology?

These conditions relate to the principle of respect for people, as an evaluation needs to be designed with the perceptions and realities of the end user in mind.

a. Do the intended evaluation users consider integrating technology to be appropriate?
If use of evaluation findings is an important component of the evaluation process, then the perception of technology as "fit for purpose" becomes important to understand. For instance, does the user consider Tweets as reliable data sources, or do they think that Twitter accounts can be too easily falsified and manipulated? On the other hand, does the evaluation user have an overly optimistic approach to new technology, setting expectations that will be hard to meet? If so, then the realities of what a given technology can and cannot achieve need to be made clear from the start.

b. What are the current trends in technology use in this context?
Evaluators should also consider the technology usage trends in the countries in which they are working. Understanding what technology trends are occurring in the specific context can ensure that the evaluation reaches the right audience. For example, technology use in a given country might be expanding extremely rapidly, but Instagram specifically might not yet have taken off; journalists might use it to communicate to an international audience, while Facebook is the more popular domestic choice.

Filter #2:
Is technology the right fit for the evaluation context?

Filter 2 continues the commitment to evaluator *competence* because an evaluation team must be sure that the technology selected will be effective in the specific context of the evaluation. It also adheres to the *systematic inquiry* principle as it aids evaluators in determining how the presence of technology in the evaluation will affect their methods and approaches, and how technology might affect the accuracy and credibility of data collected. For instance, evaluators have the responsibility to understand how differences among participants—such as gender, socioeconomic status, age, and education level—pose a challenge to the use of technology in the evaluation. Such differences can bias the evaluation findings and need to be mitigated or otherwise accounted for. The following questions help an evaluator assess whether a specific technology is appro-

> "If the use of technology requires a certain type of conceptual or analytical thinking that might not be the cultural norm, the evaluation team needs to consider how to overcome this challenge before implementing a technology."

priate for the evaluation context.

2.1 What languages are needed to access the target population(s)?

A 2016 study found that only 61% of the population of the developing world would be able to find a version of Android (the most common operating system used on tablets and smartphones globally) localized to their language. So if digital data collection requires different languages and scripts, one needs to determine

if all the necessary local languages are available for that device.[22] The issue of languages and scripts becomes more complicated if the evaluation spans multiple regions with distinct languages or significantly different dialects. For example, if one is evaluating a program in conflict-sensitive regions in central India, it is possible to be dealing with at least three or four different languages. An evaluation team that wanted to generate feedback from the evaluation conclusions would need to consider whether the technology they wish to use can handle all of those languages and scripts before selecting that technology as their medium of communication.

2.2 What is the literacy level of the target population(s)?

Any technologies that require literacy (such as the use of Twitter or Facebook to communicate evaluation conclusions) should be carefully reviewed against the various target populations. For illiterate populations, audio or video recordings (Interactive Voice Response, or IVR systems are one example) may offer a better way of conveying the findings if the evaluation team does not have a physical presence. Although literacy is important, another factor to bear in mind is the target population's "way of thinking"—if the use of technology requires a certain type of conceptual or analytical thinking that might not be the cultural norm, the evaluation team needs to consider how to overcome this challenge before implementing a technology.[23] Think of GIS mapping as one example—while the audience might be literate, they might have never learned to read and interpret maps, in which case understanding what the technology is trying to convey would be conceptually difficult.

2.3 What are the challenges to accessing the target population?

Technology can offer ways to access difficult-to-reach communities, but not in every instance. In an active conflict context where populations might be on the move, mobile phones, email or Facebook may be a way to maintain contact over time. Equally, in these contexts the evaluator will need to consider if those populations will continue to have mobile or internet connectivity from one location to the next (information that it might be possible to get from mobile phone providers directly in certain contexts). During the 2013-14 crisis in Central Africa Republic, for instance, technology would probably not have helped evaluators access internally displaced people that could not make it to Bangui. Conversely, technology could be a great enabler of access to reach Syrian refugees in Lebanon.

2.4 What is the scale of the data collection of the evaluation?

A number of the digital data collection options enable an evaluation to gather far greater amounts of information in less time, for less money. Digital data collection can also allow for greater geographic reach than what may be feasible using traditional methods. For instance, SMS polling or digital survey (e.g. Qualtrics) can enable an evaluation team to collect data from civil servants in Kinshasa, Lubumbashi and Goma, three cities in the DRC that would require days of travel and expense in order to have physical presence. This assumes that the evaluation team has the necessary expertise to design a rigorous survey and use the appropriate quantitative or qualitative techniques to analyze the results. When weighing up the cost-benefit of SMS surveys, it is important to remember that it is common for families to share mobile phones in some contexts, so the evaluation needs to consider whether the convenience of using SMS surveys will yield accurate and unbiased results based on which member of the family has access to the mobile phone.[24]

2.5 What is the motivation to respond?

Similar to any non-technological outreach means, the evaluator must consider whether the target population will be motivated to participate. As others have argued, "motivations and incentives to produce and react to information—not technological capability—are the key factors that must be addressed in order to facilitate greater use of new technology in peacebuilding programming and evaluation."[25] Using a crowdsourcing platform to obtain data, facilitate participatory analysis or generate a feedback loop all presupposes that people are willing to participate without the implicit incentive of the physical presence of the evaluation team. One cannot conflate connectivity with willingness to contribute. Sufficient offline mobilization is critical to success and needs to be built into the evaluation plan. Experience with e-government shows that its use remains quite low, as people prefer more traditional ways of communicating, and the parallel e-systems go unused and savings go unrealized.[26]

2.6 Could the technology create unintentional bias?

Demographic factors have to be taken into account in picking a technology. Younger adults, people with higher socio-economic status, and those with greater education all tend to have more familiarity and access to technology, while older adults, women, populations on the lower socio-economic rung, and those with lower education levels tend to engage with technology less. This is despite the research showing that "among the poorest 20 percent of households, nearly 7 out of 10 have a mobile phone. The poorest households are more likely to have access to mobile phones than to toilets or clean water."[27] The Internet gender gap is also of concern because women often have less access to technology in general and the Internet in particular.[28] In terms of data collection, this can impact the validity of

the findings. These gaps affect downward accountability as well, as they may impact who is

> ### IS TECHNOLOGY THE RIGHT FIT?
>
> - What languages are needed to access the target population(s)?
> - What is the literacy level of the target population(s)?
> - What are the challenges to accessing the target population?
> - What is the scale of the data collection of the evaluation?
> - What is the motivation to respond?
> - Could the technology create unintentional bias?
> - Will technology complicate establishing rapport?
> - Could technology negatively impact the evaluation?

engaged and given a voice. Evaluation teams that opt for social media inclusion will also need to think carefully about potential bias. For instance, there is evidence that people in more autocratic countries are less likely to forward information (for example, by re-tweeting it).[29]

2.7 Will technology complicate establishing rapport?

Building rapport with target populations is a key competency of any evaluator, and such cultural competency is especially critical in contexts where trauma, suspicion and distrust are rife. Showing empathy and establishing trust can be key components to developing the rapport necessary to broach sensitive topics, with some going so far as to argue that it is a core tenet of humanitarian work.[30] In these situations, the evaluation team must ask if technology is an appropriate medium to obtain authentic information, particularly without doing harm.

2.8 Could technology negatively impact the evaluation?

An evaluator must consider whether the technology will distract from the task at hand. For instance, a webcast or a fancy graphics and visualization tool could be distracting to the audience and detract from getting information across effectively. Respondents might also modify their answers to fit the technology, particularly for open-ended survey questions. Typing out qualitative information into tablets can be difficult for many enumerators, and if it causes undue delays in the interview process, respondents might shorten their answers, compromising the quality of the data. Finally, even if the evaluation team has built a good relationship with the target population, will they 'trust' the specific technology being used? If the population has had negative experiences with fake email or social media accounts, or generally perceives these to be easy to falsify, this could negatively impact how motivated they will be use it. In conflict contexts where government surveillance can lead to dire consequences, people might avoid discussing sensitive topics through technology.

Filter #3:
Will using technology in the evaluation do harm?

The commitment to "Do No Harm" (DNH) is clearly seen in the evaluation principles of respect for people and respect for general and public welfare. When it comes to applying the DNH framework to technology, it most commonly refers to privacy,[31] confidentiality,[32] anonymity,[33] and security in physical, technological, and administrative measures.

For the purposes of analyzing whether a technology used in an evaluation in a conflict context can do harm, a reasonably current conflict analysis needs to available to the evaluator. Drawing from CDA's Dividers and Connectors framework,[34] the evaluation team could ask if the technology has the potential to exacerbate a divider in that context and if so, how? On the other hand, could technology support a connector, bringing people together not only across physical distance, but also ideologically or across socio-economic differences? Using this framework, it is also important to recognize that technology's interplay with dividers or connecters could change along with the conflict context in which the evaluation is being conducted, as the conflict evolves over time.

Acknowledging that a true DNH analysis needs to be conflict-specific, there are a number of common scenarios where technology could cause harm if used without caution:

3.1 Can the technology exacerbate societal tensions, inequalities or conflict?

A professional evaluator's responsibility for general and public welfare requires them to carefully think through how an evaluation might exacerbate tension or conflict in a fragile state. The two most common examples found in the existing literature are described below, but should not be seen as the only way in which technology could further fracture a delicate situation.

a. Does the technology unintentionally alter power dynamics?
Access to certain types of technologies can increase an individual's perceived status in their society.[35] It is commonly seen in data collection when enumerators or even community members are given smart phones or tablets to gather data for an evaluation, while others in their communities do not have access to similar devices. This can also occur when in a downward accountability process some are able to provide feedback or validate conclusions through the provision of technology whilst others are not. In these instances, the evaluator needs to think carefully about which individuals are selected to provide feedback. Are individuals

with technological access the only ones who are able to participate in providing feedback? If so, an already unequal situation—in which some individuals have technological access and others do not—is further exacerbated, as those with access have a voice in the evaluation and those without access, do not. While this issue is not specific to using technology, the ease of using technology often leads to more and more data being collected from individuals, thus exacerbating the potential of such inequalities occurring.[36]

b. Does the technology contribute to unrealistically raising expectations?
Asking people for feedback (i.e. SMS feedback or crowdsourcing) raises expectations that their input will be heard. If their feedback isn't considered, or they aren't made aware of the outcomes of their participation, this can lead to disappointment and/or disenfranchisement.

c. Can technology be perceived as "conspicuous consumption" and generate negative perceptions?
Community perceptions of resource use matter greatly when working in conflict contexts. Conspicuous use of technology may lead certain groups to perceive that resources are being spent in a wasteful manner by implementing actors. While using tablets or smartphones might speed up data collection, consideration should be given to whether their use could result in the evaluation or implementing actor being perceived with distrust. For example, the Vietnamese Red Cross opted not to use laptops or other data collection technology for surveys several years ago, because they didn't want to be seen as spending money on anything other than helping people directly.[37]

3.2 Can the technology cause direct harm?

All evaluators should carefully review their evaluation design to ensure that it fulfils the professional ethic of respect for people. Evaluators should think through any scenarios in which the use of technology could cause harm—physical, mental, emotional, or socio-economic—to the individuals they are working with, or who are the subject of data collection. Aspects to consider include:

a. Could technology increase risks to physical safety?
Robbery, domestic violence and suspicion can all result from technology that is not appropriately integrated. When an evaluation introduces hardware into a community, consideration must be given to the risk of those in possession getting mugged, because the hardware (e.g. a tablet or smartphone) makes them targets for robbery. In contexts where women are typically not given access to technology, encouraging them to use phones can put them in danger of physical violence, as was seen in one Zambian example.[38] In a sensitive conflict context, there is also a risk that data collection will be mistaken for intelligence gathering. Consider the hypothetical use of drones to take pictures of infrastructure development in a post-conflict setting. If the respondent's experience with this technology is limited to drone strikes, this could cause significant anger and suspicion.

> ### To Learn More:
> There are several US-based and international organizations that provide basic training in Internet and technology security to development practitioners (for example, the ISC Project: https://iscproject.org/who-we-are/). Evaluators could make use of these trainings in order to ensure that they are aware of privacy related issues when using technology in an evaluation.

Another concern is whether an individuals' physical location or identities posted on social media by the evaluation team can be tracked

to discover their real social networks and put them at risk. For instance, a seemingly innocuous photo of a family's hut included in the evaluation report could be used to locate the family's specific village location based on the type of construction material used or building style.

b. Will technology respect nuance, individuality and respondent's time?

Given the excitement around technology, organizations run a risk of "becoming obsessed with the cost-saving possibilities of digital devices and data collection, spending less time on interviews, spending less time on the ground, and getting to know the people, stories, and contexts behind the numbers."[39] The danger here is making conclusions about the intervention based on numbers, but without any nuance, thereby over-emphasizing quantitative data at the cost of qualitative data. This is not unique to the use of technology in data collection, but is amplified when technology is added to the mix and there is a temptation to collect as much data as quickly as possible. In terms of respecting people's time, technology is often thought of as enabling faster, more efficient and more cost-effective data collection. Since using technology makes data increasingly easy to collect and analyse for the evaluator, there is often a temptation to collect more and more data. However, as stated above, this hunger for more data may lead to data collection practices that are not "light-touch" or lean.[40] This translates to taking more of a respondent's time, often in contexts where time is a scare resource.

c. Will it be possible to protect data privacy, ethically and legally?

As an evaluator, thinking through the ethical implications of data privacy when using technology can be challenging. There is a lot of literature available about data privacy in general, but it can be difficult to understand, particular-

ly for a digital immigrant. Furthermore, there are no clear standards for data privacy, as these

> **To Learn More:**
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> Although the laws and rules around data privacy and security can be murky, several large organizations have created resources to help guide practitioners in minimizing the privacy risks associated with using technology. "Principles for Digital Development" has a number of guides that provide strategies to address privacy and security concerns.
>
> URL: http://digitalprinciples.org/address-privacy-and-security-guides/.

tend to vary by organization, country, or Institutional Review Board. As of 2014, some 107 countries had privacy laws, but only 51 of them were developing countries.[41] For instance, an evaluator based in the state of Massachusetts would need to abide by the law that there must be all-party consent before anything (such as a Skype call or interview) can be recorded.[42] At the time of writing, some countries are considering new regulations that would make it legally binding for data of or about their citizens to reside within national borders. Navigating this will be difficult for multi-country evaluations. While the general ethical considerations—i.e. those that are not specific to technology but the overall ethics that guide an evaluation practitioner—still hold, the ethics being discussed here are those that specifically relate to the challenges that can arise when using technology in an evaluation.

Because privacy is such an important topic, below are a few particularly salient factors of privacy to keep in mind:
  • *Does the evaluator have informed consent?*
Although informed consent might be a rel-

atively straightforward process to undergo when conducting a survey or an interview, mining large amounts of publicly available data—such as social media posts —raises different issues. It is not always clear whether the person has provided informed consent just because their data has been made publicly available. This is a lively and ongoing debate that has yet to reach a conclusion.

• *Does technology impede the evaluator's ability to guarantee anonymity?*

The evaluation should ensure that data, despite being anonymized, cannot still be used to pinpoint an individual. Location coordinates, computer IP addresses, or SMS messages can all be used to track an individual. Similarly, members of the evaluation team should be careful about photos, videos, or comments that they post online (say, on their Facebook or Twitter accounts) during the evaluation that could be used to track individuals or triangulated with other information to determine where data were located.

• *Can adequate data protection measures be put in place?*

Digital data can be hacked (e.g. stolen) if inadequately protected, resulting in identity theft; or, in countries where the government is a party to a conflict, imminent threat to individual safety The ability to be hacked applies to the entire chain of hardware—from the internet router, to the mobile phone, to the email account. Common mistakes that people make include sending sensitive data over email while using an unsecured public internet connection (e.g. free wi-fi at an airport or hotel lobby), or sharing confidential documents without encrypting them. Though the Bring Your Own Device (BYOD) practice is very common in the business world and therefore has rules and systems in place, this is far less so in the international evaluation community. What personal devices might the evaluation team use

during the course of the evaluation, and do they need to be protected? For instance, an external evaluator might bring and use her own phone, and if it isn't properly protected, could risk her data being misused.

Filter #4: What is the existing organizational technology?

This section reflects on the considerations to take into account when thinking about the technology capacity of the organization facilitating the evaluation. This might be the evaluator's organization, the evaluation commissioner, or the evaluand. All of these considerations relate to the principle of competence, as knowing the right questions to ask is central to successfully incorporating technology into an evaluation.

4.1 Hardware Management (sometimes called asset management): thinking through purchasing and managing the hardware is an important consideration, especially because it needs to be accounted for when building the budget for the evaluation. Before deciding to use technology in an evaluation, some things to consider include:

a. Who will own the hardware purchased for the evaluation?
It is important to have clarity on who has final ownership of technology purchased in the course of an evaluation. This applies not only to the various entities involved (such as the evaluand or the evaluator's company), but also to community members when they are given devices to enable data collection. In these instances, expectations about what happens to the hardware at the end of the evaluation will need to be made clear.

b. What hardware does the organization already own that can be used for the evaluation?
In order to be as cost-effective as possible, the

evaluation should try and use existing technology where possible. For instance, if the program already uses video cameras as part of their activities, can they be used again in the evaluation rather than purchasing new equipment? In this case, can the evaluation team use the hardware freely, or will they need to compensate the evaluand for using it? Alternatively, can hardware specifically purchased for the evaluation be used later for other purposes by the evaluand, in order to make the hardware purchase more cost-effective.

c. What are the procurement options for this technology?

Technology procurement in conflict contexts can bring a host of challenges. Once it is determined who will do the purchasing, it then needs to be ascertained if sufficient quantity and quality of the items are available locally. If it needs to be brought into the country, there might be restrictions to how much can be brought in at one time, with what fees for customs or other duties, the likelihood of the items being intentionally held up at the border and what other legal restrictions may exist. Once all of this is determined, the evaluator should consider if the procurement process creates undue time delay for the evaluation. Can the technology be procured following due process that does not do harm (for example, by privileging suppliers from an advantaged community over others)?

To Learn More:

http://www.rmu.edu/SentryHT-ML/pdf/bcnm_nonprofit_security_checklist.pdf

http://techbridge.org/services-for-nonprofits/security-basics/

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d. Is all the hardware compatible?

While most hardware today tends be compatible across different voltages, it is best to confirm beforehand that this will not be an issue that could damage the device. There are numerous things to consider about compatibility, a few of which are offered here to illustrate the point:

• If bringing in hardware from outside, are sufficient adapters and plug converters factored into the procurement?

• If using a digital camera, has the team considered the device such as a laptop with a card reader that can read the SD card and transfer images, or the appropriate cables for transferring images?

• If using CDs to record video, do the team's laptop computers have CD drives?

e. Is there a hardware inventory system that can be used or will one have to be devised?

In evaluations where numerous devices are necessary (i.e. giving out digital cameras to teens to take pictures of what constitutes violence in their lives), the evaluation team will need to track and manage the inventory of hardware. Similarly, what exists in terms of setting expectations around liability if a piece of hardware gets stolen, misplaced, or damaged?

f. What security measures are needed?

Viruses can ruin a device, so it is critical to determine what virus protection software is needed. Hardware such as routers can get hacked, which is particularly dangerous in conflict contexts where data security is paramount. Evaluators therefore need to ensure that all their hardware has the appropriate protection measures in place.[43] In addition to protecting devices from viruses, some hardware will need a safe storage space for when it is not in use. For example, if the team is using laptops to manage the evaluation but it is too unsafe to be seen entering and exiting the

building carrying them, is a safe storage space available inside the building? Finally, does the evaluation team need to have a breach protocol in the event that a device is lost or stolen? If the data on those devices is no longer secure, what are the consequences for the organization as well as the individuals whose data it is?

4.2 Software Management: similar to hardware management, thinking through purchasing and managing the software is an important consideration, for reasons particularly to do with cost, ease of use, and compatibility across devices. Some things to consider include:

a. Do the technologies being used for the evaluation fit the existing technology systems of the host organization?

One of the main advantages that technology offers is integration of processes to increase efficiency and decrease cost. This can be thwarted when there has not been sufficient planning to make sure different software can work together. For example, in a situation where an implementing actor has significant monitoring raw data stored in a database, will the evaluation's chosen software work with that particular database? If the software does exist at the host organization, is it the appropriate version? For instance, NVivo (a qualitative analysis software) will allow data to be merged from different accounts only if everyone is using the same version.

b. What security mechanisms are in place, and are they adequate for the evaluation purposes?

If relying on another organization's software, the evaluation team must ensure that adequate security is in place. This encompasses malware protection, firewalls, network security, and other terms that can often sound intimidating to someone without a technology background. There are several resources online that are targeted to nonprofits (such as the

ones below), and it is best to consult an Information Technology professional either in the organization or externally in order to ensure that these basic criteria are met.

c. Is Information Technology support available to the evaluation team?

Unless a member of the evaluation team is an avid user and able to troubleshoot the vast majority of problems, an evaluator must consider how support will be accessed if or when things go wrong. For instance, if the evaluator runs into issues with their software or needs assistance installing virus protection or uploading data, is there local expertise available?

Filter #5:
Do the practicalities of the evaluation allow for using technology?

After running the evaluation through the previous steps in the decision filter, there are a few more questions to think about at the final operationalization stage. These relate to the evaluation principles of integrity and honesty. Evaluators should present an honest and accurate picture of what the technology will cost, which could often include costs that do not appear obvious at first glance. These costs need to be considered from the start and included in the budget of the evaluation.

5.1 How much will the technology cost?

• For software costs, what is the fee structure? Is it a one-time cost, or a licensing fee? Does one pay per use, as could be the case with SMS? How long will the evaluation need to use the software for, and what implications will this have on cost?

• For hardware costs, other than the cost of purchase, will there be any maintenance costs? Does the hardware have resale value? Is there a future use of the hardware within the organization or with the evaluation team thus reap-

ing more benefits from the original cost? What discounts are available for nonprofits?

• How much will it cost to train people to use the software and hardware? Will a trainer have to be hired? Does staff familiarity with technology ensure the sustainable use of the tool in the future?

Does the duration of your evaluation process allow for integrating technology?

• Is there enough lag time from input to useful output? For example, if the evaluation conclusions need to be shared via podcasts or radio as a means of validating them prior to the final report, is there sufficient time from asking for feedback to using it?

• If one needs to find, vet, learn, and test software and hardware, and possibly hire technical assistance, is there sufficient time to complete these steps?

5.2 Does the evaluation team need capacity building in the technology?

If the team needs to be trained in the use of specific technologies in order to successfully undertake the evaluation, this needs to be factored into the timeline and budget of the evaluation from the start—not to mention, the evaluation team needs to be willing to undertake this effort. Evaluators should ensure that the required time, budgets, and skillsets are specified at the start of the evaluation process.

For instance, if adopting crowdsourcing there are implications on work time as well as evaluation duration, skillsets and cost. This is because of the volume of data that crowdsourcing can generate that all require cleaning, verifying and sense making by someone with the skillset to do so.[44] In instances where crowdsourced data is used in combination with geospatial mapping (as is increasingly done in emergency contexts), there is an additional set of skills—which come at an additional cost—that would be required of the evaluation team to make sense of the data.

WHEN TO USE THE DECISION FILTER

The decision filter can be used in different ways depending on the evaluation process being considered. The most obvious of these is in developing the evaluation plan (i.e. writing the inception report). The filter will help an evaluator think about how to design the evaluation process—from meeting the purpose, to catalyzing use—keeping technology in mind. Using this Decision Filter, one can think through whether the evaluation context is conducive to using technology, and if so, what some potential uses might be. Of course, for many recruitment processes (particularly by donors), the evaluation plan stage might come too late to incorporate the skills and budgetary requirements for using technology; but for other, less standardized recruitment processes, there might still be scope to add them in.

For donor processes, the filter may best be used during the development of the Evaluation Terms of Reference (TOR). A TOR sets an evaluation up for success. For instance, an evaluation manager seeking an external evaluator could use the filter to help them determine if the evaluator needs to bring technical know-how to the process, and to then include this requirement in the relevant section of the TOR.

Finally, it is possible to use elements of the filter in an evaluability assessment (EA). An EA helps an evaluation commissioner de-cide if a project is evaluable. Part of that decision is based on the difficulty of and costs associated with answering a proposed evaluation question. Technology could provide options that help the evaluation manager to conclude that a specific evaluation question is feasible. If the EA is conducted prior to program implementation but after the design and monitoring plan are in hand, the reviewer would also be able to assess the fit for context of technology used for data collection as part of monitoring.

CONCLUSION

As technology continues to evolve and becomes increasingly integrated into work functions and processes, professional evaluators in the international community will need to stay abreast of both the possibilities and the challenges. The next frontiers of technology include virtual reality, artificial intelligence and the Internet of Things,[45] among many others. Though offering automation and massive increases of data that could offer greater efficiencies to evaluation, they also come with a new host of security threats. Ensuring privacy and security of data will become increasingly complex tasks, requiring greater trans-disciplinary skill sets. Data management skills, particularly those that are able to process large amounts of data, are also going to be in significant demand. The task for professional evaluators is to review all of these developments through the lens of core evaluation principles.

By pairing core evaluation principles with practical filters through which to view the decision to use technology, this paper offers evaluators the guidance to be able to maximize technology to its fullest potential.

ENDNOTES

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Big Data:
- *What it is:* Big Data refers to massive amounts of data being generated at a high frequency. It is differentiated from other types of data by "3 V's": volume, velocity, and variety of the data. It is generated from a variety of sources; at a rapid pace; and in a number of different formats.[46]
- *In other words:* Think of mobile phone data—calls, texts, and location information, all being generated rapidly as people use their phones. Big Data comes from everywhere: sensors used to gather climate information, posts to social media sites, digital pictures and videos posted online, transaction records of online purchases, and from cell phone GPS signals to name a few.[47]
- *To use this technology:* one needs sophisticated databases and software that can handle such huge inflows of data, as well as professional expertise that can analyze and make sense of the data. If using mobile phone data, evaluators would need to be granted access by a mobile phone network operator; however, other forms of using Big Data also exist, such as picking up on Tweets mentioning certain terms.

To Learn More:

UN Global Pulse has an excellent white paper that explains Big Data in detail and explores how it is used in development.

URL: http://www.unglobalpulse.org/sites/default/files/BigDataforDevelopment-UNGlobalPulseJune2012.pdf

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Cloud-computing:
- *What it is:* As defined by the US Computer Emergency Readiness team, cloud computing is a subscription-based service where one can obtain networked storage space and computer resources.
- *In other words:* One way to start to understand cloud computing is to consider the experience of accessing email virtually (rather than through applications installed on your computer such as Outlook.). To access email, one opens a web browser, goes to Gmail.com (or any other email client's website), and logs in. In these cases, email is not housed on a physical computer; it is accessed through an internet connection, and can be accessed anywhere as long as there is internet access. Email is different than software installed on

a computer, such as a word processing program. With software on a computer, when one creates a document, that document stays on the device unless it is physically moved. An email client is a good basic example for how cloud computing works. With cloud computing, everything that one used to save on their computer is now saved virtually. There is a host of products and services available (such as relationship management, bulk email, sales management, file sharing, etc.), all of which store data in the "cloud" instead of (or in addition to) locally on a computer. [48]

- *To use this technology:* Typically, cloud computing software (e.g. Dropbox, Google Drive, or Amazon Web Services) is license-based, with various payment plans available for clients who wish to purchase a subscription. Several providers have free or discounted licenses available up to a certain amount of storage or for a limited amount of time. To use cloud computing services, an evaluation will need access to a good internet connection, as well as a device (such as computers or tablets) to access the service.

To Learn More:
https://www.uscert.gov/sites/default/files/publications/CloudComputingHuth-Cebula.pdf

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Mobile Data Collection (digital surveys/questionnaires):
- *What it is:* Mobile Data Collection is the use of digital devices such as mobile phones, tablets or laptops for data collection. There are many mobile phone applications (referred to as platforms) on which one can build a mobile data collection survey. These platforms will allow customization of the survey to collect specific data as required, such as photographs, information from a list selection, voice recordings, GPS coordinates, etc. Platforms vary in ease of use, cost, and features.
- *In other words:* When thinking of mobile data collection, think of translating a traditional paper-based survey/questionnaire into a digital format. This physical translation enables data collectors to digitize the data collection process, which reduces data entry errors; allows for information to be uploaded to a central, cloud-based database by multiple enumerators in real time; and enables data quality audits, offering easier analysis and visualization of data.
- *To use this technology:* The evaluation team would need to purchase licenses for a digital survey software (or use a free version, which typically has more limited features), as well as provide the requisite hardware (laptops, tablets, or mobile phones) and training on how to use it, to enumerators. Though these software guide the development of data collection tools more so than paper versions, it should be noted that evaluation teams still need strong survey design skills in order to understand how to build a high-quality digital survey.

Geo-Spatial Technology
- *What it is:* Geospatial Technology usually refers to GPS (global positioning systems), GIS (geographical information systems), and RS (remote sensing), although it does not always have to include all three. These technologies offer a way to produce and use maps required to manage communities and programs. Organizations, agencies and companies throughout the world are using the technology to transform manually produced maps and associated descriptive records

into powerful digital databases.[49]

- *In other words:* Devices that track location data (such as a smartphone or GPS unit) can be used to upload the location coordinates onto a centralized database, along with other descriptive information—such as describing what can be found at that location or what state it can be found in. Such data, when pulled together from multiple locations and sources, can form a map that contains both location data (where something is) as well as descriptive data (what that something is like). The big advantage of using geospatial technology to create maps is that it can be updated quickly and with minimal effort, giving the user an up-to-date and descriptive map of a topic of their choice—such as places of worship, locations where violence has occurred, or health centers. Once a tool that was affordable only to the largest organizations, geospatial systems have become a cost-effective option for even the smallest organizations.

- *To use this technology:* Typically, you would require an actual device, such as a satellite or a Geographical Positioning System (GPS) unit, to generate location coordinates that could then be uploaded using specific software onto a mapping platform, such as Google Earth. You could also use location coordinates that are provided to you (via social media, or existing databases), rather than sourcing them yourself. Existing databases of geo-spatial information already exist (such as http://opendata.arcgis.com/), and organizations creating new ones should consider making them freely and publicly available so that others can use the same data rather than replicate costly data-collection processes.

To Learn More:

Similar to the digital data collection tools mentioned above, Kopernik provides an overview of several geospatial mapping tools.
URL: http://impacttrackertech.kopernik.ngo/geospatial-mapping-tools.

Participatory mapping is an application of GIS that has been used to empower minority groups who might otherwise not have a voice in the mapping process: http://www.participatorymethods.org/method/participatory-geographical-information-systems-pgis
There are also numerous free GIS software options available: http://gisgeography.com/free-gis-software/.

Graphics Software:

- *What it is:* Specialized software that enables a person to manipulate visual images on a computer or visualize data as images or graphs.
- *In other words:* Software that an evaluator can use to create and edit images, infographics*, or icons to communicate a message, or software that can be used to visualize data collected through surveys or questionnaires. Infographics are representations of information in a graphic format, designed to make the data easily understandable at a glance. People use infographics to quickly communicate a message, to simplify the presentation of large amounts of data, to see data patterns and relationships, and to monitor changes in variables over time.
- To use this technology: The evaluator would need access to graphics software. Some types of the software may need to be purchased and installed, whereas other types are available online

for free or a modest fee.

Interactive Voice Response Systems (IVR systems):

- *What it is:* "IVR technologies is the broad term used to describe automated systems that allow humans to interact with computers through phones using voice—ranging from traditional automated messages to newer talk-to-text applications on smartphones, like Siri on Apple phones or Cortana on Windows phones."[50]

- *In other words:* IVR systems are software packages that allow individuals to communicate using automated messages over phones. IVR systems automate the process of calling a high volume of individuals and playing recorded messages. As IVR technology has developed, newer versions allow users to "talk" to a device which is then able to use IVR technology to convert the voice note to "text" (think of Siri, Cortana or Google Now).

- *To use this technology:* The evaluator would need to pay for an IVR service and ensure that the recipients of the messages have phones (either smartphones or regular mobile phones, depending on what is required) in order to receive the message.

SMS polling:

- *What it is:* SMS stands for Short Message Service, also commonly referred to as a "text message". Most mobile phones support this type of text messaging. SMS polling refers to sending out quick survey questions via text. Respondents can then answer the question using the keypad on their phones to send an SMS back in response.

- *In other words:* We can't think of a simpler way to explain this one!

- *To use this technology:* Several services allow an organization to send out mass SMS messages. The evaluator would need to pay for such a service and have a computer through which to send the SMS out. Obviously, the evaluator would also need a list of phone numbers of the intended recipients.

Social media:

- *What it is:* Social Media is a group of technologies that typically refer to forms of electronic communication (such as Web sites for social networking and microblogging) through which users create online communities to share information, ideas, personal messages, and other content (such as videos).[51]
- *In other words:* Social media is a term used to describe a variety of technologies that allow users to not only communicate with one other, but also interact and engage with one another in real-time. Types of social media include Facebook, Twitter, Instagram, Snapchat and Vine. Individuals can share information (e.g. text, audio, video) and receive comments on it. Hashtags (the '#' symbol) allow users to attribute their social media posts to specific stories or categories, allowing one to quickly see what thousands of people might be saying about a particular topic. It can therefore be a powerful means to connect with people, as more than one-fifth of the world's population is now believed to active on one or more social media platforms.[52]
- *To use this technology:* Evaluators would need knowledge of the specific type of social media they hope to use and a device (smartphone, tablet or computer) on which to use it; internet access that allows them to create or use the social media account; and for more sophisticated usage, social media analysis software (as in described in the links below).

Podcasts:

- *What it is:* Podcasts are audio files available in digital format for download over the Internet to be listened to on demand.[53]
- *In other words:* These are music or talk programs that can be downloaded from the internet and listened to at the audience's convenience. They are usually designed to be listened to in a segments or episodes.
- *To use this technology:* An evaluator would need a device that can record an audio file, ideally a smartphone or a computer, and have access to software to edit the audio recording as needed. Typically, podcasts are also stored on a cloud-based service such as SoundCloud to allow dissemination. An evaluator would need to ensure that her audience can access the podcast, for which

they would need a suitable device (smartphone, computer, mp3 player) and a way to load the podcast onto the device (either by downloading it over an internet or data connection, or by using a USB cable to load it as a media file in the absence of an internet connection).

To Learn More:

http://aea365.org/blog/susan-kistler-on-two-terrific-evaluation-podcasts/

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