



Employing Information Technology

TO COMBAT HUMAN TRAFFICKING

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Anti-trafficking advocates, law enforcement agencies (LEAs), governments, nongovernmental organizations (NGOs), and intergovernmental organizations (IGOs) have worked for years to combat human trafficking, but their progress to date has been limited. The issues are especially complex, and the solutions are not simple. Although technology facilitates this sinister practice, technology can also help fight it.

Advances in sociotechnical research, privacy, interoperability, cloud and mobile technology, and data sharing offer great potential to bring state-of-the-art technology to bear on human trafficking across borders, between jurisdictions, and among the various agencies on the front lines of this effort. As Microsoft shows in fighting other forms of digital crime, it believes technology companies should play an important role in efforts to disrupt human trafficking, by funding and facilitating the research that fosters innovation and harnesses advanced technology to more effectively disrupt this trade.

Microsoft and its partners are applying their industry experience to address technology-facilitated crime. They are investing in research, programs, and partnerships to support human rights and advance the fight against human trafficking. Progress is possible through increased public awareness, strong public-private partnerships (PPPs), and cooperation with intervention efforts that increase the risk for traffickers. All of these efforts must be based on a nuanced understanding of the influence of innovative technology on the problem and on the implications and consequences of employing such technology by the community of interest (COI) in stopping human trafficking.



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An Overview of the Problem

Trafficking in human beings for sexual slavery, forced labor, or other commercial gain (such as organ harvesting and surrogacy) is truly a blight on modern, civilized societies. The United Nations

defines human trafficking as "[t]he recruitment, transportation, transfer, harboring or receipt of persons, by means of the threat or use of force or other forms of coercion, of abduction, of fraud, of

deception, of the abuse of power or of a position of vulnerability or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purpose of exploitation. Exploitation shall include, at a minimum, the exploitation of the prostitution of others or other forms of sexual exploitation, forced labor or services, slavery or practices similar to slavery, servitude or the removal of organs."i Certain categories of people are more vulnerable to this human rights violation than others. While some people are at risk because of their relative poverty or their irregular migrant status, others are vulnerable because they are unemployed, uneducated, or young, or because of their ethnic background. According to the International Labour Organization (ILO), approximately 2.5 million people are trafficked every year, affecting all sectors of society.ⁱⁱ

Human trafficking is one of the largest and most profitable criminal enterprises in the world. Contravening numerous international treaties, as well as the laws of most nations, the practice ensnares more than 25 million people (mostly women and girls) around the world, including upwards of 250,000 people in the United States. It is estimated to be the third largest criminal activity globally, after the illicit sales of weapons and drugs, generating roughly \$32 billion dollars a year. This is more than the profits of Nike, Google, and Starbucks combined.

Yet, our recent interviews with informed staff from relevant IGOs and NGOs in Southeast Asia identified only a small number of reported cases and general human-trafficking routes, as shown in Figure 1. The sum of these reported cases presents a stark contrast with the ILO estimate; so the choice in cartography here is also deliberate, reflecting not only the timeless nature of the problem, but also the current lack of advanced mapping and other technology to effectively track and document the trade.

Human trafficking is a classic example of a transnational asymmetrical threat. Trafficking enterprises, small and underarmed compared to the nations wherein they operate, are extremely adept at eluding, confounding, and circumventing traditional law enforcement and security organizations. Human traffickers do not recognize traditional political boundaries. They operate,

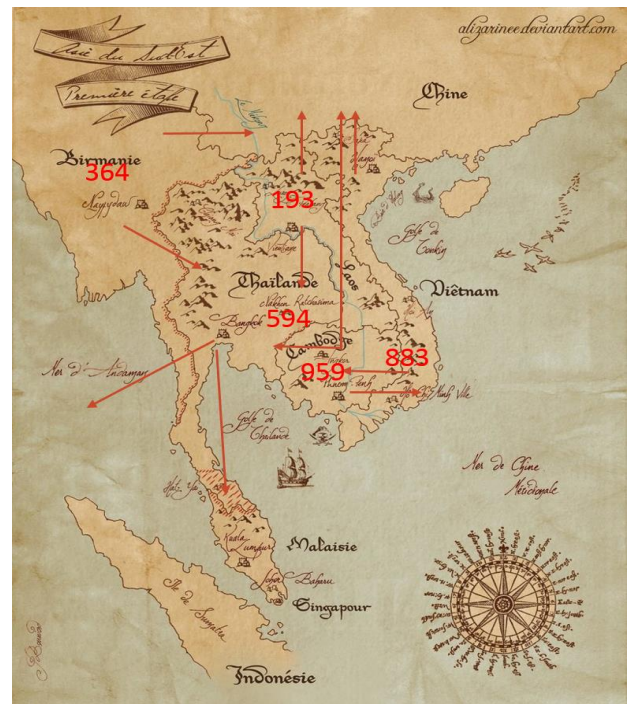


Figure 1. Last year's documented human trafficking cases and routes of travel in Southeast Asia.

often with impunity, within and between nation states. Quick to adopt the latest IT trends, increasingly they use websites, social media, and mobile technology to escape scrutiny from the COI and to fuel the hopes of targeted audiences with false promises of a better life.

Unfortunately, improvements in technology and increased network bandwidths across the developing world will allow this trend to continue unabated unless effective, collective strategies are put in place that keep pace with the latest technological trends. These formidable criminal enterprises proliferate in the lesser-governed regions of the real and virtual world, as do the well-documented linkages between human trafficking, drugs, violent crime, money laundering, and even international terrorism.

Altering the Risk-Reward Environment

While completely eliminating this crime may not be possible, it is possible to dramatically increase the risks associated with human trafficking to the point where traffickers are forced to recalculate their cost-benefit analysis and seriously consider the wisdom of continuing their heinous trade. Currently human traffickers operate in a low-risk, high-reward setting. By contrast, illegal marriage brokers and those who smuggle migrant labor operate with impunity in a low-risk, low-reward setting.

There are many reasons why the risk is so low for these highly rewarded trafficking profiteers. Victims and their families eschew cooperation with law enforcement agencies in many countries. They may live in close proximity to traffickers and may be threatened or intimidated by them. Some countries lack the appropriate law enforcement procedures, antitrafficking legislation, legal penalties, and evidentiary practices necessary to bring forth meaningful prosecutions. A weak criminal justice system assists perpetrators and harms victims.

Where a legal framework to combat human trafficking does exist, law enforcement officials and prosecutors may not be sufficiently trained or motivated to go after traffickers; or they may lack the tools and resources to investigate and bring forth meaningful charges and successful prosecutions. Prosecutorial success, for example, requires extensive evidentiary support and case management systems, which is lacking where agencies have not adopted—or cannot afford to adopt—the latest criminal justice technology. Still, even the best-equipped criminal justice system can face a formidable obstacle in securing convictions against traffickers, due to corruption within the criminal justice system. So human trafficking remains a low-risk, high-reward endeavor.

The goal of Microsoft and its partners in combatting human trafficking is to force traffickers into settings that increase their risk and reduce their profitability. By mobilizing the COI on this issue—working across multiple jurisdictions and criminal justice systems through a variety of means—the goal is attainable. Such means include the appropriate incorporation of modern information technology solutions (several of which are described later in this document) into the collective effort. In particular, Microsoft believes that “disruptive” technology solutions can play an important role in shifting the dynamics of the trafficking trade. Technology can democratize the process of combatting traffickers, providing everyone a mechanism to participate and “speak” with an equal voice; enabling ways to connect individual emotions and public sentiment to the issues; and presenting methods for more active participation. While creating and facilitating these opportunities for dynamic participation, technology can build and disseminate sources of awareness, knowledge, skills, encouragement, and public acknowledgement. Through cooperative efforts that raise the costs, risks, and difficulty of doing business for traffickers, Microsoft and its partners can make human trafficking a less appealing trade.



The Technology Solution Space

Technology companies can address human trafficking by providing software tools that build citizen awareness and prevent recruitment and abduction. Energizing and mobilizing resources in this way helps to arrest the problem at its source. Furthermore, these companies can encourage civil engagement, through the funding of appropriate development efforts that draw on the intrinsic motivation of the software community to combat this global ill. Mobilizing the development community through events such as antitrafficking hackathons and investing in technology partners with the skills and interest to tackle this problem are some of the ways that larger companies can foster rapid creation and deployment of needed tools.

Customized mobile applications that ordinary citizens can carry in their pockets, coupled with inputs from the Internet of Things (IoT), can create billions of sensors linked to more comprehensive crime-fighting technology solutions via cloud services. This is one way in which citizens can become engaged in the fight against human trafficking with minimal personal risk.

Human traffickers reduce their risk through the use of the latest technology. In order to shift the balance of power, law enforcement agencies and others engaged in the fight to stop trafficking need to adopt advanced information technology. Organizations combatting trafficking can:

- Deploy software solutions that take inputs from a vast global network of mobile sensors and the IoT.
- Harvest relevant information from open data and other big data sources using analytic platform solutions
- Monitor the social media networks within public domains that are used by traffickers.
- Apply state-of-the-art geospatial and other analytical tools to the information they gather.
- Develop information-sharing arrangements and implement technology solutions that facilitate secure collaboration among partner agencies and organizations.

Such technology will disrupt the human-trafficking supply chain, making it more difficult for traffickers to recruit, abduct, transport, and sell their precious cargo. Disruptive technologies can also gather forensic evidence, like financial transactions, photographs, and sensor-based identification of trafficking routes—essential for identifying key actors—to expose the links among criminal organizations and to facilitate prosecutions. The forensic appliances and evidentiary fabrics created

through the use of technology in this manner become powerful enablers for criminal justice systems that are chronically understaffed.

Bringing technology to bear in combatting human trafficking can also accelerate the speed and improve the quality of decision making. Technology enables transparency. Political leaders and heads of LEAs and related organizations will be able to demonstrate greater transparency and accountability through their use of technology, thereby building public confidence in their decisions and actions. The same technology used to counter human trafficking can also be used to enhance public safety in other areas—reducing crime, exposing corruption, revealing inefficiencies, and providing citizen access to governmental services, for instance. Leaders who understand the power of technology and seize the opportunities presented will be well positioned to contend with internal challenges, manage change, and govern more effectively. Leaders who seize the opportunities presented by new technology in this fashion will no doubt discover additional political leverage.

Awareness of the problems and challenges of human trafficking has led to initiatives joining governments, LEAs, NGOs, IGOs, academia, and socially responsible businesses in antitrafficking PPPs. Still, not enough attention has been given to the role that technology plays in facilitating human trafficking, or the multitude of ways that technology can be marshalled to fight it. Today, it is increasingly relevant to consider the technology solution space in order to tackle the problems of commercial sexual exploitation, forced labor, and other forms of modern-day slavery in an end-to-end fashion.

Inter-Agency Situational Awareness, Information Management and Analysis

Interagency responses often need to focus first on the search and rescue of victims of human trafficking, retrieving trafficked persons when possible and providing relocation and emergency social services when needed in order to save and recover lives. In the transitional period between the search for and the relocation of victims,

focused and well-coordinated interagency responses can have the greatest impact in mending affected lives and communities.

Situational awareness solutions are essential components of any response to human trafficking. Intelligence-based, georeferenced information on changing conditions, movements of victims and perpetrators, and the relationship of responding teams to political and jurisdictional regions are critical.

Armed with this information, responding agencies can make better operational decisions, coordinating teams and providing the right resources where they are most needed to interdict and interrupt trafficking operations. Geospatial intelligence tools allow for the integration of contextual data analysis with response activities and resource deployment planning. Logistics management applications can provide a rich context for ensuring that response activities possess all the required resources.

Advances in digital technology have greatly increased the use of real-time information and open data for decision making with immediate and powerful “on-the-ground” impacts. Social media can also help responding organizations determine where to focus their efforts. When aggregated, managed, and analyzed appropriately, real-time information, open data, and social media may reveal previously unrealized links and unrecognized risks. Employing big data analysis and natural language processing are examples of techniques that can surface such hidden relationships.

The information gained from social media and other open data sources is incredibly valuable, but organizations require additional processes, solutions, and resources to manage and analyze this data so that it can be used effectively in collaboration with other agencies or as part of an organization’s own incident response. Identity management, privilege management, and access control can assist organizations in limiting what information is shared among groups and teams, so that sensitive information is protected both within and outside the organizations. Application and use of all forms of information management and analysis systems must also contain mechanisms to allow for compliance with current privacy and security standards, policies and regulations.

Information-sharing with external organizations needs to be accomplished on the basis of well-established data-sharing protocols such as the National Information Exchange Model (NIEM) and governed with dissemination practices that include audit trails and records management. When released to the general public, information gathered on human trafficking must be sanitized to protect the sources and methods of the agencies involved, as well as, the privacy of the victim.

Case Management

Performing advocacy, outreach, and placement activities on a large scale can be challenging. IGO, NGO, and government administrators must contend with numerous statutory requirements, programs, and government agencies—each with its own guidelines for service delivery, in addition to unique fiscal management and reporting requirements. Additionally, these organizations frequently deliver their outreach programs through an extensive network of affiliated agencies; therefore, the organizations must collaborate and share information with hundreds of independent entities at both the programmatic and individual case level.

The ability to correlate information about cases, individuals, services, and agencies is absolutely critical to match recovered victims of human trafficking to the agency or agencies that can best serve them. The ability to exchange data between case management solutions and accounting systems speeds expense approvals and disbursement of funds, which literally can be a lifesaver. Even more effective are case management solutions that enable organizations to share data across a network of affiliates—nationally, regionally, or even globally—and connect directly with the governmental agencies that oversee program compliance and spending. The ability to aggregate data for all cases within one or multiple programs in a single system will facilitate the delivery of services with confidence and compassion and will greatly enhance the way in which these organizations conduct business.

Coordinating Needs with Offers & Services Portals

Greater awareness of the horrors of human trafficking and greater consensus for public action have mobilized increasing numbers of agencies, organizations, private-sector companies, and citizens to take action. Agencies can deploy citizen portals and public safety messaging with better security and enhanced manageability on the cloud. This will, in turn, enable greater transparency and create greater public trust, while also introducing efficiencies for busy citizens through these online portals; making information more readily available and accessible. But even well-intentioned efforts can be counterproductive unless they are focused on specific assessed needs and the organizations involved are actually prepared to receive and effectively manage the assistance provided. Public-facing service portals and back-end management applications can help to display outstanding needs that could be fulfilled by individual citizens or private companies. They can also be employed to broadcast the services and harness the energies of software developers to write additional mobile apps that can be made available to affected citizens and help them understand how to access or even provide funding and additional resources for these services. In this manner, technology can serve as a mechanism for creating a market of willing donors; one that can provide all the necessary cybersecurity measures to protect donor financial data while also addressing the privacy concerns of those trying to escape a legacy of bondage.

Connectivity Centers

Unlike certain government organizations and LEAs, which maintain command and control through a network of operations centers, NGOs and IGOs often do not have such operational centers working on their behalf. Effective coordination between a nonprofit organization and its personnel conducting activities in the field can be challenging without the proper hardware and software assets for network connectivity. Deploying these assets can provide vital resources for both the paid and volunteer staff. Connectivity centers colocated at or near hospices or shelters can provide a lifeline that allows displaced

trafficked persons to reconnect with loved ones and families, while also assisting with their rehabilitation and reintegration. PPPs and the IT industry can assist in building such “bridges back to dignity” by providing former victims the necessary skill sets to enter the job market and build careers based on digital literacy, which are always in demand for modernizing information-based economies. Connectivity through mobile devices is nearly ubiquitous, and antitrafficking organizations are increasingly recognizing this connectivity as critical infrastructure that they can employ effectively with the help of private-sector providers, Telcos and IT firms, including Microsoft and its partners.

Public Communications and Response

Increasingly, organizations combatting human trafficking are looking to partner with concerned citizens and communities to collect information and assist in remediation efforts. Traditionally, aid organization tend to look at impacted communities in terms of what services need to be provided. But this view is rapidly shifting from “needs assessment” to “citizen engagement” as mobile technology applications allow community members to play an active role in responding to human trafficking—reporting on trafficking, assisting in victim release and reintegration, developing means to prevent trafficking. The challenge is integrating community-based actions with the actions and recommendation of frontline organizations in the anti-trafficking effort. Technology can support such integration between communities and organizations just as it supports cross-agency collaboration and coordination by delivering incident reports, emergency dispatch updates, and even forums to solicit feedback from concerned citizens and increase community engagement. Cloud computing and collaboration technologies can now more cost effectively enable volunteer organizations, business communities and engaged citizens around the world to support anti-human trafficking efforts by collecting situation details, response information, geographic data and providing it to LEAs, NGOs and IGOs to enhance their decision-making, public messaging and planning capabilities.

Cloud Computing

The cloud is really an enabling force for the other trends which currently dominate the technology landscape--mobility, social media and big data. Although “cloud” is an overused term in the industry right now, cloud computing simply pools IT resources, maximizes usage of computing investment by taking advantage of the boundless resources and scale of the cloud, and introduces a consumption based pricing model that is causing soaring adoption among both commercial and government users. With the cloud, organizations can better meet a range of priorities; from enabling a common operational picture across systems, devices, and geographical boundaries to providing reliable, secure communications and collaboration capabilities that connect people with information and each other, wherever they are located.

Cloud services bypass the need for expensive, robust local IT infrastructure and facilitate the rapid deployment and scalability of IT tools and resources that responding organizations need for critical communication and collaboration: email, calendars, Office Web Apps for document creation, web conferencing, and file sharing in the most cost-effective manner. Public, private, and hybrid clouds, and non-cloud, on-premises data storage offer organizations many options for classifying and storing data. LEAs, IGOs and NGOs gain continuous application availability, scalability and manageability to accommodate the huge growth in data, while also improving and streamlining data protection with automated backups by storing data in the cloud. The trustworthiness or certification of different cloud providers must be evaluated, and if concerns about cloud-based data security arise, they can frequently be alleviated by using a secure gateway to connect internal IT infrastructure to the cloud and through robust encryption technology.

In sum, as organizations face increasing pressures to search for new, innovative ways to optimize operations to counter human trafficking across teams and the IT systems which support them—in effect to do more, and new, with less—many of these same organizations will turn to cloud services and solutions to gain new levels of flexibility, manageability, and agility. The cloud

provides unified management across physical and virtual environments, enables rapid deployment of new services, and delivers capacity and scalability for addressing rapidly changing needs. When integrated with existing technology infrastructures, the cloud will enable LEA, IGO, NGO and government officials to maximize their existing investments, lower costs, reduce risks and deliver various solutions and services—mobile, social and big data analytics—across multiple departments and to a broad set of external stakeholders and citizens with unparalleled privacy, security and reliability.

Applying Specific Microsoft Efforts & Technologies

In recognition of the risks that vulnerable populations confront when accessing the online environment, Microsoft offers programs and settings for its operating systems that are dedicated to the safety of families, and especially for protecting young or inexperienced users. Using Internet communication tools such as mobile phones, social networking, online gaming, chat rooms, email, and instant messaging places children and young adults at risk of encountering online predators. Predators take advantage of the anonymity provided by the Internet to build trust and intimacy when developing online relationships with inexperienced young people. These predators seek to diminish young people's inhibitions by gradually introducing sexual content into their conversations or by showing them sexually explicit material online. Microsoft provides information and resources on its public-facing websites that encompass critical security scenarios and settings for Internet usage by vulnerable populations. Designed specifically for teachers, young students, and parents, these sites provide videos, papers, and other information about how to identify and avoid child predators online. Microsoft offers a certification course about understanding online security through its Digital Literacy program and has created a set of resources accessible online for

parents, students, and teachers to help raise awareness of Internet safety.

Microsoft is also committed to investing in research and developing partnerships with government and industry to drive a better understanding of the role of technology in combatting human trafficking. As a leading global corporate citizen, Microsoft recognizes that it can have a huge impact on respect for human rights and can greatly aid in the fight against human trafficking. The company's approach builds on the Microsoft Global Human Rights Statement released in July 2012 in accordance with the United Nations Guiding Principles on Business and Human Rights. Microsoft has a unique opportunity to work with a range of stakeholders in combatting trafficking through the breadth of its products and services; its global, regional, and local partner ecosystems; and the long history of Microsoft Research collaboration with the academic community. Microsoft recently sponsored six research teams through grants that help them focus on the role of technology in the advertising, sale, and purchase of child sex-trafficking victims. Initial results from these teams are due this year. These corporate efforts are uniquely furthered by the work of the Microsoft Digital Crimes Unit (DCU) and the newly established Microsoft Technology and Human Rights Center.

Figure 2 lists some Microsoft efforts and technology solutions that can be put to use to combat trafficking in persons:

- Providing research grants and promoting innovation in partnership with academia, government, law enforcement, NGOs, and industry with the goal of bringing the latest technology to bear on the fight against trafficking.
- Upholding a long history of PPPs with leading advocates, LEAs, IGOs, NGOs, and experts to address the world's most pressing trafficking challenges.



Figure 2. Microsoft supports a variety of efforts and technologies to counter human trafficking.

- Promoting best business practices and policies to ensure that Microsoft technology solutions and procedures are not contributing to the exploitation of children or facilitating human trafficking. This includes both Microsoft business operations and those of its suppliers. To undertake this effort, Microsoft invests heavily in supply-chain social and environmental accountability programs for its packaging and hardware manufacturers (which include independent third-party auditing) to help ensure that the Microsoft Supplier Code of Conduct and applicable local and national regulations are met or exceeded.
- Making available to these partners the Cyber knowledge and techniques pioneered by the Microsoft DCU.
- Exploiting international technology initiatives such as PhotoDNA to help protect societies against technology-facilitated sexual exploitation with the help of partners such as the National Center for Missing and Exploited Children.
- Working with leaders in the antitrafficking community of interest to collaborate on creative approaches to disrupting human trafficking with other advanced Microsoft

technology solutions, such as the Child Exploitation Tracking System, the Computer Online Forensic Evidence Extractor, the Guardian App, as well as Microsoft partner solutions that can help shift the cost-benefit analysis fueling the trafficking trade.

Microsoft is a member of the Global Business Coalition Against Trafficking and is also working with the White House Office of Science and Technology Policy, as well as with leading US State Attorneys General, the UN, local police agencies, and others on a variety of PPP initiatives to address human trafficking. By promoting these cooperative efforts and providing disruptive technologies that raise the costs, risks, and difficulty of doing business for traffickers, Microsoft believes it can assist the COI to make human trafficking a less appealing trade.

DCU

The Microsoft Digital Crimes Unit (DCU) is part of the Microsoft Legal and Corporate Affairs (LCA) office. The organization comprises attorneys, investigators, forensic analysts, and business professionals located in 30 countries across the globe. With cybercrime affecting millions of people

around the world, the DCU mission is to assist LEAs in stopping the criminals behind these acts while continuing to create a safe digital world. To this end, the DCU opened a Cybercrime Center in Redmond in November 2013, with satellite operations in Beijing, Berlin, Brussels, Singapore and Washington DC, where teams are available to engage with customers and policy makers who seek to better understand the Microsoft approach to stopping cybercrime—including crimes against vulnerable populations. The Redmond center has a working lab that showcases the Microsoft approach to cybersecurity and how the company engages in the fight against cybercrime. However, the DCU cannot tackle the challenge of cybercrime alone, and must rely on partnerships within the IT industry and academia, and with LEAs, NGOs, and IGOs, in order to make an impact.

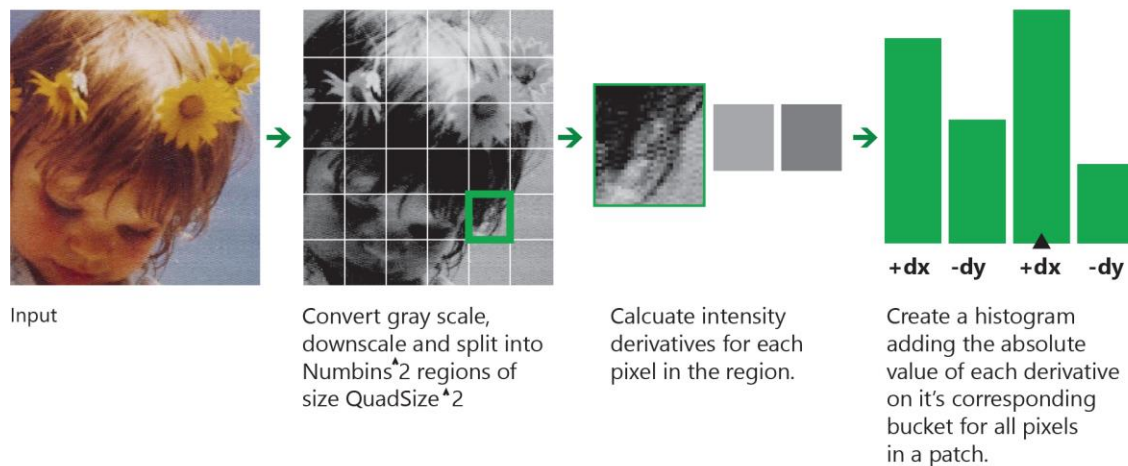
PhotoDNA

In 2009, Microsoft partnered with Dartmouth College to develop PhotoDNA, a technology that helps detect and stop online exploitation of children by creating unique fingerprint-like signatures of images. This technology arose from research that was part of a joint effort between Microsoft and the National Center for Missing & Exploited Children (NCMEC) to find new ways of helping Internet service providers (ISPs) better identify child pornography images distributed online. NCMEC is designated by US law as the clearinghouse for all child pornography that is reported by American-based ISPs.

The scale of the online child pornography industry is massive, as is the amount of data associated with these types of investigations. In response to global interest expressed by law enforcement

PhotoDNA: How it works

The technology



The NCMEC Program



Figure 3. In essence, PhotoDNA creates a unique signature for a given image based on a mathematical algorithm. Microsoft donated PhotoDNA to the National Center for Missing & Exploited Children in 2009, and today PhotoDNA is licensed to over 50 organizations, including INTERPOL.

agencies, Microsoft made PhotoDNA available for investigations of child sexual abuse. PhotoDNA now helps LEAs around the world to more quickly and accurately identify and rescue child victims. It also helps bring to justice those who would exploit children.

PhotoDNA works by using a mathematical algorithm to assign a unique signature for an image that then can be used to locate other copies of that image online. Nothing about this technology recognizes the content of what an actual image depicts. It is not similar to facial recognition technology or even object recognition software. Instead, a unique PhotoDNA signature or “hash” is created by sizing the image to predetermined standard dimensions for processing, turning the image into black and white, and then separating the image into sections or grids (see Figure 3). Each grid is analyzed to create a histogram describing how the colors change in intensity within it. The solution then calculates a unique number representing each section of the picture, and places all numbers together to produce a single code that distinctively

represents that image's “DNA” or hash. Investigators can utilize that hash to compare with the DNA signatures from other images in order to determine matches.

Microsoft donated PhotoDNA to NCMEC. Today, PhotoDNA is used by organizations around the world—including LEAs, INTERPOL, large IT companies, and social media companies—in support of eradicating child exploitation. Certainly this technology can be harnessed to further enable antitrafficking efforts as well.

Child Exploitation Tracking System (CETS)

The Child Exploitation Tracking System (CETS) is a Microsoft software-based solution, developed in collaboration with Canadian law enforcement, that manages and links child protection cases worldwide across jurisdictional boundaries. Currently administered by a loose partnership of Microsoft and LEAs, CETS offers tools to gather evidence and share information so they can

Deployment of Child Exploitation Tracking System

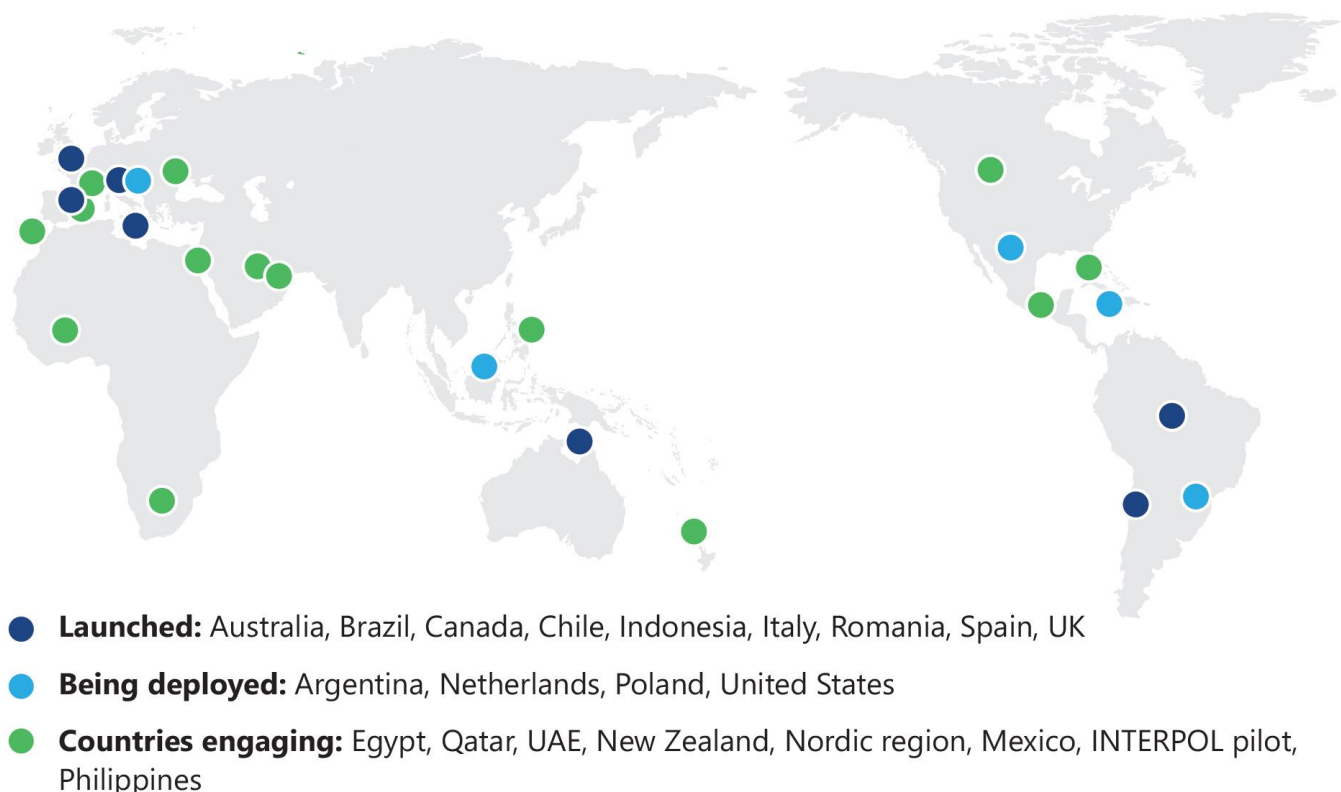


Figure 4. Deployment of the Child Exploitation Tracking System. Computer Online Forensic Evidence Extractor (COFEE)

prevent (when able), identify, and punish those who commit crimes against children, including trafficking. Designed by investigators for child exploitation investigations, the solution enables investigators to share, search, and collaborate, while complementing existing investigative software such as records management systems, image storage systems, and big data analytics solutions—all on an open platform.

PhotoDNA has also been integrated into CETS, making CETS a truly global law enforcement tool for child pornography investigations. CETS helps LEAs eliminate duplication, making the agencies more efficient in following up on leads, collecting evidence, and building cases against suspected child pornographers. CETS is currently used by law enforcement in Australia, Brazil, Canada, Chile, Indonesia, Italy, Romania, Spain, and the United Kingdom to combat child sexual exploitation (see Figure 4).

Computer Online Forensic Evidence Extractor (COFEE)

Another toolkit developed by Microsoft, COFEE, assists computer forensic investigators to extract digital evidence from any computer that uses a Windows operating system. A common challenge confronting cybercrime investigations is the need to conduct forensic analysis in the field on a computer before it is powered down and restarted.

Live evidence, such as some active system processes and network data, is volatile and might be lost when a computer is in the process of turning off. This evidence might contain information that could assist in the investigation and prosecution of a crime. COFEE can be installed on a USB flash drive or other external disk drive for ease of use, and an officer with minimal computer experience can be tutored to use a preconfigured COFEE device in one quick training session. This enables the officer to take advantage of common digital forensics tools that the experts use to gather important volatile evidence, by doing little more than simply inserting a USB device into the computer. Building on the Microsoft April 2009 distribution agreement with INTERPOL, Microsoft provides COFEE devices, training, and online technical support to LEAs at no cost, so they can better combat the growing and increasingly complex ways that traffickers use the Internet to commit crimes.

Guardian App:

The explosive growth of mobile technology worldwide has created a more informed and participatory populace eager to share information in both developed and the developing world. At Microsoft, we seek to leverage this trend in our attempt to help the COI to address societal challenges such as human trafficking and other criminal activities in order to make our communities a safer place for all citizens. In this

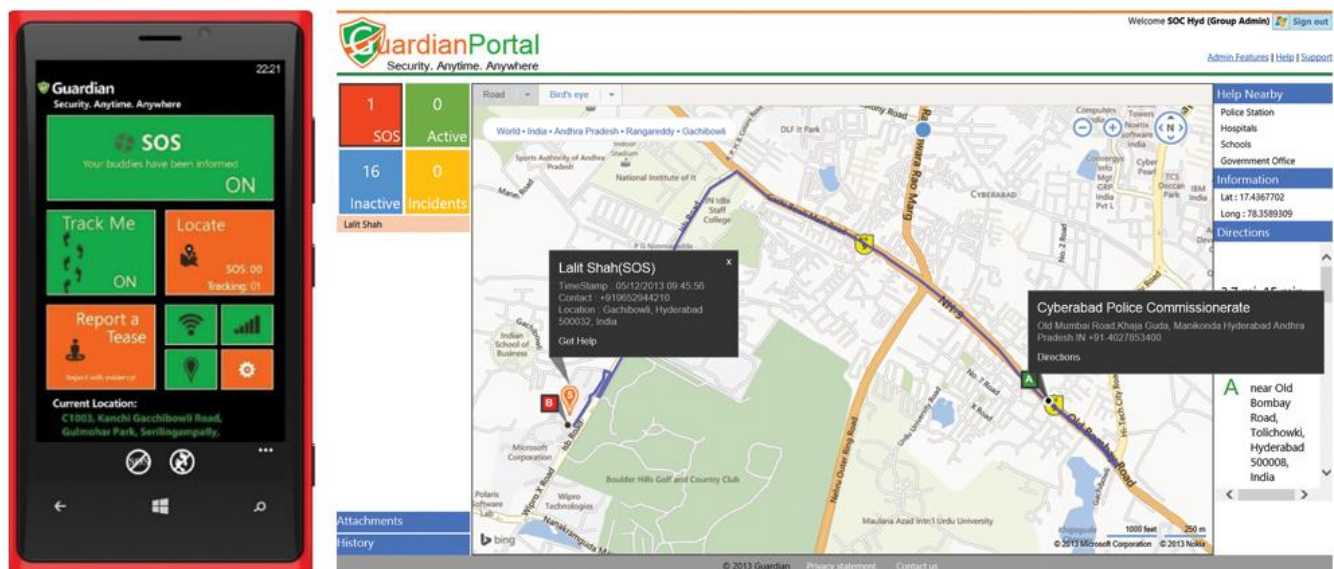


Figure 5. Guardian Windows 8 Phone App and Accompanying Web Portal

manner, governments, LEAs, IGOs and NGOs can benefit from two-way communication with people through mobile apps as a way to facilitate more citizen engagement when helping to detect and eradicate public safety threats. By channeling technology and software efforts to make a difference for people and communities, Microsoft developed a smart phone mobile application, called Guardian. The application is available for Windows Phone and Android platforms today and will be available for iOS platform very soon. The app alerts designated friends and families when the user is feels threatened, and can be integrated into existing solutions for Police or private security agencies to monitor distress calls and provide help through a cloud based portal. It also provides directions to the nearest local help, such as police, hospitals and other agencies. Because the Guardian ecosystem has a cloud based infrastructure, even if the phone is destroyed or the GPRS connection gets lost, the system intelligently continues to relay its SOS alerts. With a real-time tracking and intelligent SOS alert function, a call for help (and the subsequent recording of related evidence associated with suspected criminal activity), this application is exactly the type of “disruptive technology” which could alter the risk-reward calculation and serve as a potential deterrent in the fight against traffickers and other criminal enterprises (see Figure 5).

A Microsoft Partner Solution for Combatting Human Trafficking:

Entegra Analytics' Fusion Cloud

No simple answers to stopping human trafficking exist. Efforts to combat this problem must address a multitude of economic, social, and cultural factors. Regardless of the approach, stopping human trafficking requires current, accurate information as well as the tools to adequately process this information. Antitrafficking information needs are similar to those required to combat any transnational asymmetric threat such as terrorism. These needs are to gather, analyze, disseminate, and archive information on human trafficking—the components of a standard intelligence “life cycle.” Individuals and organizations fighting this menace need to be equipped with the latest technology to meet and manage these information needs. The balance of this paper proposes such a solution.

A Windows Azure-based intelligence management solution (IMS) to combat human trafficking can take advantage of the latest technology for intelligence management and analysis. An adaptation of Entegra Analytics' FusionCloud is the hub of this IMS. FusionCloud is the shorthand name given to Entegra Analytics' AIM (Advanced Intelligence Management) 2020 solution when it is running as an Azure-based solution. FusionCloud features: (a) incident management; (b) geospatial intelligence (GIS); (c) dissemination management and auditing; (d) an integrated analytical tool suite capable of natural language processing and link analysis; and (e) a user query component. It captures many of the capabilities described in “The Technology Solution Space” above and can apply the specific technology solutions described there.

Currently, few methods exist for collecting and analyzing intelligence and other information on

human trafficking and its prevention. Existing databases that deal with human trafficking were either designed around legacy technology or created to support prosecutorial measures after traffickers were apprehended.

What is needed is a robust, easily accessible tool for those on the front lines of combatting this global issue. The Azure-based solution proposed in this paper, with its emphasis on mobility, device independence, and ease of use, would complement existing methods of information gathering and analysis in antitrafficking, and offer a cost-effective, extensible platform capable of expanding and adapting to meet future needs and requirements.



Figure 6. The four phases of the Intelligence Information Life Cycle.

The Phases of Intelligence Life-Cycle Management

Applying intelligence life-cycle management simply means that the IMS solution should steward all information through four key phases (see Figure 6):

Intake. Capture intelligence in such a way that it is never lost.

Analysis. Direct intelligence to the individuals best suited to analyze it.

Dissemination. Communicate intelligence analysis to the right people for decision making.

Archiving. Store the results of steps 1 through 3 in such a manner that they can be searched and retrieved to benefit future analysis.

The ability to validate one item of information against others is a significant part of managing and analyzing intelligence. Rarely does one data source contain all the information required to perform such validation. Intelligence received from one source needs to be cross-checked with information that exists in multiple local data sources, or in data sources that are spread across multiple agencies. Those agencies in turn may be local, regional, national, or even international. Likewise, an agency might not only need to consume such external data—it might need to provide selected portions of its own data to other agencies (state, local, regional, national, international) in a two-way information-sharing arrangement. An information-sharing network such as this must support the highest levels of security, identity, and privilege management. Only those authorized to view information contained in such a multilateral network should have access to the network. Even among authorized users, not everyone will have the same privilege level; privilege will be based on one's position of authority. Those with higher privilege should be able to view information that is restricted or redacted from viewing by those of lower privilege levels.

Furthermore, a modern-day intelligence agency should be able to access data in an information-sharing network in real time. Data warehousing—periodically downloading, storing, and collating information from external data sources—is a legacy approach to information-sharing that was appropriate for the threat and information environments of decades past. With the high volumes and rapid pace of information creation in today's threat environment, real-time information sharing is mandatory.

Intelligence Analysis

Most intelligence analysts openly admit to spending far more time looking for information than actually analyzing information. Within an intelligence management solution, the goal of intelligence analysis is to give analysts tools that reduce the time spent searching for and through information, so they can spend more time

analyzing information. In the solution proposed here, four principal strategies are employed to shift this balance of time.

Text Analysis. Documents are scanned by the software prior to delivery to the analysts. The software automatically identifies key entities—such as people, locations, organizations, weapons, URLs, latitudes, and longitudes—and then highlights those entities by color code (see Figure 7).

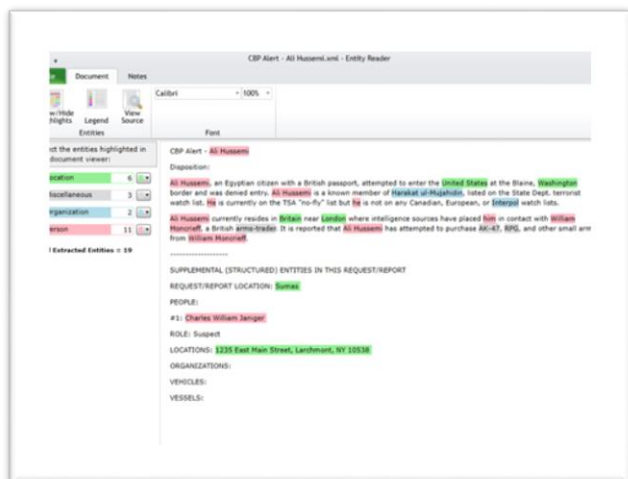


Figure 7. A color-coded document after entity extraction.

Subscription Search. When possible, information is “pushed” to the right analyst so analysts do not have to spend extra time looking through extraneous information. The analyst can immediately focus attention on the relevance of the document by scanning the color-coded entities. If a document contains entities of interest, it might be assigned a higher priority for a thorough read, compared with a document without such entities of interest.

Link Analysis. Creating a visual mosaic of entities tied together by connecting lines is a time-tested method used by intelligence analysts to graphically identify related items. Software now makes it possible to accomplish the creation of such link charts in seconds (see Figure 8), allowing analysts to focus on the connections revealed rather than the task of creating the charts.



Figure 8. A link chart showing relationships among people, locations, and organizations across four different intelligence reports.

Geospatial intelligence. Integrated intelligence analysis also includes a robust GIS capability, based on mapping all intelligence activity and overlaying other GIS assets to develop accurate situational awareness and a common operating picture (see Figure 9).

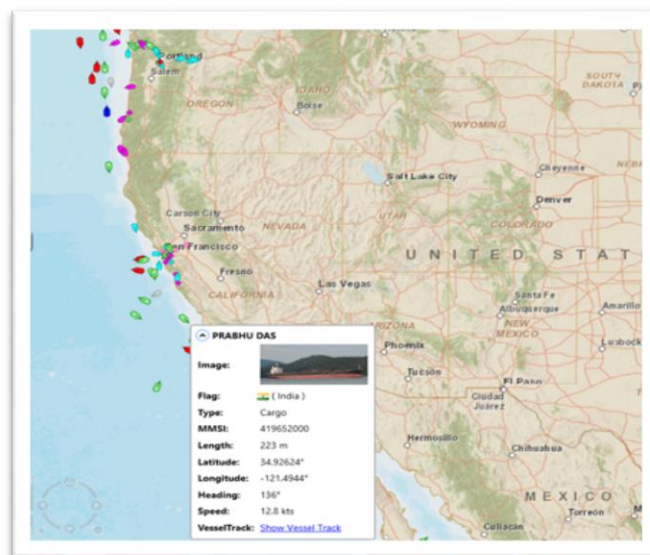


Figure 9. A vessel is tracked in real time using a satellite-based GPS system.

FusionHT

High-level architecture for Cloud-Based Anti-Human Trafficking Solution

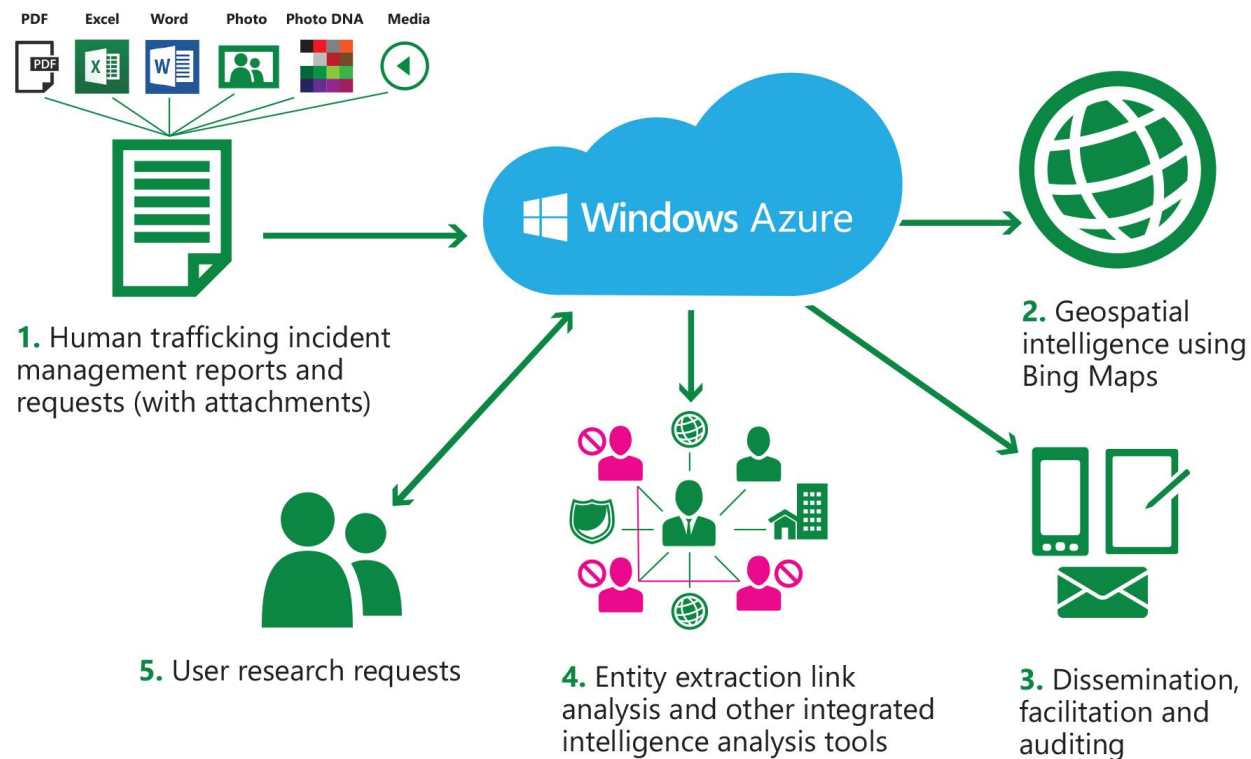


Figure 10. Schema for the proposed FusionCloud integrated intelligence management solution to combat human trafficking.

Solution Components

The individual components of the proposed intelligence management solution for human trafficking fit together in a five-part schema (see Figure 10). This section describes these components and their interrelationships.

Intelligence Reports and Requests

Intelligence reports and requests about human trafficking may come from a number of different sources: reports from law enforcement agencies or other entities working in this field, telephone calls placed directly to the agency, information received from other public safety agencies, information entered via mobile devices, email traffic, and information delivered via secure network connections. *Reports* represent intelligence delivered about human trafficking, and *requests* represent intelligence requested about human trafficking.

This FusionCloud solution will manage the capture of intelligence reports and requests.

Supplementary data—photos, PhotoDNA, Word and Excel docs, PDFs—will be stored with each report or request. The information contained in the reports and requests will be captured either manually (for example, typed into a form) or automatically (for example, electronically stored in a form from a data transmission). FusionCloud is designed to run in an Azure environment. It will use simple workflow management to move the information contained in a request or report from the intake stage to the analysis stage, assigning responsibility for the intake to a specific analyst or pool of analysts. After analysis is completed on the report, FusionNext will migrate the intake from analysis to dissemination, where an audit log is maintained of the individuals and groups to whom disseminations are made.

Real-Time Access to Data

Information about human trafficking will be stored in the Azure cloud, thereby making it accessible by those with appropriate identity and privilege levels via requests managed by the solution. Ultimately, the solution can and should be expanded to

handle data available from any source with suitable connections. However, political and legal issues must be surmounted before such a wide-scale data exchange can be implemented, so initially the solution will simply search for and return the data it has captured. This real-time data exchange about human trafficking is tentatively called HUMDEX.

Azure identity and privilege management will be utilized to secure access to HUMDEX data. Each person authorized to access the HUMDEX system will have a unique username and password (identity), plus a key associated with their identity and privilege that governs what data can be seen. This privilege management component will be very granular, capable of restricting individual data fields within a database record from viewing by users authorized to access HUMDEX but lacking sufficient privileges to view restricted data.

Solution Tools for Integrated Analysis

Integrated Federated Search Capability

Intrinsic to the operation of nearly all analytical tools is the capability for federated searching—that is, the ability for one search entry to search all the data sources, internal and external, to which the IMS has access. While initially limited to human trafficking data collected and managed by the IMS, this federated search capability can be readily expanded through Azure as new data sources become available.

Subscription search is an enhancement to this federated search capability that is part of the extended capabilities being proposed. As described earlier, using subscription search, analysts subscribe to a set of search terms they are interested in. Then, analysts are automatically notified of any information entering the solution that meets those stored search terms.

Geospatial Intelligence Tools

GIS is a key component of the analytical capabilities of this proposed solution to combat human trafficking. GIS provides a common operating picture for agencies involved in this effort. Bing Maps will be used as the GIS platform and will be extended by offering:

- A mapping interface that shows the location of incident reports and requests.
- The ability to produce map layers from simple Microsoft Excel spreadsheets such as a table of where human trafficking activity has been reported.
- The ability to create map layers that show related information such as nearest safe houses, law enforcement offices, or offices of organizations working to combat human trafficking.

Text Analysis, Entity Extraction, and Link Analysis

As described in an earlier section of this paper, text analysis scans documents for entities such as people, locations, and organizations, which are then extracted (highlighted) within the documents. Link analysis combines the results of text analysis and information on persons and groups of interest to create visual graphs that display connections and relationships.

The tools used to accomplish text analysis and entity extraction are sophisticated statistical models of different languages—models that have been trained to understand the grammar and syntax of each language. Based on cost and complexity issues, this paper proposes that initially all requests and reports are captured and analyzed in English. At a later date, the solution can be expanded to encompass information reported and requested in other languages.

Summary

Human trafficking is a global phenomenon; it affects every region, country, and economic sector. Traffickers are quick to incorporate the latest IT trends into their tactics and techniques.

Academia and technology companies should continue to work proactively with governments, LEAs, IGOs, NGOs, advocates, and others in the antitrafficking community to help understand and address the abuses of technology to facilitate trafficking; investigate effective intervention and disruption techniques; and establish industry best practices and guidance. Best practices can include investment in scientific research, enforcement of

codes of conduct, increased awareness of trafficking hotlines and information for victims, as well as increased citizen engagement and cooperation with NGOs and law enforcement agencies on antitrafficking initiatives. Microsoft also supports the enactment and enforcement of human trafficking laws that recognize and protect victims regardless of age, gender, race, or national origin, while holding traffickers accountable.

Today, it is a “cloud first, mobile first” world, and the spectrum of antitrafficking solutions Microsoft and its partners have to offer are cost effective and easy to deploy. The power of technology no longer resides in a desktop PC; it sits with mobile solutions such as a smartphone or a tablet, powered by the cloud and delivering solutions and services to organizations and individuals wherever and whenever they happen to be needed. LEAs and humanitarian organizations need the right technology solutions to react quickly to human trafficking scenarios. Technology can help restore lives by making communication and collaboration faster, easier, and more comprehensive. Microsoft and its partners deliver technology and expertise for governments, citizens, humanitarian organizations, and customers that can improve awareness and responses to human trafficking. Cloud computing, with technology and applications specifically developed for these environments, and the proliferation of mobile technology can be incredibly valuable. By capturing the full array of emerging solutions and capabilities, Microsoft enables affected communities to be safe, informed, and connected through technology.

A public cloud, Azure-based intelligence management solution is proposed as a primary means of supporting those organizations involved in the effort to stop human trafficking. The solution is a first step in providing state-of-the-art intelligence management and analysis capabilities featuring incident management, geospatial intelligence, text analysis, and link analysis. Although specific details of implementing this solution need to be addressed, all elements of the solution are feasible within the current technological environment offered by Azure.

Until recently, there has been limited connection between the antitrafficking community and the technology community, although there are

passionate and experienced people working to explore and improve that relationship. This white paper is merely a first step in this exploration of the best uses of technology to counter human trafficking, recognizing that many more steps must be taken on this journey. Microsoft and its partners are committed to supporting law enforcement and humanitarian organizations as they look for better ways to further their efforts in battling human trafficking.

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ⁱ United Nations Office on Drugs and Crime. [United Nations Convention Against Transnational Organized Crime and the Protocols Thereto](#), 2004.

ⁱⁱ International Labour Organization. [A global alliance against forced labour](#), 2005.