THE USE OF ADVANCED TECHNOLOGY TO FIND SOLUTIONS FOR HUMANITARIAN ISSUES

IR892 – Graduate Internship

A Culminating Experience Paper submitted to the faculty of International Relations
San Francisco State University
In partial fulfillment of
the requirements for
the Degree

Master of Arts

In

International Relations

by

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San Francisco, California

December 2020

Abstract

Digital humanitarianism is on the rise with the technology community asking questions on how advanced technologies can be used to address the world's biggest social issues. Businesses and governments have already been utilizing technologies such as AI to improve their operations and processes. This paper argues that the humanitarian sector should also harness the potential of advanced technologies to improve their service delivery and operations. The promises and possibilities to use technology as a driver for solutions in the humanitarian sector is immense and deserves further research and exploration. Technology-based solutions show effective especially in refugee resettlement processes as the case study presents. With the example of a tech non-profit, this paper shows how the issue of language barriers in resettlement cases can be solved with machine learning matching technology. Translating humanitarian issues into technological solutions not only show great impact but also unintended repercussions that need to be addressed by a collective of policy makers, humanitarians and developers. Issues of control, security, and confidentiality can be mitigated when needed policies are implemented. When technology is designed to benefit humanitarians, developers need to leave room for human supervision to guarantee a humane use of the technology.

Acknowledgements

First, and foremost I am thankful to God who is and continues to be my source of strength and hope through Jesus Christ. Completing my master's degree is not due to my own merit but solely through His goodness and faithfulness. In the course of completing my masters I have encountered many inspiring people who have helped me push towards the finish line. My gratitude goes to my family, who have been supportive from near and afar.

Thanks goes to all the professors of the Department of International Relations at SFSU who have contributed to my academic success. Lastly, a big thank you to the Tarjimly team that opened their doors and trusted me to learn in a fast-paced, tech, non-profit and start-up environment. Without the internship experience, my understanding of using disruptive technology for humanitarian purposes would have not been the same.

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1. Introduction

The rise of technological progress is at a peak in human history today with Artificial Intelligence (AI) serving as the knowledge producer of the 21st century. Throughout the revolutions in human history, the center of production has changed. From the industrialization, the invention of electricity to the computer revolution and now the so called 4th revolution, which represents AI. Scholars from varying disciplines such as Neuroscience, Computer science or Philosophy have researched in recent years the implications and ethics of the applications of AI in different industries and sectors. AI can be viewed as an autonomous intelligence able to produce knowledge on its own after being programmed to do so. In recent years, the private and public sector have harnessed the potential and promises of advanced technology to improve their organizational processes and increase efficiency as well as organizational profits.

The aim of this internship paper is to show how advanced technology can be used besides the improvement of efficiency and effectiveness of businesses and governmental organizations and thus benefit the humanitarian sector. Across the board, the humanitarian sector lags behind in including digital solutions to their operations. Humanitarians are starting to ask the question how their goals can be satisfied by using advanced technology as a problem solver. Using the example of a tech NGO, this paper researches on how the humanitarian sector, especially refugee resettlement cases can use technology-based approaches to find solutions to their greatest issues. Language barriers is one of the main issues in refugee resettlement processes, impacting medical access and legal processes. The humanitarian sector tends to be slow and inefficient in their work which reinforces the issue for refugees to access services due to language barriers. Inaccurate communication or misunderstandings lead to inadequate treatment or sometimes even service denial to refugees or asylum seekers. The main argument of this paper is thus, that technology-based solutions promise to help NGOs improve their services. The case study used will incorporate a close look into the study of migration by

highlighting the problems that language barriers causes for refugees to access services and basic needs. As presented in the case study, on-demand remote interpretation and translation carried out by machine learning algorithm connects aid workers with a volunteer interpreter for the requested languages. This technology-based solution reassures that refugees can have access to services and can be heard and understood. It has also a scaling impact because more refugees and asylum seekers can be helped due to the access to on-demand translation. Beyond the tech-based solutions for refugee cases, I want to promote the idea that technology presents a great benefit for the humanitarian sector as whole. The solutions for humanitarian issues should be engraved in a digital way. Digital solutions, as this paper will show, do not come without a cost. Concerns around human rights, confidentiality, privacy issues, the ethical use of AI, as well as the use of data are being addressed. Advanced or disruptive technology as used in this paper includes Information and Communication Technology (ICT), different forms AI like machine learning technology or Internet of Things (IoT) but is not exclusively limited to these.

This paper will analyze the use of technology for social causes and show that technical solutions has the power to accelerate social change. Furthermore, I hope to shed light on the need for the sector of humanitarian aid to exploit the technological advancement to address humanitarian issues. In this assessment paper, I will explore how non-profits can harness technology and how digitalization and machine learning can help provide humanitarian help. With the documentation of my culminating experience during my internship with a tech non-profit, I will show that the intersection between Silicon Valley and social good is possible. With the growing importance of digitalization and an increasing use of smart technologies within the refugee population themselves, I believe technology-based solutions have gained momentum and should be used by organizations who provide services to refugees and other displaced people. It is also important because of the positive impact it can have on improving the quality and efficiency of services for the refugees and migrants. This graduate internship paper will first

present the scholarly discussion and public discourse on the topic of the use of advanced technology in the humanitarian sector, specifically for refugee (re)settlement. Furthermore, I will conduct an analysis on the chances and challenges of using of technology to support the argument that advanced technology represents a true opportunity for the humanitarian sector to scale the impact of their work. Then, I will give a brief introduction to the case study and of the internship placement, presenting my responsibilities and achievements. In the analytical part of this paper, I will dwell on the issues that technology can solve in the particular example of immigration resettlement and the issues it can't solve. I will make the case to harness technology with human supervision despite the risks it represents. Doing so I will also highlight the hypothesis of this paper by describing the need to use technology but with the necessity of human intervention because of the sensitive nature of the humanitarian sector. In the sixth section, I will argue why the humanitarian sector as a whole needs technology-based approaches to solutions by presenting how advanced technology has also been used to find solutions for other social and humanitarian issues. Doing this, will give me a great range of examples to evaluate overall risks and benefits on the use of technology in the humanitarian and social sector. Lastly, I will make future recommendations and suggest further study in the area of the intersection of technology and social good.

2. Culminating Experience Report

This section will focus on my experience in the supervised graduate internship with the tech non-profit organization Tarjimly from August 24 to December 11, 2020. The work at the internship inspired and contributed to this culminating experience paper and the research question analyzed. Working in a tech-nonprofit, start-up environment gave me insight on how the tech community approaches issues with a solution-oriented mindset. From the humanitarian perspective, Tarjimly approached language barrier issues with a technological solution which I will document in this paper. The organizational structure of Tarjimly is divided into two main operational teams. First, the Development or Engineering team, which is the technical side,

assures the functional efficiency of the app and analytical tools. The second is the Communication and Partnership team, that focuses on external activities surrounding fundraising, partnership building, marketing, and outreach to volunteers and organizations. In the near future, Tarjimly aims to be used as the default humanitarian tool for translation and interpretation. For this reason, a strong outreach program has been started in 2020 in order to establish meaningful and strong partnerships with other organizations that work with refugees to adapt the app for their translation and interpretation needs. From the beginning of the internship, I joined the Communication's department of the small non-profit to support with partnership building. I had the chance to accompany the organization from its early stages of implementing a strategy to build partnerships with other non-governmental organizations who provide services for refugees. The partnerships are based on mutual benefit where Tarjimly's partners receive cost-effective, advantageous, and on demand translation and interpretation services and Tarjimly receives long-term partners who agree to give regular product feedback and pay for the premium product which has more features. As a 501(c)(3) California non-profit organization, Tarjimly relies on funding from donors to cover their operational costs. With the new business model to introduce a paid version of the app, Tarjimly will not only be able to grow their team, which will result in scaling their vision by reaching more refugees, asylum seekers, and aid workers but can also employ paid translators who cover the rare languages many organizations desperately demand.

During my internship I was one of the active members of the team working to grow the Tarjimly platform and making the app known to organizations that work with refugees.

I worked remotely from home for a total of 10 hours per week using my personal laptop to fulfil my tasks. During the internship, I was entrusted with the general team email address, which was the first contact point for questions and inquiries of app users and interested partners. On a weekly basis, I would engage in email correspondence in form of general outreach, responding to user inquiries and communicating to large corporations who reached out to

Tarjimly during the COVID-19 outbreak to implement a remote employee volunteer program. The process of the outreach starts with sending an initial outreach email to either organizations from Tarjimly's database or to aid workers who have registered with their organization on the Tarjimly app. If an organization is interested in using Tarjimly as a translation and interpretation tool in addition to their in-person interpreters, a meeting via videocall is scheduled for us to learn more about their organization and for them to learn about Tarjimly. During those calls, I participated in explaining how Tarjimly works and presenting the benefits of using the Tarjimly app as a translation and interpretation app as well as informing the organization of the new paid version *Tarjimly Premium* which has more features and advantages than the free version. Furthermore, I became acquainted with the various tools Tarjimly uses to analyze its impact and reach in the user base like Chartio and the Conversations tool. For analytical purposes and a better understanding of the overall use of the app, I could conclude from the data provided: who uses the app, for what reasons, the content and topic of the translations. Qualitative and quantitative information were also visible like languages requested, the number of requests in a week, the number of successful matches or failed matches, the quality of the sessions, the average wait time to request a translator, the satisfaction level of the aid worker or refugee with the received translation, and much more. Being part of the partnership building was important to have an insight on the trend of aid workers requesting a translator on Tarjimly and differentiating between new users and old users. This information gave us an indication on how successful the outreach was since the goal was to grow the number of aid workers using the app to request translators or interpreters. For strategic planning and partnership building it was also important to understand the retention rate of returning users and the reasons why some users decide not to use the Tarjimly app in the future. For us, it was crucial to understand the user's perspective in their need for translation in the app in order to implement modifications and changes that fit their needs more accurately.

The nature of the partnership we were aiming for, was to get as much input from aid workers as possible because they are the ones who directly work with refugees and who use the app. The app should thus meet all their translation and interpretation needs. For quality assurance and to get a better sense of the content and framework of the use of the app, I used the Conversations tool which gave a summary of the individual translation sessions. Besides the regular day to day operations, the development team occasionally needed support with testing of new features to be updated on the app. Therefore, my tasks also incorporated testing the new app version on the Apple Store for developers.

All in all, I am grateful for the work experience and insight I have received with the tech non-profit because of the mix in the organizational structure. I enjoyed the dynamics of a tech start-up work culture blended with the mission and purpose of an NGO that works for the betterment of human lives. The outreach to organizations and bilingual communities improved my capability to take on individual projects and enhanced my skills in working independently.

Finally, the greatest value I take from the culminating experience is to witness how disruptive technology is being used as a tool to eliminate language barriers in the humanitarian field. It shows that using AI as a solution is possible and that it has the power to impact many lives. It is also a great realization to observe how issues around interpretation could be translated into technological solutions. More interestingly, observing how AI is used only for the purpose of connecting volunteer bilinguals to beneficiaries was very insightful. I will show why a partial utilization of the possibilities of disruptive is necessary and why human supervision is important when using AI in the humanitarian sector.

3. Literature review and Methodology

There is a strong need for more scholarly engagement on the subject of using new technologies in the humanitarian sector. Given the novelty of the topic, the discussion is mostly driven by reports or projects of international organizations and corporations who have recognized the need to explore how recent technological advancement will change the way private

corporations, governments and humanitarian aid agencies do business. There is an overall consensus on the chances and opportunities that advanced technology offer for the humanitarian sector and social good (Action, 2014) (Google, 2019) (Harvard Humanitarian Initiative, United Nations Foundation, OCHA, & Vodafone Foundation) (IFRC, 2013) (Fong, Lubben, & Barth, 2018). Bergtora Sandvik et. al (2014), however, insist that the question of how technological innovation affects humanitarian action is in need of more critical inquiry. They believe such analysis need to go beyond any discussion of the cost and benefits of how technological innovation affects humanitarian action (Bergtora Sandvik, Karlsrud, & Gabrielsen Jumbert, 2014). In the public discourse, the mainstream media has been portraying an apocalyptical overtake of technology over humans when discussing the issue of control of AI (ARTE Magazin, 2020) (Independent, 2020) (The Guardian, 2019). Still, the New York Times found some positive impact tech have had, which is the focus of this paper, that there were organizations using technology to advance important causes and address large-scale problems. The media coverage and portrayals of AI and tech matters because it drives the public discourse, particularly in regard to acceptance in the population and later the development and regulations of AI. A rigorous assessment of the risks of novel technology is necessary in order to have the right measures and policies in place when developing them. However, an exaggerated depiction can contribute to misinformation and create fear towards disruptive technology.

3.1 Digital Humanitarianism & digital migration

It is in the midst of this debate, that a sub-topic of digital migration and digital humanitarianism in refugee resettlement processes is emerging. After the 2010 Haiti earthquake, the topic of using technology in humanitarian situations gained increased momentum. Patrick Meier, one of the pioneers of digital humanitarianism argues that big data has changed the face of humanitarian response. He examines how new uses of technology and vast quantities of digital data are transforming the way societies prepare for, respond to, cope with, and ultimately understand humanitarian disasters (Meier, 2015). Digital Humanitarianism can also be

understood in the context of having volunteers somewhere in the world who care enough to help the best way possible. Meier (2015) brings up the aspect of digital volunteering which he states anyone can be a digital humanitarian with the dual requirement of having a big heart and access to the Internet. Digital volunteering has shown effective and crucial in disaster response. OCHA (2013) explores how new ways of interacting are bringing people in need closer to those who can help. A world that is increasingly informed, connected and self-reliant will affect the delivery of humanitarian aid by volunteers, frontline responders, and communities. This was seen during the floodwaters in Manila, the Philippines, in 2012 when a woman issued an urgent appeal on the social network Twitter that her mother and grandmother were trapped by surging floodwaters and asking who could help. Within minutes, emergency responders rescued them (OCHA, 2013). The Harvard Humanitarian Initiative defines people who engage in this newfound way of volunteering as Volunteer and Technical Communities (V&TC). They even go one step further by arguing that V&TC not only help to make sense of large-scale calamities but also give a voice to an affected population.

Benton and Glennie (2016) explain how technology is transforming every stage of the refugees' journey. Digital migration can be understood as the use of tech innovations across the asylum process to facilitate and improve the overall asylum process. Digital migration studies is a stream of research that is bringing to the forefront the essential role played by mobile technologies, such as smartphones and social media, in helping refugees and undocumented migrants to obtain vital information to accomplish their journey successfully (Nedelcu & Soysüren, 2020). The most developed innovations for refugees' integration include digital tools to help newcomers navigate through local services, skills training and employment matching services, and digital platforms that employ principles of the sharing economy to connect. Information and Communication Technologies (ICT) can be used for displaced people to maximize refugees' chances of completing their journey to the destination country (Nedelcu &

Soysüren, 2020). Depending on who uses digital technology in the migration process, the purpose of its use will change.

The impact of digital technologies on migration processes is visible when it is used by migrants themselves, because they are empowered. If used by civil society actors, it is to make their services more efficient, and by governmental institutions for purposes of surveillance and migration control. While Benton and Glennie (2016) and Nedelcu and Soysüren (2020) argue in favor of the digitalized migration process, Gillespie et al. (2016) are more critical on the current digital provision for refugees. They are primarily concerned about the spread of misinformation for refugees' services due to the large number of apps addressing the challenges of refugees. Mobile phones that refugees use to help them in the resettlement process can be both a resource and a threat (Gillespie, et al., 2016). Moreover, the growing number of digital resources designed for refugees reduces the quality of the overall offers. Gillespie et al. (2016) argue that most are inadequately resourced and unsustainable and can ultimately do more harm than good if they disseminate misinformation. Attempts at quick 'tech fixes' do not work. Morozov (2013) addresses exactly this issue in his book where he talks about the concept of solutionism in technology and how developers have an increasing urge to fix problems that do not exist. However, the arguments against the ever more increasing innovation in humanitarian technology are limited. Not only does Morozov (2013) believes that ideas coming from the Silicon Valley can be somehow far-fetched, he goes further by implying that ultimately our humanity and individuality is at stake. Therefore, the development and use of ICTs should not be left to their developers, policy makers, or other professional groups alone but should be for the larger public to reflect on.

For Burns (2019) leaving the development of digital technologies to the private sector means these businesses will turn crises and disasters into sites of private business and capital accumulation. He argues that private and for-profit businesses have been making philanthropy and humanitarianism core to their business model. Burns introduces a new terminology of

"philanthro-capitalism" as a potential danger for the purposes of digital humanitarianism. Since humanitarian agencies rely more strongly on contracting work to these companies who have technological expertise, capitalist logics is embedded in humanitarianism by framing social and political problems as technical in nature and thus goes beyond critique to digital humanitarianism solutions. Beyond humanitarianism being exploited for capitalistic purposes, digital innovations in migration processes can also be used for control and surveillance. Nation states and supranational entities can use e-border systems to enlarge states' control and surveillance capacities (Nedelcu & Soysüren, 2020).

3.2 Humanitarian technology in disaster relief

While some authors focus on information sharing in humanitarian emergencies and disaster relief, others put an emphasis on the technology of AI and big data to bring forth social good. Guidi et. al (2017) define social good as a service or a good that benefits the largest number of people in the largest way possible. They view Internet of Things as connected objects that will become the texture of our society, providing us the possibility and responsibility to shape it. Mormina (2018) presents a view of scientific knowledge as a social good and the means to produce it as a matter of social capability (Mormina, 2018). Many authors have expressed concerns of inequalities that may arise from technological advancement. If not taken the right preventive measures, there will be unequal distribution in society in the production and generation of scientific and technological knowledge but also in terms of access to technology (Mormina, 2018) (Bergtora Sandvik, Karlsrud, & Gabrielsen Jumbert, 2014) (Mao, Koide, Brem, & Akenji, 2020) (Cosner Berzin & Coulton, 2018).

On the one hand, some authors emphasizing on the technology of AI and IoT focus on the improvement of livelihood especially of smallholder farmers in emerging economies since technology can play a crucial role in their supply chains to alleviate various social and environmental concerns (Quayson, Bai, & Sarkis, 2020) (Google, 2019) (Forbes, 2019). On the other hand, Cosner Berzin et al. (2018) and Mao et al. (2020) believe that technological

innovation presents an opportunity for social and human services to reach more people with greater impact on our most complex social problems.

Proponents of modern technology have been proactive to drive the narrative to harness technology for social good (Google, 2019) (Cosner Berzin & Coulton, 2018) (Quayson, Bai, & Sarkis, 2020). Mao et al (2020) have published a study for future technology development describing the implications and foresight of technology and its effects on social life by 2050. They predict an agent technology that could allow people to be empowered. Google is equally persuaded of the empowerment effect of advanced technologies for people and their communities (Google, 2019). The Office for the Coordination of Humanitarian Affairs (OCHA) on the contrary sees an issue with data and agency. They argue that, because of the aggregation of humanitarian data from multiple sources, the likelihood of individuals and groups reflected in that data, will be aware of, and be able to influence the way that data is used, will decrease (Action, 2014).

Furthermore, there are researches focusing on technology and the future of humanitarian action exploring how new ways of interacting are bringing people in need closer to those who can help. The OCHA and International Federation of Red Cross and Red Crescent Societies (IFRC) analyze challenges and opportunities in the ways in which technology, especially ICT can assist communities at risk and actors in humanitarian aid more effectively to prevent, mitigate and prepare for the impact of a disaster and in its aftermath, respond, recover and rebuild livelihoods (IFRC, 2013). Bergtora Sandvik et al. (2014) go further in their research in identifying how humanitarian technology applied to a context of crises encompassing natural disasters and conflict zones affects humanitarian enterprises.

Nevertheless, all agree on the responsibility of governments and policy makers to ensure an ethical implementation of frameworks in which disruptive technologies can be developed to avoid negative repercussions and inequality. Mao et al. (2020) even argue that policy maker should provide more inclusive and public participatory foresight in discussions with diverse

stakeholders to understand social needs and implications of technological innovations for society.

3.3 Chances and benefits to use technology for the humanitarian sector

As the world becomes increasingly reliant on technology, a grand challenge for social work is to harness technological advancements for social good. There are great possibilities that digital and technology-based solutions have the power to create massive change and radical transformation in who is served and the way they are served. The first benefit is the opportunity for social and human services to reach more people with greater impact. Humanitarians scaling their reach will bring a wider array of help to more individuals and communities. Scaling services will allow more people in need to receive assistance as seen in the example of crisis relief. Humanitarian work has up to now focused on local impact, which is valuable in itself, but with the help of technology their impact can increase, and more people can be helped.

Secondly, it represents a great opportunity for engagement of marginalized populations. Given these communities have equal access to information and communication technology, they can benefit from the new innovations and participate on a global social scale. Populations difficult to reach in the past through traditional services might find new opportunities for engagement in social work services through technology such as asylum support and services as mentioned in the case study.

For service provider, using technology-based approaches will improve their efficiency and optimize their processes. Tools such as mobile phones, social media, crisis mapping and big data analytics can give beneficiaries the opportunity to take informed decisions in a crisis, give humanitarians better situational awareness and improve aid delivery. Sharing data during the response to a disaster leads involved parties to make faster and better decisions in emergencies. The future promises not only aid assistance for a greater number of people but also a more suitable form of delivery for the ones who are being helped thanks to data analytics, evaluation, and interpretation.

Furthermore, it will benefit society by improving communication and productivity in the supply chain of aid delivery. Taking preventive measures through predictive analytics is now easier; the negative impact of issues like spread of child sexual abuse material and natural disaster can be avoided. Technology can thus reduce societal risks when implemented for preventative reasons. AI can be used to address a wide array of societal challenges and is flexible enough to extend beyond one societal challenge or sector because it can be used in health, environmental challenges, human rights issues, refugee resettlement, education, economic development, equality and inclusion, and finally crisis response.

Lastly, humanitarian technology reshapes relationships between "helper" and the "helped" (Bergtora Sandvik, Karlsrud, & Gabrielsen Jumbert, 2014). The people being helped gain more agency in the way they can communicate the type of help they need given their lived situation, especially in disaster relief. A solution suggested by the people in need is progressive because it confronts the savior-complex mentality which is widespread in humanitarian relief. It is equally a gain for the helper because they can direct their efforts and resources in the right place and the right way by meeting the expressed needs of the communities they are trying to help. Humanitarian Technology as stated by Bergtora et al. (2014) will also impact our understanding of common humanity and the way in which empathy is mobilized. It may even enable a better form of humanitarian assistance that doesn't take sides or make distinctions based on race, gender, age or political convictions. Action will be results-driven instead of ideologically motivated.

Despite great potential and many positive effects of technological innovation, it can have unintended consequences and raises various ethical and human rights issues that need to be addressed. The identified risks need then to be mitigated by implementing suitable policies.

3.4 Risks and challenges in using technology for the humanitarian sector

A balanced assessment of using tech for good requires looking at potential risks and challenges to minimize the risks when designing and developing technological systems that should solve

our greatest social issues. The development of such technologies introduces the first problem that comes with using technology in the humanitarian sector. Most of the new technologies are being researched on and developed in the Global North which creates an unequal allocation of innovation and access to technology for the Global South population. Disadvantaged communities could continue to face barriers to accessing information and analytical tools if not made affordable and available. For example, in the case of relief distribution which relies on technology such as mobile money, they often require network coverage, widespread mobile phone ownership, and sufficient technical and financial literacy among the beneficiary population. Since the population of industrialized nations have widespread access to these things, they can use it more than those in less developed countries. This can have unintended consequences such as deepening inequality and an increase in economic disparity between Global North and Global South.

Moreover, as mentioned above, technological literacy is crucial when incorporating technological solutions. The effectiveness of using advanced technology will only show if humanitarians have the ability to make knowledge-based decisions based on big data analytics. This ability requires education since the difficulty comes with translating insights and analysis into social impacts and asking the data the right questions to drive the right conclusion to benefit society. A great challenge is therefore understanding and managing the responsible use of AI and other technologies. Furthermore, its use brings ethical and legal considerations such as confidentiality, privacy and security matters. Greater information sharing and more data collection through crowdsourcing or crowdseeding brings risks of information misuse and compromised data security and privacy. It is essential to protect confidentiality, privacy and self-determination. Technology raises the risk of such breaches which can be critical when it comes to highly sensitive information that can put people in danger. The example of Tarjimly shows a potential risk in enabling remote volunteering because individual volunteers

participating in such initiatives are often less equipped than traditional humanitarian actors to deal with ethical, privacy, and security issues surrounding their activities.

Curation of big data is another enormous challenge, because the data are a byproduct of numerous processes, not generated specifically for the purpose to which they are eventually applied (Cosner Berzin & Coulton, 2018). The control and accurate or ethical use of data is not guaranteed since a large group of actors will have access to it. Since some information is generated by crowdsourcing, the data is open to everyone which raises the question of data ownership, control and regulation. A great point of concern becomes then potential data manipulation. So called "data dictators" who own people's data would be able to predict their next moves and thus manipulate outcomes. That is why the question of ownership needs to be regulated when developing datasets that will help humanitarians make more informed decisions. There is a compelling issue with ensuring data accuracy in three aspects. First, the validity and veracity of the data is crucial since the data collected or generated through digital or mobile mechanisms will often pose challenges in verification. Second, assuring anonymity is difficult because the use of data for reidentification of individuals and groups increase at an unknown rate. The potential damage of reidentification would be extreme especially for political refugees or persecuted and oppressed people. Third, the unethical use of data decreases the likelihood in which the individuals and groups reflected in that data will be aware of, and able to influence the way in which that data is used.

There are many challenges that technology presents when adapting its newest innovation to the humanitarian sector. This is mostly due to the novelty of the topic which indicates the fact that risk mitigation has not been thoroughly studied yet. However, one thing is certain, which is that many lives have been saved due to the use of technology by humanitarians. The positive impact it is already having in the lives of those being helped and served shouldn't be underestimated. Like every new human invention, it comes with risks that are at first overwhelming. Therefore,

it is necessary for policymakers and engineers to develop and implement policies as well as frameworks on the use of AI that will guarantee the safety and protection of people.

3.5 Methodology

This paper will contribute to the debate on the use of advanced technology in the humanitarian sector by stressing the need to harness the potential it offers. It will argue that just as the private and public sector have utilized technological advancement to improve their operations and performance indicators, so can the humanitarian sector use technology to scale their reach and services. I will take one step further than the already existing discussion by arguing to use technology as a tool to benefit humanitarian services. Doing so, however, should have a limit on the degree of automation and control humans entrust to machines to deliver humanitarian services. In analyzing the risks and chances of advanced technology, I will thus argue on the essential need of human supervision due to the importance of empathy in the given sector. My graduate internship with Tarjimly will serve as a supporting concept to strengthen my argumentation because they rely on machine learning algorithm to match human volunteer translators and interpreters with aid workers to translate or interpret for refugees, immigrants or asylum seeker. I will highlight the decision of the non-profit to limit the use of technology in connecting the right interpreter to the aid worker instead of using a fully machine translation solution. In this normative analysis, I will present the problems that technology solves in the case of immigration and the issues it can't solve. By doing so, I want to stress the importance of human connection and interaction in the vulnerable situations in migration. Furthermore, I will introduce other use cases in which advanced technology has been used to solve humanitarian issues. Having a broad range of examples, I will then assess the risks and benefits of technology in the humanitarian sector. Finally, I will draw conclusions and make future recommendations on how to address and mitigate those risks to best utilize the potential of technology.

4. The challenge of language barriers in resettlement processes

Language barriers represent a great challenge in migration and refugee services. It is part of the everyday struggle and hassle of many NGOs who provide services to refugees and migrants but still seems to be a tissue that is not tackled. NGOs mostly focus on organizational and operational concerns which leads the aspect of communicating with their clients to be a lesser matter of importance because as a last resort, humans can still find alternative ways of communicating like with hand gestures or machine translation. Despite difficulties of finding effective solutions for this issue by sometimes having an interpreter on-site, this section will show that language barriers should not be categorized as a small issue in the humanitarian sector. Most nonprofits rely on the bilingual language skills of their staff members or client's family members to interpret in needed situations. Those who have the necessary funding can afford to hire in-person interpreters or translators. In both cases, however, the NGO is limited in the language access they have for interpretation. Depending on the region of the world, some languages are more frequent than others which makes it difficult to ensure that a certain language interpretation can be offered when requested. The second issue that comes with depending on the small pool available of people who may be able to step in and interpret for a language they moderately or proficiently speak, is the personal availability of these potential interpreters. Meaning, the NGO can only communicate effectively with their clients, the refugee, asylum seeker, or migrant, when that person is around. Refugees and migrants need assistance and services at any given time. Unfortunately, sometimes it means that these services and basic help can't be offered to them when the aid workers can't communicate with them. Finding sustainable and long-term solutions for language barriers is crucial to assure refugees full access to the services they depend on like resettlement services, health care, or education. In the following, I will show why the issue of language barriers in refugee and migration services is important tackle and explore potential consequences it can have on those vulnerable communities if not handled properly.

First, if language is a barrier in conveying services to refugee communities properly it can lead to the communities being denied services. The potential of abandonment of refugee and migrant communities sounds harsh and unethical but is much a reality in some refugee camps. This leads to the vulnerable community to not only receive the help they need but they are deprived of their most basic human needs (Evans, 2020; Davies, 2020). In their vulnerable situation, access to nutrition, health treatment, education or even legal consultation on their resettlement or asylum cases is vital yet not having someone who can interpret the content of the services, they are often times abandoned. Refugees are thus left to their own perils and finding ways of survival. A non-ideal situation like this can lead to desperation for refugees and migrants since they are not able to access their basic needs just because of language barriers. Second, if the aid agency or NGO decides to proceed with providing services with no interpreter, miscommunication is very likely to happen. Inadequate service provision or even the wrong treatment can be a consequence of miscommunication due to language barriers. In addition, misinterpretation of cases and severe misunderstandings are possible repercussions. Some NGOs or resettlement agencies can even lose sight of the actual issue at hand because trying to figure out how to communicate can become the main problem. It can create mutual frustration on the side of the service provider as well as client.

Third, it can have psychological implications for refugees who already find themselves in a difficult reality of having left their home country and everything they know behind to start new lives in a foreign country. The feeling of not being heard or understood can give some a sense of loss of dignity. The fact that they are in a country where they don't know the language and the people, who are kind enough to want to help them but can't understand them, can cause a sentiment of devaluation of their humanity. It is a negative type of anonymity that no human being should feel because the feeling of being lost or feeling less than leads to identity loss and potential hopelessness. In extreme cases, this can lead to depression or even suicidal attempts

(Nye, 2018). For this reason, the issue of language barriers and refugees not being heard and understood should not be underestimated. It has become even more crucial during the current COVID-19 pandemic outbreak, where refugee and migrant communities are the most vulnerable. Essential messages and service provision need to continue especially during challenging times as this.

Theoretically, if NGOs and resettlement agencies face the issue of language barriers, they can solve the issue by either hiring bilingual staff or get interpreters whenever they need to. The issue at hand, is more complex than cause and effect. The inefficiency of most NGOs in this case can be caused by structural reasons which can't be solved overnight. Non-profit organizations in their nature have the benefit of being human-centered and carrying the goodwill of wanting to help groups of people and communities who are underserved by the government or their environment. NGOs therefore play a crucial role and are an essential body in the humanitarian sector. Their inefficiency is often caused by their low-budget and the limited amount of funding that is available to them. Although their mission and work are valuable and much needed for communities who cannot help themselves; their means of doing so is limited. With low budgets and low capacity, the staff providing services are often times overwhelmed and can't provide adequate services to their clients. In the cases where capacity to serve these communities are given, they sometimes don't possess the right resources to help the refugees or migrants. Another issue is bureaucratic hurdles that many non-profits face which makes their operations inflexible and unadaptable to the needs of their beneficiaries. All these factors that lead inefficient workflow leads to inadequate service provision, unmet needs of refugees and migrants, and underserved refugee communities. The mentioned challenges can appear individually exclusive while still reinforcing each other. Language barriers in the face of structural and organizational issues can give them impression to not be as pressing.

This is not to disregard the importance and necessity of the use of certified community interpreters by non-profits when possible. However, it is important to recognize that in many

situations, language access is a problem but hiring an interpreter or translator is not a viable solution.

Nonetheless, the refugee and asylum seeker communities need to be served to the best of the nonprofit's abilities. Hence, technology offers various solution approaches to tackle the issues nonprofits face in their day-to-day operations. A technology-based solution to address the issue of language barriers, I believe is the first step in the right direction to ensure that refugees can be helped and receive the basic needs. I will support my argumentation with the case study of *Tarjimly* and present their concept of using technology to eliminate language barriers in the humanitarian sector.

5. Case study: graduate internship with Tarjimly

In the following I will present the concept and operations of the tech non-profit *Tarjimly* that uses machine learning technology to eliminate language barriers in refugee resettlement cases. The method used to present the case study is based on observation from an internship report. In this assessment I will argue that the humanitarian sector needs to take advantage of disruptive technology to find solutions for its biggest issues. Using the concept of Tarjimly, my main argument suggests to exploit the potential of disruptive technology while limiting the use of AI as a tool to benefit humanitarians by allowing human supervision. In the case study, Tarjimly uses machine learning algorithm to connect aid workers to human interpreters and translators instead of using fully machine translation as the solution for language barriers. The concept of Tarjimly addresses a core issue that humanitarian workers working in refugee resettlement face. With their mobile app that connects aid workers with a volunteer interpreter or translator for the languages requested, a gap is closed in the informal communication between refugees, asylum seekers, and immigrants and their service provider. Adapting this into their daily operations can ensure that refugees and asylum seekers will be served to their best abilities. The mobile app is free for users to download and request on-demand translation or interpretation.

A free access to a large platform of multilinguals means for non-profits a higher probability to receive interpretation for a needed language than under normal circumstances. This solves the cost and availability issue that many NGOs are currently confronted with. Not only will NGOs and resettlement agencies who provide services to refugees be able to meet the needs of their clients by communicating with them effectively, but they can do so in a cost-effective way. The case study will show that AI can be used as a solution to the language barrier issues that is prevalent in refugee resettlement and other circumstances to help displaced people. The aim is to shed a light into the potential of disruptive technology such as AI for the humanitarian sector.

5.1 Tarjimly's mission to eliminate language barriers

The graduate internship I am doing is with Tarjimly, a tech non-profit founded in 2017 with the mission of eliminating language barriers for refugees and humanitarian workers. Tarjimly is based in the heart of Silicon Valley in California and is a 501(c)(3) California non-profit organization. The meaning of Tarjimly stems from Arabic and means "translate for me". It is a fast-growing organization run by four full-time employees and 25 volunteers as well as interns who are around the world supporting the day-to-day operations of the non-profit, working hard to ensure their vision is met to give a voice to vulnerable people and refugees.

Tarjimly was developed by two MIT graduates, who divide the executive responsibilities in the two main departments. One of the co-founders is responsible for executive directions around outbound communication and marketing while the other operates as the Chief Technology Officer, leading the product development and leveraging the latest technologies in communication and machine learning to increase the efficiency of humanitarian services and global volunteering. They both founded Tarjimly in response to the Syrian refugee crisis and the US government's refugee and travel ban prohibiting refugees from majority Muslim nations to enter the United States (Trump, 2017). The platform was first created for refugees, asylum seekers, and immigrants to get translation help on Facebook messenger and was soon launched

on an independent app in 2018. Tarjimly was founded with the mission to eliminate language barriers for refugees and humanitarians by developing the world's default humanitarian translation tool. They believe it is a universal human right to be heard and understood which increases dignity and equality of service for displaced people. Thus, humanitarian services should never be denied due to language barriers.

In addition, technology needs to work with communities to build trust. Technology and high-quality skilled people are widely available to address these issues but deployment often times is not. As a duty to their own communities, the two Tarjimly founder, who both have a migration background, took it upon themselves to build a product that gives refugees and immigrants their voices back; whether they are in a refugee camp or resettling in a new country. Their goal is to translate for over 1 million beneficiaries with a pool of over 1 million bilingual volunteer translators through the phones of refugees, immigrants, health workers, lawyers, educators and much more (Tarjimly, 2020). With the combination of Silicon Valley and social good, the vision is to build a new product category of remote volunteering for humanity, giving instant access to the world's largest pool of trained translators and interpreters.

The Tarjimly Mobile App trains and connects its community of more than 16,000 bilingual volunteers to humanitarians in less than two minutes, using machine learning matching technology. On the mobile app users can send text messages, documents, and start calls. Recently, they have developed a premium version, *Tarjimly Premium*, a suite of tools and certified translators built on top of the mobile app designed to meet all of an organization's translation and interpretation needs.

5.2 How it works

The Tarjimly mobile app allows the world's three billion multilingual speakers to remotely volunteer their language skills as translators and interpreters for the 65 million displaced people. They use crowdsourcing to get volunteer bilinguals to provide on-demand translation and

interpretation on their app. The mobile app distinguishes between two user types. On the one hand, there are beneficiaries or humanitarians, amongst whom can be refugees, asylum seekers, immigrants, and aid workers. On the other hand, there are multilingual volunteers who download the Tarjimly mobile app on their smartphone, where they fill out their language skills and go through a conduct training and confidentiality agreement. Since the launch of the mobile app, there has been more than 16,000 volunteer translators globally who signed up to volunteer remotely. On the flipside, more than 9,900 beneficiaries have registered to request on-demand translation or interpretation (Tarjimly, 2020). As seen in Figure 1 this impact can be quantified by the amount of the times the mobile app has connected a translator to someone in need since the launch of the app in 2018, which is more than 16,000 times (Tarjimly, 2020).
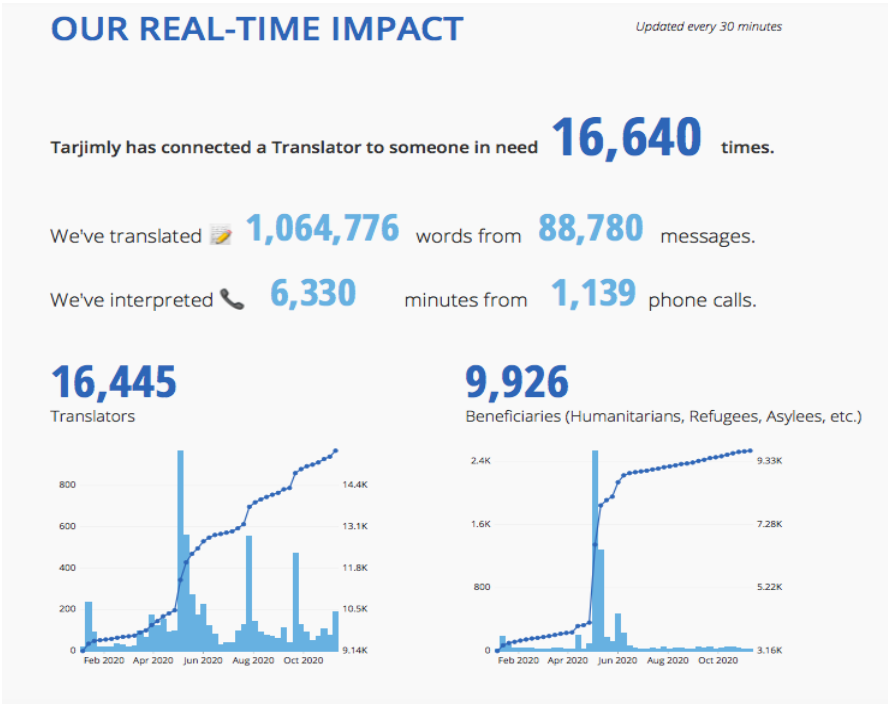
Figure 1: Tarjimly Mobile App impact as of November 2020 (Tarjimly, 2020)

When a refugee, asylum seeker, or humanitarian worker requests a translator or interpreter, they select a language, and Tarjimly's machine learning matching algorithm searches to find the best volunteer translator or interpreter available in the pool of people who speak the requested languages. The volunteer translator or interpreter accepting the request is then connected in a

live chat with the person in need, where they can send text messages, documents, and start a phone or video call. When a session is finished, either person can end and rate the conversation. The described procedure above is the simple depiction of the executed idea of how Tarjimly works and the impact it makes.
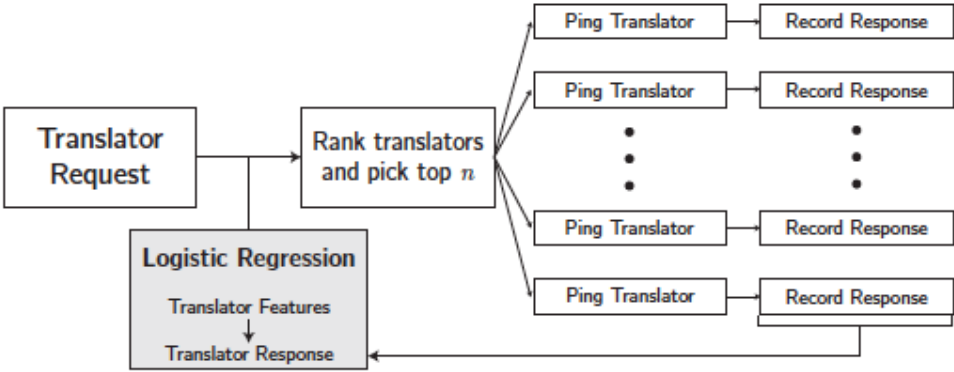
Figure 1: **Translator matching pipeline.** Each request for a translator is passed through a logistic regression classifier after a series of filtering steps. The top $n = 30$ translators are ranked according to the classifier, and pinged. Translator responses (yes, no, and null response) are recorded for further training of the classifier. The first translator to respond "yes" is matched with the requester.

Figure 2: Tarjimly Translator matching pipeline (Source: XXX)

The overall aim of Tarjimly is for it to be used in spontaneous situations and day-to-day operations. Use cases vary from legal situations when providing information on legal procedures or communicating with walk-in clients, to communicating with refugees on pre-existing health conditions in medical contexts. Other examples are when classroom materials need to be translated or parents provided with information regarding their children's education, or more generally translating documents and posters. The number of sessions on the mobile app differ from week to week. Tarjimly documents at least 10 sessions a day and up to 150 per week depending on the demand and need. Tarjimly's concept of remote interpretation that is not limited by place, time, or location, has proven effective and essential especially during the current global pandemic with the outbreak of COVID-19. Many organizations have been searching for ways to provide remote services and communicating with refugees. For this

reason, the tech non-profit has strategically sought partnerships with non-profit organizations who provide services to refugees and asylum seekers, to help them have on-demand remote interpretation with their pool of volunteers. The Tarjimly mobile app is free to download and use for both multilingual volunteers and beneficiaries. The collaborative partnerships with NGOs working with refugees, however, include an upgraded paid version of the Tarjimly app, *Tarjimly Premium*. To cover long-term costs and to continuously receive feedback from users, Tarjimly offers NGOs to join the Premium user base and gain access to more features that increase quality, accuracy, and the security of their conversations. Tarjimly has closed partnership agreements with fourteen organizations who have all joined in 2020, amongst others are *Refugee Info Bus, Refugee Assistance Alliance, Indigo Volunteers, and Heart & Homes for Refugees* (Tarjimly, 2020). The growth and development of the tech non-profit is tremendous since its launch in 2017, which indicates the great need for interpretation in refugee resettlement processes.

Nevertheless, the recurring concerns of confidentiality, security, and privacy of clients expressed by NGOs are one of the main obstacles a new tech non-profit like Tarjimly faces. Since refugee resettlement cases are sensitive and deal with people's very existence, many NGOs shy back from trusting a mobile app to provide them secure and accurate interpretation and translation when needed. Many who are comfortable with the conventional route of having certified in-person community interpreters, don't know if the bilingual volunteers on the mobile app has the necessary qualifications and competence of a translator or interpreter. Furthermore, aid workers fear the small possibility of not getting connected to a volunteer translator. Tarjimly addresses these concerns by giving their volunteers a code of conduct training, get them to agree to confidentiality and pursuing HIPAA compliance (Tarjimly, 2020). The concerns Tarjimly face go beyond the power of one tech organization to solve. These weaknesses of the mobile app only highlight the long way developers and the tech community still have to go in order for traditional services to be enhanced and improved with technological means. A collaborative

effort between governments, humanitarians and the tech community to mitigate these risks is therefore necessary.

More than the practical impact and timely relevance of the app, the mission of Tarjimly has positive emotional and psychological impact on the beneficiaries. Refugees who already face adversity in the new realities they find themselves in, have a feeling of hope when they see there are thousands of people who are ready to help them from the other side of the world and give them a voice to be heard and seen. For this reason, the concept of solely using advanced technology for the matching algorithm and not developing a fully machine translation is very crucial, because humanitarian care is guaranteed. Human intervention is essential when using advanced technology in the humanitarian sector for various reasons I will mention in the next section, one of them being empathy for the vulnerable.

5.3 The importance of human intervention while using technological solution

Tarjimly has limited their use of AI to machine learning matching algorithm to connect a human translator to the beneficiary. This use case depicts a fundamental choice of having human translators instead of machine translation, which with the current level of AI technology is very much possible to design. The need for human intervention is a relevant consideration in the current debate and the question of AI and automation. In the following I will explore differences, between both chances and risks, on the one hand in having a fully automatized machine translation system and on the other hand limiting the use of technology to the matching technology and connecting a human translator with the beneficiary.

5.3.1 Benefits and limitations of machine translation

For the discussion of assessing the necessity and benefits of using human translators to guarantee human supervision when helping people in the humanitarian sector, I will first start by debating the possibility of having fully automatized AI system to provide translation services in humanitarian aid. Here, I will discuss the chances and risks of doing so.

Supposed the NGO would use automation translation by artificial agents, the possibility of programming language capabilities and capacities would be immense. Tarjimly relies on human volunteers who are at least bilingual with a basic or proficient language skill to provide translation when needed. A machine can be programmed with a wide range of language skills and through machine learning it will be able to perfectionate the art of translation by conveying a message the aid worker is trying to tell a refugee. AI will simulate intelligence, rationality and linguistic behavior successfully because that is how they are designed to function.

Furthermore, the availability of translation for the language needed will always be there since the aid worker or refugee will not have to rely on another person's availability and time schedule. Another significant advantage that AI systems have comparing to humans is their ability to be objective. Artificial agents are not subject to biological constraint that humans inherit. This is a point that shows how AI can enhance the possibilities of improvement (Haroutioun & Montemayor, 2016). Overall, AI presents a golden opportunity to benefit the human condition and humans should exploit this in every sphere possible.

Nevertheless, whether a machine language system performs well depends on how well it is trained. Machine translation systems are trained with corpus groups of people and cultures of the Global North like the US or Canada. Thus, the model of those systems is Westernized, highlighting the issue that the group that is served when using machine translation is under-resourced. Refugees and asylum seekers, the people who need translation and interpretation services, are not the ones who can fund the development of those systems (Brizan, 2020).

The challenge is the strong regional influence of the languages in a machine translation system. Frequent languages like Arabic require mutual intelligible since there are differences in regional slang. Machine translations like Google Translate can't recognize these differences which can cause difficulties in humanitarian situations because the beneficiary may not be able to understand a particular regional slang. In addition, the company Google itself is aware of its products' limitations when they communicated that Google Translate can't replace human

translators when documents show that US Immigration officials have used it to vet refugees (Torbati, 2019).

Language availability in the pool of machine translations is another issue. Google Translate doesn't have some indigenous languages which many displaced people speak. Furthermore, indigenous languages are oral and not written, making machine translation futile. Google Translate only offers text to text translation and doesn't have the option for oral interpretation, which is crucial, not only for live but also remote interpreting for clients. Legal frameworks and questions need to be considered when involving machine translation in the humanitarian sector. First, the issue of control is a great concern because it needs to be clear whose purposes the artificial agent is serving. In cases where refugee resettlement and asylum rights are the topic of discussion, sensitive topics are addressed and often times it is people's existence that are the subject of the communication. The question of data ownership, control and agency is important to consider when talking about confidentiality. Machines are not living agents who can be held accountable for their actions like misinterpretation or the misuse of confidential data. Surely, humans can't be fully trusted either, however, humans can sign confidentiality agreements and in case of breach of confidentiality, the person responsible is known and can be held accountable and liable for it. In the case of AI there is a greater question of agency and identifying the one responsible for the actions of the machines.

In addition, Fairweather and Montemayor (2017) argue that social intelligence is critical for successful communication. Knowing how to speak requires attending to the right contextual cues to identify speech acts. Language can be ambiguous and requires historical, cultural or social understanding that machines do not possess. Language also keeps evolving and changing. Machines don't keep up with cultural changes and evolution of slangs. They also do not have contextual understanding that goes beyond simple translation of a text since knowing the difference between a command, suggestion or a joke is critical in human interaction. Google's AI don't have body comparison like humans do, therefore, they can't recognize idioms or

metaphors (Brizan, 2020). It also can't understand misspelled words or grammar mistakes. Some refugees, asylum seekers and immigrants have lower levels of education and don't have perfect spelling or grammar. A human translator could still understand the meaning through context, even if words are misspelled.

Lastly and most importantly, machines lack social and moral intelligence which is very crucial in a sensitive surrounding of humanitarian aid. Technological advances to facilitate and improve our everyday life has many positive sides to it and programming ethical behavior based on rules and machine learning is possible but we will never be able to reproduce emotions or empathy by programming such control systems. Regardless of how successfully AI will be able to stimulate intelligence, rationality, and linguistic behavior, AI agents may become intelligent and competent speakers on a human level, but they may never be able to experience feelings or emotions in the same way as humans. Emotional intelligence is irreplaceable in human interaction and AI systems don't have it. AI lack moral standing and moral intelligence, something that is indispensable in the field of humanitarian work.

5.3.2 Necessity of having human translators

Emotional intelligence is by far the greatest advantage that humans have towards machines because it is something that is difficult to design and program. In this specific case when translating for refugees, having human translators on the other line is so valuable to people who are in a situation where they were forced to leave their home countries due to various reasons. Being in an already vulnerable space and finding oneself in a foreign country, any sense of belonging or being heard by other human beings is often priceless given the situation where people don't feel heard. For refugees in difficult and complicated situations in which they feel abandoned, it is comforting to know that another human being on the other side of the world is taking time and willing to help by translating for them. This sense of empathy and sympathy is not small.

Jodi Halpern (2003) comments to this effect in the medical context as clinical empathy. The effect is the same where patients seek empathy from their physicians because we as humans are wired to wanting to be understood in our greatest pain. She describes empathy as a mode of understanding that specifically involves emotional resonance. It involves associative reasoning where an emotional guided thought links one idea to another in an associative way. Haroutioun and Montemayor (2016) argue that phenomenal consciousness is essentially a biological process and thus AI is limited in simulating it. The risk of having an artificial agent with human-level intelligence is that because AI is goal oriented, and if understanding the person's emotions is not a variable that plays into solving a problem, then they won't consider this as necessary. But the case study shows that emotions are indeed valuable and necessary. The difference between humanitarian sector to the economic world is that their work is not driven by profit maximization objectives, it is more about the human connection.

The great dilemma in this debate is finding the balance on how much we should take advantage of the technology we have and how far research should go in exploring the never-ending possibilities of AI to benefit our human condition. Criticizing shortcomings and risks of AI is not the same as blocking technological advancements. Simultaneously, we need to address the chances AI can bring in bridging the shortcomings and flaws of humans.

First, as much as human emotional intelligence can be beneficial to helping other people, human emotions, irrationality, biases and pre-conceived notions have influence on how people translate. There have been cases in the realm of translation for humanity where translators purposely mistranslated a message from people of different religious belief to hamper and endanger their asylum process. This touches on Halpern's point that emotional responses can be threats to objectivity. Second, sympathetic helper risk over-identifying with the ones they are helping which can create emotional ties that is not necessarily beneficial to the work.

Third, regardless of the large pool of bilingual volunteers who speak different languages, there is no guarantee for receiving a translator for the languages requested at the time needed. AI

systems are ahead of humans on this point. An automatic translator is available at any time with every language available to the system when designing and programming it. Fourth, in a pool of volunteer translators and interpreters, the quality and proficiency of interpreters can't always be ensured. The question of liability is also a point of concern. However, machine translations are not less liable since the accuracy of their translation can also not be guaranteed.

Having assessed both sides, it is important to define the objectives for which a system should be used for and know who they should benefit. In this case, the primary beneficiary of the translation services is the refugee or migrant who is in a vulnerable position and in desperate need to be understood. Therefore, the necessity of providing human connection and empathy through emotional intelligence should outweigh any benefit of AI systems or human flaws. Lastly, the importance of human connection should not be underestimated, especially during this current period where governmental order requires us to 'social distance' and the majority of our everyday lives and operations have been moved to remote operations. This time in history should remind us humans that regardless of the great invention of technology which is keeping us connected in a time where social gatherings are prohibited; zoom meetings, video calls, and all the great the innovations of technology, can't replace true human connection.

6. The case to use of tech in refugee resettlement

The humanitarian sector has a great opportunity to tackle its efficiency issues and eliminate language barriers which prevent them to offer their services effectively and efficiently. This section will discuss why agencies who offer services to refugees and migrants should adopt technology-based solutions to improve their services. Besides having a more effective workflow, agencies working with refugees should adapt the technology that their clients use excessively on their journey and throughout their asylum process.

6.1 other apps and technology that address helping displaced people

Innovations and technological efforts to ease refugees' situation has increased dramatically in the past few years. Tech and startup responses to find new solutions to help displaced people were mostly birthed as a response to the 2015 "refugee crisis" in Europe after millions of Syrians had to flee their homes due to the civil war. Concerned individuals and organizations, compassionate developers, altruistic humans have since designed and created solutions using new technologies rethinking the way displaced people can be served and so challenging the status quo. Recent innovations around refugee resettlement and asylum process include technological solutions in the range of pre-departure, transit journey, initial arrival and orientation, and finally long-term integration (Benton & Glennie, 2016).

In the first stage of migration, communicating with those who have gone before is crucial to determine the country of destination. International Migration scholars have proven that a network is crucial in the refugees' and asylum seekers' choice on where to migrate (Haug, 2008). Communicating with their network through either WhatsApp or Viber about the potential country of destination and the safest route to take is thus the first way refugees to use their smartphones before embarking on their precarious journey of migration (Benton & Glennie, 2016). In their transit journey, refugees rely heavily on mapping systems and Global Positioning Systems (GPS) for orientation and navigation. Access to digital resources is crucial because it helps for protection against smugglers during their perilous and dangerous journey. Migrants are empowered by their strategic use of ICTs since they can document their journey and be locatable by sending their accurate geographical location to their family and friends.

Once refugees and migrants arrive safely to their destination, there are several apps that helps them navigate through their new environment. For the initial arrival and orientation, tech innovations vary from navigating services ranging from health services, housing and goods, employment search, money and banking, and translation and interpretation. RefAid for example offers an overview of local services for migrants from trusted organizations on their mobile

app. The app shows migrants, refugees and those who help them find services near them (RefAid, 2020). Since some researches have the concern regarding the spread of misinformation for refugee services due to the large number of apps addressing the challenges of refugees (Gillespie, et al., 2016), RefAid works with some of the world's largest and trusted organizations to ensure that migrants can access trusted services and accurate information in the palm of their hand, wherever they are.

The BMC Health Services Research team in Germany developed a digital communication tool that is to help paramedics communicate with patients who hardly speak any German. Addressing the issue of language barriers in paramedic care, the research team developed and evaluated a digital communication tool designed to improve communication in medical consultations (Noack, Kleinert, & Müller, 2020). They emphasize the importance of mutual understanding for medical treatment which allows patients and medical staff to communicate about acute complaints, pre-existing conditions, and the treatment procedure. Misunderstandings can have far-reaching consequences, especially in time-critical emergencies which require rapid assessments and decision-making.

Kiron Campus, an online University platform, offers free online learning opportunities to refugees and underserved communities. They believe in a vision where everyone has the equal chance to access and succeed in higher education (Kiron, 2020). Part of settling in a new country is having educational and professional perspectives; access to higher education is therefore essential to bring hope into the refugee's life.

On a general scale there are far less innovations for the long-term integration processes for refugees and migrants. Most of the apps facilitate finding housing or community. The lack of innovations for the long-term settling plan is an important aspect that needs to be highlighted in this discussion. The existence of a multitude of tech-based approaches to solve issues in refugee resettlement and across asylum processes reaffirms the argument made in this thesis to harness the potential of advanced technology to find solutions for the pressing social issues our

world face. However, the growing number of digital resources designed for refugees only reduces the quality of those innovations available. It this therefore not just a matter of designing new tech innovations to ease refugees' lives but the focus should be on adequate and sustainable models. The varieties of innovations and idea prove to be helpful but innovators, developers and all stakeholders must make sure to have long-term sustainable models that can scale and help the largest number of refugees as possible.

Many initiatives and apps have launched as a response to the Syrian refugee crisis between 2015 and 2017 but have stopped working due to various reasons like lack of funding or unsustainable business models. Other aspects to consider with the tech-based solutions is whether their aims are appropriate and responsive to the actual needs of migrants. Humanitarians working in asylum process and refugee resettlement need to reassure solutions don't cause more damage than the problem they seek to address (Gillespie, et al., 2016). It is not enough for there to be an organization like Techfugees that exists to empower displaced people whilst supporting tech innovations designed by, with, and for them (Techfugees, 2020). Humanitarian agencies and governments need to find ways to work together with UN coordinating structures, donors, civic groups, tech businesses, and engineers to design and create solutions useful for the affected communities (Harvard Humanitarian Initiative, United Nations Foundation, OCHA, & Vodafone Foundation). Partnerships between nonprofits, technology companies and academic institutions will allow for an open ecosystem to share knowledge and intellectual property to benefit organizations working on the same solutions. In this way, attempts to fix deep-seated social problems will not be compulsive but well thought through. Resettlement agencies working on the field with refugees have the knowledge on their own operations and technology companies have the expertise to design solutions that will facilitate the work for the domain of refugee resettlement.

6.2 refugees using tech themselves

There are many reasons why different actors in migration cases should adapt technology-based solutions for the betterment of their operations. Digital migration studies reinforce that ICTs can be creatively used by refugee populations and by other actors in civil society to maximize refugees' chances of completing their journey to the destination countries (Nedelcu & Soysüren, 2020). Most importantly because refugees are the main actors in refugee studies, their relationship with technology is vital when analyzing the benefits of technology for their purposes. Despite the vast amount of research in migration dealing with refugees, researches are about them and not for them (Gillespie, et al., 2016). Refugees use technology for every stage of their journey; from the decision to leave home to the process of settling in their destination (Benton & Glennie, 2016) and to manage their transnational lives (Nedelcu & Soysüren, 2020). The argument to use technical solutions for resettlement operations is strengthened by the fact that refugees who are the focus point of service in this case already use the tools that is supposed to help them have better access to services. Mobile communication tools allow refugees to plan, navigate and document their journeys, use translation tools, access vital services like legal, medical, food, shelter and support networks while being in contact with family and friends. It is also important for them to be locatable and visible to ensure survival. In addition, mobile technology doesn't only allow for migrants' emancipatory practices but has psychological impacts on the vulnerable groups. Global positioning applications, digital maps, and digital platforms like social media through which experiences are shared within informal networks represent innovative logistics that allow migrants to cope with the changing often hostile social, political and economic conditions to which they are exposed.

Knowing this changes the way to think about basic and necessary needs that refugees and asylum seekers need for their survival. Digital infrastructure has become just as important as the physical infrastructure of roads, railways, sea crossings and the borders (Gillespie, et al., 2016). Smartphones is essential for many refugees because it provides access to a range of news

and information resources they depend on for their survival. Unfortunately, the risk of misinformation is very high (Nedelcu & Soysüren, 2020) since governments and news outlets fail to provide accurate information, forcing refugees' to rely on alternative often unverified and unreliable sources of news and information circulating on social media, particularly smugglers and handlers (Gillespie, et al., 2016).

The same digital tools that help refugees and asylum seekers empower them during their passage until the integration in their country of destination can also be used against them. Smartphones are therefore both a resource and a threat. Their voluntary or involuntary exposure to smugglers endangers them and exacerbate the already dire situation. Smartphones can also be a threat because of digital traces they leave behind which makes them vulnerable to surveillance by states or non-state actors. According to border and security studies, digital technologies, when used by governmental bodies can erect new e-borders and enlarge states' control and surveillance capacities (Nedelcu & Soysüren, 2020). ICTs have also become central to the management of migration flows by nation-states and supranational agencies. Furthermore, the safety of those trying to flee political oppression is undermined because digital traces can serve as vector for hostile political regimes from origin countries to track political opponents.

The study of digital migration shows to be very complex especially when regarding the different actors in the field and their purposes of using technology to address their individual concerns. Digital technology is not only used by migrants themselves, but also by civil society actors, or by institutions with their mediating role in the processes of empowerment, surveillance and migration control. A thorough digital management for migration is thus crucial for the future. Refugees already facing dire situations should not have to worry about their use of mobile technology to be used against them by states they are seeking protection from. This will be only possible if states work in cooperation with tech companies, NGOs, and other stakeholders to

develop coherent news and information strategy for and with refugees on their journey from their home country to the country of destination. The debate becomes ideological when a cooperation of governments with stakeholders and refugees to assure them safe passage to cross their states' borders would appear as if they were facilitating migration and attempts of refugees to seek asylum in their nations (Gillespie, et al., 2016). The fear of displaying migratory policies in favor of refugees is inhibiting states to fulfil their human rights obligation to facilitate the refugees' travels under the UN Refugee Convention (UNHCR, 1951).

6.3 Problems technology solves

Technology-based solutions to facilitate the refugees' journeys (Benton & Glennie, 2016) and help resettlement agencies work more efficiently (Königes, 2016) are prevalent with great momentum. The myriad of initiatives and apps show the possibilities of problem-solving capacity advanced technology present. In this section, I will analyze the problems in refugee resettlement that already existing technology solve and then identify the issues that can't be solved by technology as of the time of writing this paper.

First, the mission of the tech non-profit Tarjimly as presented above is to eliminate language barriers. The use of machine learning algorithm on the Tarjimly mobile app allows aid workers to connect with bilingual volunteers anywhere in the world within a few minutes to receive interpretation or translation. On-demand interpretation or translation is provided with the help of technology which is a crucial factor in solving communication and mutual understanding issues. Common day to day conversations like translating a text to inform a migrant about an important appointment or helping paramedics communicate with their patients about pre-existing conditions are essential milestones made possible through technology. The gap of providing informal services to refugees is closed because aid agencies can connect to a bilingual volunteer for free instead of hiring professional interpreter for a short time. In addition, having a global community of translators reassures anonymity for the client because they won't

personally know the translator or interpreter. This is valuable in sensitive cases where refugees don't want people in their community to know their personal issues. The potential for social desirability bias is reduced since the beneficiary wouldn't know the interpreter personally (Lee & Sulaiman-Hill, 2014).

Furthermore, with the help of GPS and digital mapping systems, refugees who are in the midst of their transit journey are locatable. Migration scholars have analyzed transit journeys for migrants and refugees to be dangerous because of the potential exposure to human traffickers (Vogt, 2013). Mobile communication tools allow refugees to plan and navigate their journey and be locatable and visible to ensure their survival. In worst-case scenarios, refugees can be tracked down by families if they don't send a sign of life.

The problems of information and access to it are lifted since refugees can receive instant notifications on their smartphones about relevant organizational or political information concerning their journey. Staying informed about what awaits them during their transit journey and in the country of destination is key since in the past they had to embark on an unknown and uninformed journey to an uncharted place. Assuming the information they receive about services and latest regulations are correct and regularly updated, refugees can navigate with less worry and concern due to the knowledge the information provide. Lastly, most tech-based solutions help with organization and settling in the host country. It eliminates the sense of disorientation and powerlessness for the newly arrived refugee since the apps helping with structuring different services and administrative steps guide them to have concrete action plans. The inefficiency problem of agencies for migration and refugees are equally solved by implementing digital solutions into asylum processes. An example is the response German authorities had to the large number of Syrian refugees who needed to be recorded into the database of the Federal Office for Migration and Refugees in 2015. The responsible parties advanced the agenda for a digitalized asylum process (Königes, 2016). The new uniformed integrated identity management system allowed German officials to increase transparency in

processing, reduce processing times in asylum applications and decrease the waiting period for asylum seekers.

Consequently, advanced technology solves many deep-rooted challenges in refugee resettlement procedures including but not limited to language barrier issues. Still, the migration sector is a field that faces complex issues that can't all be solved by technology to date.

6.4 Problems technology doesn't solve

Technological innovations have opened the door for solution-driven initiatives to address the most pressing humanitarian issues and have shown the possibilities when fully harnessing the potential it offers. Great progress has been made in the domain of digital migration to find new ways in which digital change drives migration in the 21st century. Nevertheless, the reality of any great invention and innovation is that they come with limitations. Although, I strongly argue for the case of using disruptive technology solve humanitarian issues, technology can't be the solution to every problem due to its limitations and to some degree inability to do so. Despite the benefits of being geographically locatable which can protect refugees to avoid smugglers, technology doesn't guarantee safety or a fully secure journey. Avoiding violence or finding refuge from inclement weather on the transit journey are aspects technology can't protect refugees from. The access to information on local services is similar to the issue raised above. Just because migrants have the information about services provided doesn't guarantee them actually receiving or benefitting from those services they are being informed about on their smartphones. Thus, technology can't ensure the delivery of services.

Although, language barriers and communication issues are eased by online interpretation and translation services like the Tarjimly, it creates further dependence on technology for the beneficiaries. By solving language barrier issues with the mobile app, a new issue of dependence on volunteers is created since communication is only possible with the help of the volunteers who accept to interpret or translate in a session.

In addition, the emotional and mental health needs of refugees that stem from traumatic experiences in their journey of being displaced is a psychological issue that cannot be solved with technology alone. There are ways in which to implement technology in therapeutic contexts but human supervision in these sensitive subjects is essential. Complex socio-political and economic dynamics that lead people to leave their home countries to seek refuge somewhere else are also issues that can't be solved with a quick tech-fix. Solving the core reasons for displacement need human discourse and action. Technology can't contribute to conflict resolution or implementation of policies and measures to keep vulnerable people to immigrate; only human initiative can.

Being aware of the limitations of technology is crucial because it will inspire action and provoke conversations on how to address and tackle the core of social issues. Only relying on technology to solve our deepest problems is not the right way because there is no technology that can change the human heart or its intentions. Understanding that technology is only a tool that can be used to address social challenges and not the way to end those challenges is important because this perspective will foster two approaches in the future use of technology in the social and humanitarian sector. First, more intentional approaches to solve the origins of social issues will be made to avoid these issues to rise to begin with. Second, strategic collaborations will be implemented to create more holistic and long-lasting solutions with technology instead of creating quick tech-based initiatives. The majority of tech-based solutions have still proven to be helpful and effective in the domain of refugee resettlement; this proven success shows that the potential of advanced technology can and should be harnessed in the entire humanitarian sector.

7. Using digital humanitarianism for the biggest social problems

The ethical use of technology has gained momentum in the past decade with more tech non-profits rising in the sea of technology-based companies. Diverse tech non-profit entrepreneurs as well as governmental agencies around the globe have started to build tech to solve our biggest

social issues ranging from education, healthcare, to human rights. In this section I will introduce how digital humanitarianism translates beyond refugee resettlement cases into the rest of the humanitarian sector. Further examples will support the argument made in this paper on how we can best apply the best technology to our biggest social problems. Digital solutions should not simply be understood in terms of transitioning operations from analogue to digital. Neither only for operational purposes (i.e. optimize processes, organizational structures, or improve work efficiency and how services can be improved with technology), but the solutions for humanitarian issues should themselves be engraved in a digital way. The first example presents the use of AI for human rights purposes, meaning to combat the spread of child sexual abuse material on the internet. It shows how AI can be used to advance law enforcement efforts to combat child sexual abuse. The next example explores how new ways of interacting with ICT brings people in need closer to those who can help. This short excurse will shed light on the merits of the theoretical approach of digital migration study and digital humanitarianism as stated in the literature review. In addition, it presents how the variety forms of advanced technology ranging from ICT to AI can be utilized in different ways to address the most alarming issues humans face today.

7.1 AI for human rights purposes

Thorn, a Californian-based nonprofit, was founded in 2012 after the founders learned about the issue of child sex trafficking. It is a tech nonprofit using technology as a solution to stop and eliminate child sexual abuse material from the internet. The rise of the internet brought a greater market online and thus increased the spread of child sexual abuse content drastically. Issue experts today face a problem that is complex and still growing. To put it in figures, the number of files of child sexual abuse reviewed by the National Center for Missing and Exploited Children was 450,000 in 2004 and sky-rocketed to 70 million in 2019 (Thorn, 2020). The founders of Thorn know that technology plays a role in extending the crime. However,

technology has yet to play a significant part in its solution. In this interesting use case, emerging technology is at the same time perpetrator of the problem (the internet) and the source of the solution (AI). Thorn believes that the solution for this problem should be on the cut-fronting edge of technology because the abuse is on the cut-fronting edge of technology.

After prototyping a product to aid in identifying child sex trafficking victims who were sold online in 2014, Thorn has grown its organization since and launched more products to help accelerate the technology innovation to fight child sexual abuse exploitation. They have the first engineering and data science team focused solely on developing new knowledge and subject matter expertise to innovate and deploy new technology solutions at a faster rate. Thorn has a three-step approach to tackle the issue. First, they accelerate by identifying critical technical needs and produce tools that allow law enforcement to stay ahead of perpetrators and identify more children. Second, they equip small-sized and middle-sized companies with resources and tools to help protect children on their platform, since many don't have the resources or knowledge to implement child safety procedures and tools which makes their platforms vulnerable to abusive content. Third, they empower society by increasing awareness and starting conversations to prevent further abuse by means of campaigns to stop sextortion and destigmatize the issue.

Their product *Spotlight* accelerates victim identification and helps law enforcement to make the best use of the critical time they have to focus on finding more child sex trafficking victims. *Spotlight* takes the massive amount of data and turns it into an asset for law enforcement. The objective of *Spotlight* is to improve the effectiveness and efficiency of domestic sex trafficking investigations and increase the number of children identified and rescued. A shared-hashing program called *Safer* identifies known and unknown child sexual abuse material with perceptual hashing and machine learning algorithms. A perceptual hash is a fingerprint of a multimedia file derived from various features from its content (pHash, 2010). *Safer* is a complete pipeline to identify, remove and report child sexual abuse material. Almost all big

tech companies are part of the Safer community to work together to eliminate child sexual abuse content from the internet. After the content is identified, it is reviewed and reported, then it is securely stored to a cloud with a unique fingerprint. All other participating companies can pull that fingerprint down and find that image on their network and thus delete the content from their website. A rapid identification and removal of those images across the internet is achieved. Further impact of the technology-driven solution is the quick identification and rescue of the children. It is achieved by gathering insights from millions of data points to identify and locate those most at risk and reducing the risk for law enforcement to follow misleading information.

7.2 AI and ICT in disaster relief

Natural disaster and environmental crisis in form earthquakes, floods and tsunamis are unfortunately part of our planet. Examples where technology has been used as a response to disaster relief are plenty especially due to the existing chaos in crises that need to be managed. The aftermath of such natural disasters is mostly severe, affecting the lives of hundreds, thousands and sometimes even millions. Innovations have explored how new ways of interacting are bringing people in need closer to those who can help. The humanitarian community, governments, and information technology companies are exploring new ways on how a world of increasingly informed, connected and self-reliant communities will affect the delivery of humanitarian aid. The first point of action as seen in disaster relief is the use of cell phones, social media platforms, geospatial technologies and various forms of crowdsourcing to communicate, detect and analyze humanitarian crises (Gabrielsen Jumbert, 2013). The Haiti earthquake was the first time members of the community affected by the disaster issued pleas for help using social media and widely available mobile technologies. Thousands of ordinary citizens around the world mobilized to aggregate, translate, and plot these on maps and to organize technical efforts to support disaster response (Harvard Humanitarian Initiative, United Nations Foundation, OCHA, & Vodafone Foundation).

Geospatial information systems experts used satellite imagery to rebuild missing maps of Haiti and plot a picture of the changed reality on the ground. Beyond that the Humanitarian OpenStreetMap Team (HOT) also integrated deep learning and AI-assisted humanitarian mapping to map regions that are difficult to access. By doing this, disaster-affected areas can be mapped in a few days to allow volunteers to have necessary data for a robust humanitarian response (HOT, 2020). ICT is transformational in its power to connect, create access to, and embolden new opportunities to rethink disaster relief. Big Data is also transforming the way societies prepare for, respond to and cope with humanitarian disasters. Not only are more accurate predictions possible which allow for better preparation and taken precautions, the effective rehabilitation work is also assured.

TABLE 1.1 Examples of technological innovations for use in humanitarian actions

Humanitarian action phases	Selected action	Selected technological innovations
Mitigation	Early warning	Big data analytics for early warning, including social media, satellite imagery, etc.
		Advances in computing
		Text messages and social media warning systems
		Open data, access through social media
Preparedness	Planning and training	Resource databases and social networks
		Online distance learning platforms and discussion platforms, mail lists
		Mobile platforms
		Social media campaigns
Response and recovery	Situational awareness and needs analysis	Big data analytics
		Information sharing platform
		Mobile and digital data collection
		Satellite imagery, aerial photography, unmanned aerial vehicles
		Crowdsourcing information
		Micro-tasking
		Secure data transmission and encryption
		Long range data transmission
	Resource management and accountability	Resource mobilization through social media
		Mobile cash transfers
		Commodity and resource tracking through mobile phones
		SMS-based feedback from affected people receiving aid
		Resource management platforms
		Matching needs and volunteers through social media
	Search and rescue	Reunification through social media
		Search and identification through 'digital signature' (e.g., mobile phone SIM card)

Figure 3: Examples of technological innovations for use in humanitarian actions (IFRC, 2013)

Technology as shown in these examples opens up opportunities for social and human services to reach more people with greater impact on our most complex social problems. If accessibility, availability and affordability is given, it has the potential to bring a wider array of help to more individuals and communities.

8. Future recommendations

Assessing the valuable contributions in key areas of humanitarian action and the emerging challenges of technology, leaves an ambiguous view on the use of technology for the future. The aim of this paper is not to advocate for the complete exploitation of all possibilities technology has to offer by trivializing its risks, nor should the risks stop humanitarians to adopt the great opportunity that emerging technology present.

> "Predicting what today's innovations, including humanitarian innovations, will bring tomorrow is impossible. Do they deserve support because of their demonstrated or potential effect on humanitarian action, or should they be dismissed because of the inherent risks and challenges they raise for communities and humanitarian actors?"
>
> (IFRC, 2013)

I don't believe there is one answer to this question that should steer the decision in only one direction. As always, the answer lies somewhere in between because the way these systems are designed and evaluated, determine the level of risk and threats to humanitarian and ethical principles. Therefore, I will present at least four measures (not exhaustive nor limited to these) that need to be taken in order to ensure an ethical use of emerging technologies.

First, transdisciplinary corporations and holistic solutions are necessary. Humanitarians and NGOs must work with governments, academic institutions, the private sector and technology communities to ensure that technologies are used to improve humanitarian responses without compromising humanitarian principles. The new model of assistance calls for new forms of partnerships in which groups that previously worked in isolation come together with affected

communities to create product solutions useful to them. It is an opportunity for partnerships among stakeholders to develop AI for social good.

Second, the solutions should not be at the expense and exploitation of vulnerable populations. This can be reassured with the future perspective to invest in social work and the collaboration of social work with other discipline (Cosner Berzin & Coulton, 2018). Humanitarians have the experience working on the field and technology company have the technical expertise. Together with computer science, engineering, statistics, social science, and business, an interdisciplinary partnership will assure that vulnerable populations are served accordingly with the best expertise for innovations. If social work does not invest in building the capacity to fully make use of technology to benefit society, the promise of these innovations will not be universally achieved.

Third, policymakers should provide more inclusive and public participatory foresight in discussions with stakeholders to understand social needs and implications of technological innovations for society. According to Google's assessment to accelerate social good with artificial intelligence, the application of AI should be: socially beneficial, avoid creating or reinforcing unfair bias, built and tested for safety, accountable to people, incorporate privacy design principles, uphold high standards of scientific excellence and made available for users that accord with these principles (Google, 2019). Governments and policymakers play a critical role in facilitating the ethical use of AI; they can build responsible AI expertise in government bodies and implement governance and legal frameworks for the use of AI. In addition, since funding projects for humanitarian technology is an issue due to the low economic return on investment, new ways to attract tech geniuses into the humanitarian aid need to be found. Policymakers should create incentives and programs for technical talent to support organizations that want to use AI for social good (Google, 2019).

Lastly, all stakeholders involved need to work together to establish common standards and ways of working together that will enhance the research on the ethical use of AI in the humanitarian

sector. The objectives to achieve these goals are less technical challenge than a matter of political will. The OCHA (2013) conclude that politicians need to recognize the importance of data and information to introduce data openness for other organizations, developers and researches to use those for humanitarian purposes. Doing so, should lead them to develop guidelines to ensure information is used in an ethical and secure manner.

9. Conclusion

This paper has shown the great possibilities advanced technology has for the humanitarian sector. Issues such as language barriers in refugee resettlement cases, human rights abuses, and natural disaster response and relief are being addressed and mitigated with the help of AI and ICT. The paper has argued to harness the potential these technologies offer for humanitarian purposes while still valuing human supervision due to the sensitive nature of the sector. By exploiting the capabilities of technology, non-profits can scale their impact in vulnerable communities and help more people than through conventional means. However, the use of advanced technologies can bring potential negative repercussions when not designed properly. When using technology, concerns of data use, confidentiality, privacy, and security arise. It is therefore indispensable for policy makers to ensure that humanitarian technologies are used for the benefit of humanitarians only and thus mitigating risks. Collaborations between governments, the private sector, humanitarian organizations, technology communities, and developers are necessary to assure the needs of humanitarians are met and an ethical use of the data is guaranteed. An interdisciplinary research is therefore crucial for this topic because of the scope and breadth it covers. Further study on the use of technology is necessary and should go beyond a discussion on advantages and disadvantages.

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