

NOTES

FINDING REFUGE: BLOCKCHAIN TECHNOLOGY AS THE SOLUTION TO THE SYRIAN REFUGEE IDENTIFICATION CRISIS

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Turning fifteen years old, for some, means the doors of opportunity and freedom begin to open. In the United States, many high school sophomores see the occasion as one step closer to the teenage liberation of getting their driver's license on their sixteenth birthday. At fifteen, the card, smaller than a palm, is a taste of independence—the right to drive anywhere, anytime, to wherever the holder so chooses.

In Lebanon, for a refugee displaced from Syria following the country's deadly civil war, turning fifteen signifies an age of the restriction of liberty. In order to legally reside in Lebanon, everyone over the age of fifteen is required to have a legal residency permit, including refugees.¹ The only way to obtain the residency permit is to provide certain identification documents, many of which can only be issued and renewed by the Syrian government.² Thus, without the proper identification, these refugees reside illegally.³ They are not legally permitted in Lebanon and are unable to return home to Syria.⁴ Stuck between childhood and adulthood, these adolescents also find themselves also stuck between two countries, stateless and vulnerable.

Without the required identifications, the refugee population faces “harassment, arrest, detention, and not being able to find a job without a valid residency visa.”⁵ For women, the perils are even more severe.⁶ Ghada, a Syrian refugee living in Lebanon, fears for her daughter who turned fifteen three years ago in Lebanon and has been living without papers.⁷ Her daughter, unable to find work without a visa but desperate to make a living, is more likely to be exploited into sex trafficking, child labor, and early marriage.⁸

At such a young age and having already suffered so much, these young people are forced to make a choice: do they continue to live life in fear and shadows, or do they risk returning to Syria? Sama, a fifteen-year-old Syrian refugee, resides without identification in Lebanon and is married to a fellow Syrian refugee. He, also fifteen, has risked returning briefly to Syria to renew his residency, so that he might work without fear of detention. Sama fears for his safety, saying, “Going back to Syria was the only way he could renew his residency, but it was not worth it. But what could he have done otherwise? . . . Now he is gone, and we have no idea about his whereabouts . . . Our whole life is determined by a paper.”⁹

¹ Racha El Daoui, *Syrian Refugees Deprived of Basic Human Rights*, NOR. REFUGEE COUNCIL (Dec. 10, 2017), <https://www.nrc.no/news/2017/december/syrian-refugees-deprived-of-basic-human-rights/>.

² *Id.*

³ *Id.*

⁴ *Id.*

⁵ *Id.*

⁶ *Id.*

⁷ *Id.*

⁸ *Id.*

⁹ *Id.*

Sama and Ghada are just two of 1.1 million refugees living in Lebanon.¹⁰ Their lives are hard and adjustment has been difficult: around 170,000 live below the poverty line, only half are economically active, and one in three works in the unskilled labor market.¹¹ Worldwide, seventy percent of Syrian refugees lack proper identification documents.¹² They live in shadows, on the corners of cities and towns, making homes in new countries under the cloud of fear. Without proper identification, life is constantly met with roadblocks and being turned away from basic social opportunities.¹³ All this aside, Ghada knows that it is better than the alternative. She says, “But we had no choice. It was either leave Syria or death. I chose life.”¹⁴

Identification is the key to social opportunity and often the physical manifestation of the rights that one possesses in their present location.¹⁵ In the current system, central governments grant main forms of identifications, each holding different rights.¹⁶ Depending on jurisdiction, institutions from banks to ballot boxes can only be accessed with valid identification, preventing those without, even those who are legally entitled to them, from gaining the benefit of government programs and personal opportunities.¹⁷ Without valid identification, persons can be barred from employment, housing, and are often pushed to the edges of society.¹⁸ Even in the United States, after losing all forms of identification, the process to reapply and receive new ones can be expensive.¹⁹ For example, the fees to receive a new copy of one’s “birth

¹⁰ *Number of Syrian Refugees in Lebanon*, UNION OF RELIEF & DEVELOPMENT ASS’N (Jan. 1, 2017), <http://urda.org.lb/en/details.aspx?ID=1426>.

¹¹ *Id.*

¹² Samer Aburass, *Syrian Refugees’ Documentation Crisis*, NOR. REFUGEE COUNCIL (Jan. 26, 2017), <https://www.nrc.no/news/2017/january/syrian-refugees-documentation-crisis/>.

¹³ *Id.*

¹⁴ Daoui, *supra* note 1.

¹⁵ See generally Fred Lucas, *Amid Voter ID Battles, Here Are 7 Things the Government Requires IDs For*, DAILY SIGNAL (Aug. 26, 2016), <https://www.dailysignal.com/2016/08/26/amid-voter-id-battles-here-are-7-things-the-government-requires-ids-for/>.

¹⁶ *Id.* For example, a green card holds certain rights for immigrants in the United States which is different than the rights validated by a passport which allow or by a driver’s license. A green card allows an immigrant to stay and work in the United States. A passport allows an American to travel to certain foreign countries and return. A driver’s license allows certain people to drive in the United States with restrictions that vary per state. However, these forms of right-bearing documents are deemed acceptable to verify identification at banks and, in some cases, for voting.

¹⁷ *Id.*

¹⁸ Patrick M. Bradley, *The Invisibles: The Cruel Catch-22 of Being Poor with No ID*, WASH. POST: MAG. (June 15, 2017), https://www.washingtonpost.com/lifestyle/magazine/what-happens-to-people-who-cant-prove-who-they-are/2017/06/14/fc0aaca2-4215-1e7e-adba-394ee67a7582_story.html.

¹⁹ Ashley Archibald, *For Homeless People, ID Is Vital and Expensive*, REAL CHANGE (Mar. 29, 2017), <https://www.realchangenews.org/2017/03/29/homeless-people-id-vital-a>

certificate can range from \$25 in California to \$12 in South Carolina. And fees rise quickly when assisting an entire family.²⁰ Not having proper identification can create a vicious cycle of poverty.²¹ Maria Foscarinis, executive director of the National Law Center on Homelessness & Poverty, commented, “[w]ithout an ID, basically you don’t exist.”²²

Refugees fleeing the Syrian Civil War have struggled to maintain documentary identifications which are easily lost, stolen, or confiscated during crisis.²³ Lack of identification documents makes it difficult for refugees to prove who they are and where they came from.²⁴ Without identification, assimilation into a new culture can be difficult, from being barred from opening accounts at banks to being unable to prove one’s educational background.²⁵ This issue does not just affect refugees: 1.1 billion people in the world lack identification, inhibiting access to educational, healthcare-related, and financial benefits.²⁶

The United Nations signed the Universal Declaration of Human Rights in 1948.²⁷ Article Six of this document says, “[e]veryone has the right to recognition everywhere as a person before the law.”²⁸ Article Six has been interpreted as the right to a legal identification document,²⁹ which the UN has reiterated in its Sustainable Development Goals, creating a goal to create a “legal identity” for all persons by 2030.³⁰

In order to fulfill these goals, the United Nations and private companies have begun using blockchain technology to create forms of digital identifications for refugees.³¹ Blockchain technology creates a decentralized ledger that distributes information to all members of the network instead of containing it

nd-expensive.

²⁰ *Id.*

²¹ *Id.*

²² *Id.*

²³ Aburass, *supra* note 12.

²⁴ Monique J. Morrow et al., *The Promise of Blockchain and Safe Identity Storage for Refugees*, UNITED NATIONS REFUGEE AGENCY BLOG, (2018) <http://www.unhcr.org/blogs/wp-content/uploads/sites/48/2018/04/fs.pdf>.

²⁵ *Id.*

²⁶ Vyjayanti T. Desai et al., *Counting the Uncounted: 1.1 Billion People Without IDs*, WORLD BANK: DIGITAL DEVELOPMENT BLOG (June 6, 2017), <http://blogs.worldbank.org/ic4d/counting-uncounted-11-billion-people-without-ids>.

²⁷ G.A. Res. 217 (III) A, Universal Declaration of Human Rights (Dec. 10, 1948).

²⁸ *Id.*

²⁹ *The Need for Good Digital ID Is Universal*, ID2020, <https://id2020.org/digital-identity> (last visited Nov. 26, 2019).

³⁰ G.A. Res. 70/1, Transforming Our World: The 2030 Agenda for Sustainable Development, 16.9 (Sept. 25, 2015).

³¹ *Id.*

on one centralized point of servers; it is immutable and un-hackable.³² Because it is so secure without losing its accessibility, blockchain is the ideal technology to support identity documentation.³³ Without a centralized server, documentation and transactional history cannot be deleted or destroyed,³⁴ solving many of the issues of traditional identification.³⁵ By putting identification materials on the blockchain, refugees, as well as other populations who do not have centralized identifications, can have a form of legal identity which will allow them to more easily assimilate into the societies and countries that host them.³⁶

This Note will explore the importance of universal blockchain-based identifications and the rights and opportunities that can be granted by a decentralized identification. First, this Note will break down the histories and rights of identifications and their importance to vulnerable populations through the lens of *Immigration Covering* by Stella Burch Elias and then, more specifically, it will discuss the identification crisis facing Syrian refugees today.³⁷ Additionally, it will discuss blockchain technology, an overview of the technology itself, the potential application of the technology to universal identification, and current applications of this technology to identification. Finally, it will discuss criticisms of the technology and how blockchain-based identifications might actually work in global implementation.

I. IDENTIFICATIONS AND THEIR RELATIONSHIP TO RIGHTS

The earliest record of a central government distributing identification documents to civilians is in the English Safe Conducts Act of 1414, which made reference to a passport system.³⁸ However, government identifications and passports were not widely disseminated or used by civilians until the twentieth-century.³⁹ In August, 1914, World War I began, and, with the mass migration of refugees across Europe, the previously free international borders closed.⁴⁰ Laws such as the British Nationality and Status of Aliens Act 1914

³² Sloane Brakeville & Bhargav Perepa, *Blockchain Basics: Introduction to Distributed Ledger*, IBM DEVELOPER (Mar. 18, 2018), <https://www.ibm.com/developerworks/cloud/library/cl-blockchain-basics-intro-bluemix-trs/index.html>.

³³ Justine Humenansky, *The Impact of Digital Identity*, BLOCKCHAIN BERKELEY (Nov. 19, 2018), <https://medium.com/blockchain-at-berkeley/the-impact-of-digital-identity-9eed5b0c3016>.

³⁴ Morrow et al., *supra* note 24.

³⁵ Humenansky, *supra* note 33.

³⁶ *Id.*

³⁷ Stella Burch Elias, *Immigration Covering*, 58 WM. & MARY L. REV. 765 (2017).

³⁸ Athelstane Aamodt, *Rights of Passage*, 168 N.L.J. 7791, 7822 (2018).

³⁹ *Id.*

⁴⁰ Drew Keeling, *August 1914 and the End of Unrestricted Mass Migration*, VOX CEPR POL'Y PORTAL (June 23, 2014), <https://voxeu.org/article/changes-migration-policies-aftfr>

codified nationality for the first time.⁴¹ Within the Act contained a provision of the certificate of naturalization for aliens, granting its holders “be entitled to all political and other rights, powers, and privileges, and be subject to all obligations, duties, and liabilities, to which a natural born British subject is entitled or subject.”⁴² In his book chronicling the history of identifications in England, Edward Higgs writes, “[t]he attachment of certain types of rights and obligations to particular bodies through social processes of identification is what creates their social persona, as judicial persons and as citizens.”⁴³

Today, centralized government identifications are the most commonly used indicator of citizenship and immigration status.⁴⁴

In general, wealthy countries have well-functioning national register and identification systems that have developed and adapted over centuries. Official identity is established for nearly all citizens at birth, and a birth certificate then allows access to the rights and responsibilities that come with citizenship. Typically, over 98 percent of people in rich countries have birth certificates, meaning that the majority are “included” from an identification perspective.⁴⁵

From birth, citizens in wealthy countries have full access to their social opportunities; their poor counterparts, however, do not.⁴⁶ Concurrently, expectations have grown for poor countries to provide more services such as universal healthcare and access to financial institutions which often require a central government identification to access.⁴⁷

Forms of identification typically confer rights on identification holders, and these rights correspond to the government’s purpose for issuing the

1914.

⁴¹ British Nationality and Status of Aliens Act 1914, 4 & 5 Geo. 5 c. 17. Nationality and citizenship had previously been mentioned as early as Status of Children Born Abroad Act of 1350, however the laws before the Aliens Act of 1914 mainly focused on responding to the status of those living in newly acquired kingdoms or British nationals abroad. The Aliens Act was the first time that England created an affirmative, comprehensive set of guidelines of ways British citizenship is granted.

⁴² *Id.* at 3.

⁴³ EDWARD HIGGS, IDENTIFYING THE ENGLISH: A HISTORY OF PERSONAL IDENTIFICATION 1500 - 2010 13 (2011).

⁴⁴ Humenansky, *supra* note 33.

⁴⁵ Alan Gelb & Julia Clark, *Identification for Development: The Biometrics Revolution* 6 (Ctr. for Global Development, Working Paper No. 315, 2015), https://www.cgdev.org/sites/default/files/1426862_file_Biometric_ID_for_Development.pdf.

⁴⁶ *Id.* at 7.

⁴⁷ *Id.* at 8.

identification.⁴⁸ For example, in the United States, a state-issued driver's license gives the holder permission to drive, while a federally-issued passport, in conjunction with a visa, gives the holder permission to cross international borders and return to the United States.⁴⁹ In order to open a bank account, the person opening the account needs to present a form of identification.⁵⁰ Non-citizens can open a bank account in the United States, for example, but they still must present a form of government-issued identification from their home country.⁵¹

The Syrian civil war forced many refugees from their homes and into foreign countries without the identification necessary to participate in basic society in their new countries and without the ability to return home.⁵² However, formal institutions tend to only accept verifiable documents granted by governments, which refugees have often left in their home country and are not eligible to receive in their host country.⁵³ Refugees are also not entitled to the rights of citizenship that are often associated with the receipt of identifications, such as a driver's license granting the right to drive.⁵⁴

Public bodies such as the United Nations or a private organization like ID2020 should create and disseminate decentralized identifications which would be a uniform identification card that is granted to all persons, regardless of nationality. Unlike identification documents granted by central governments, decentralized identification from a third party should be not be rights-based or be limited to the grant by a central government. Unlike traditional identifications, a decentralized identification would be comprised of self-reported, verified information used solely to prove identity.⁵⁵ Furthermore, because they would be created just to provide proof of identification, they would grant no inherent rights. Part II will explore the implications of using these decentralized, blockchain-based identification documents to provide protections for refugees and other persons without identification.

⁴⁸ See generally NOR. REFUGEE COUNCIL, REFLECTIONS ON FUTURE CHALLENGES TO HOUSING, LAND AND PROPERTY RESTITUTION FOR SYRIAN REFUGEES (2017), <https://www.nrc.no/globalassets/pdf/briefing-notes/icla/final-hlp-syrian-refugees-briefing-note-21-12-2016.pdf> [hereinafter NOR. REFUGEE COUNCIL, REFLECTIONS].

⁴⁹ *Id.* at 1.

⁵⁰ *Id.*

⁵¹ Jon Stotz, *Open a US Bank Account as a Non-Resident: A How to Guide*, CHECK IN PRICE (May 7, 2019), <https://checkinprice.com/us-bank-account-non-resident/>.

⁵² Aburass, *supra* note 12.

⁵³ *Id.*

⁵⁴ NOR. REFUGEE COUNCIL, *supra* note 48.

⁵⁵ Humenansky, *supra* note 33.

II. IMMIGRANT COVERING AND UNDERSTANDING IMMIGRANT RIGHTS

In an influential article published in 2002, Kenji Yoshino developed a legal theory of three forms of societal assimilation.⁵⁶ In his article, Yoshino formulated his model through the lens of the gay community, enumerating three ways a minority community member adapts to the majority's culture: passing, covering, and converting.⁵⁷ Yoshino argued that these three forms of assimilation create identities that in some way mask or change the underlying identity of the person.⁵⁸ In essence, "passing" occurs when someone hides their true identities to try to blend with the majority population.⁵⁹ "Converting" occurs when one changes their underlying identity to become part of the majority population.⁶⁰ "Covering" occurs when one does not change their underlying identity nor hide it, but take on some of the characteristics of the majority while maintaining the identity of the minority.⁶¹ I will address these three tactics in more depth later in this Note.

In her article *Immigrant Covering*, Stella Burch Elias adopts Yoshino's three forms of assimilation to discuss an immigrant's integration into their new host countries and cultures.⁶² Elias describes covering as "toning down" the elements of an identity to integrate into a new society.⁶³ She argues that some form of covering would help immigrants access otherwise unavailable rights and government benefits.⁶⁴

Central governments have adopted some formal covering mechanisms, but they fall short of permanent solutions that fully help immigrants integrate.⁶⁵ Elias argues that central governments creating forms of immigrant covering can be short-term or medium-term solutions.⁶⁶ However, if these programs are meant to be temporary, they may decelerate the necessary process of full assimilation.⁶⁷ For example, Elias warns that programs such as Deferred Action for Childhood Arrivals (DACA), which creates a form of covering allowing minor recipients brought to the United States as children to lawfully be present in the United States without changing their formal immigration status, merely delay the American government from addressing the comprehensive issues of

⁵⁶ Kenji Yoshino, *Covering*, 111 YALE L.J. 769 (2002).

⁵⁷ *Id.* at 771.

⁵⁸ *Id.*

⁵⁹ *Id.*

⁶⁰ *Id.*

⁶¹ *Id.*

⁶² Elias, *supra* note 37.

⁶³ *Id.* at 816.

⁶⁴ *Id.* at 817.

⁶⁵ *Id.* at 856.

⁶⁶ *Id.*

⁶⁷ *Id.*

immigration by cloaking an immigrant in enough rights or privileges to exist peacefully without granting full privileges of citizenship.⁶⁸

Elias's concerns with immigrant covering enabled by central governments carry less force in the context of decentralized blockchain-identifications. Central governments attempting to find a middle ground for citizens and non-citizens creates a limbo for immigrants, which is both difficult to administratively navigate and to culturally adapt.⁶⁹ However, for that same reason, creating decentralized identifications that are not rights-or-privileges-dependent would help refugees and immigrants to assimilate by facilitating their ability to open a bank account or school registration without the usual administrative obstacles.⁷⁰ A blockchain-based, decentralized identification system would be an ideal form of immigrant covering that would allow immigrants to better assimilate into the host countries.

A. Conversion

Conversion occurs when someone casts aside their minority identity and fully adopts, through formal channels, identifying characteristics of the majority.⁷¹ In the context of immigration, conversion occurs when one formally adopts the citizenship of the host country to which that person moves.⁷² Elias adds that, in the United States, in addition to renouncing the citizenship of one's country of origin, forsaking traditional cultural names for more "American-sounding" alternatives would be the most complete form of converting.⁷³ As a form of assimilation, converting is the most complete. Yoshino explains:

[H]uman conversion differs profoundly from either passing or covering. Passing and covering are both perceived to be compromise formations in which the underlying identity is ostensibly preserved, modified only for popular consumption. In contrast, conversion is thought to be a more complete embrace or surrender. It is believed to change not only the expression of an identity, but the underlying substance of it.⁷⁴

⁶⁸ *Id.* at 768, 773–74.

⁶⁹ *Id.* at 856.

⁷⁰ Humenansky, *supra* note 33.

⁷¹ Elias, *supra* note 37, at 774–77.

⁷² *Id.*

⁷³ *Id.* at 776.

⁷⁴ Yoshino, *supra* note 56, at 786.

Converting citizenships, as we understand citizenship, can only occur with the formal permission of a central government.⁷⁵ However, decentralized identifications should not be contingent on one's citizenship or membership. An immigrant using identification via blockchain will not need to convert citizenship for the purpose of having proper identification, because blockchain identification would not be granted by a central government. It is not meant to grant the privileges of citizenship as granted by the Constitution⁷⁶ or by statute.⁷⁷

B. Passing

Passing falls on the other end of the spectrum from converting.⁷⁸ Passing refers to the act of one concealing their identity or minority identifying characteristics in effort to conceal that identity and blend with the majority.⁷⁹ Passing is most common in populations for whom the exposure of their identities could lead to negative consequences, as is the case with undocumented immigrants.⁸⁰ Because there are few converting opportunities for undocumented immigrants in the United States, many rely on passing to assimilate into the everyday workings of the country's society.⁸¹ In Professor Elias's words:

For some categories of migrants, passing is coerced because it is necessary to conceal formal immigration status in order to enjoy a basic quotidian existence—to seek employment, to attend school, to drive a vehicle, or to access healthcare services.⁸²

Without formal citizenship, immigrants are barred from most social services and means to work, so they rely on passing and attempting to hide their identity to survive in their host country.⁸³

However, passing can be dangerous. Because they lack identification, undocumented immigrants often cannot open bank accounts; refugees whose

⁷⁵ Andrew Henderson, *Which Countries Allow Dual Citizenship in 2019?*, NOMAD CAPITALIST (Apr. 1, 2019), <https://nomadcapitalist.com/2014/04/25/countries-allow-dual-citizenship/>.

⁷⁶ See U.S. CONST. art. IV, § 2.

⁷⁷ See, e.g., 42 U.S.C. § 1982 (2017); 52 U.S.C. §§ 10301–10508 (2017); 22 U.S.C. § 2191(b) (2017).

⁷⁸ Elias, *supra* note 37, at 777.

⁷⁹ *Id.*

⁸⁰ *Id.* at 766.

⁸¹ *Id.*

⁸² *Id.* at 780.

⁸³ *Id.*

identifications have been lost or destroyed face the same issue.⁸⁴ Without a bank account, immigrants and refugees tend to carry more cash, making them a target for crime.⁸⁵ Similarly, undocumented immigrants fear reporting crimes or workplaces abuses for fear they would have to present identification in the process.⁸⁶ Passing keeps vulnerable immigrant populations from joining mainstream society, which exposes them to unsafe situations; however, passing occurs most often when the alternative is “identity-based discrimination.”⁸⁷

i. Sanctuary Cities

Sanctuary cities and campuses have created a form of state-sponsored passing assistance. Sanctuaries are state or local policies that either by statute or purposeful lack of legal action provide relief from deportation.⁸⁸ In practice, officials limit disclosure of noncitizens' citizenship status to federal officials in an attempt to protect those persons from immigration prosecution.⁸⁹ Rapid response sanctuary networks, or informal passing networks, will also notify noncitizens about checkpoints and raids, to reduce a vulnerable population's exposure to federal immigration officials.⁹⁰ These formal and informal programs can protect undocumented persons from some of the immediate anxiety of deportation, but does not alleviate all of the dangers of passing.

Passing is not a sustainable method of assimilation.⁹¹ While passing allows undocumented immigrants and others to survive in their new countries in the short term, the process ultimately leads to constant fear of deportation and targeting by criminals.⁹² Decentralized identification systems would give some undocumented immigrants and refugees an alternate path to access some government programs, bank accounts, and other avenues of social opportunity.⁹³

⁸⁴ THE CTR. FOR POPULAR DEMOCRACY, WHO WE ARE: MUNICIPAL ID CARDS AS A LOCAL STRATEGY TO PROMOTE BELONGING AND SHARED COMMUNITY IDENTITY 8 (2013).

⁸⁵ *Id.*

⁸⁶ *Id.*

⁸⁷ Elias, *supra* note 37, at 778.

⁸⁸ Jason A. Cade, *Sanctuaries as Equitable Delegation in an Era of Mass Immigration Enforcement*, 113 NW. U. L. REV. 433, 433 (2018).

⁸⁹ *Id.*

⁹⁰ Rose Cuison Villazor & Pratheepan Gulasekaram, *Sanctuary Networks*, MINN. L. REV. (forthcoming 2019) (manuscript at 29), <https://ssrn.com/abstract=3038943>.

⁹¹ Yoshino, *supra* note 56.

⁹² *Id.*

⁹³ Humenansky, *supra* note 33.

C. *Covering*

Covering is the third and final form of assimilation, according to Professor Yoshino's taxonomy.⁹⁴ Covering occurs when a person is, and is allowed to be, open about the characteristics that make them a member of the minority population, while still blending with the majority population by not being "obtrusive" with those characteristics.⁹⁵ Elias describes this in an immigration context in situations where a government entity grants some rights or privileges without granting full citizenship.⁹⁶

The United States has developed many forms of covering for undocumented immigrants. In 2015, eleven million undocumented immigrants lived in the United States.⁹⁷ Their presence has become politically divisive, which has prevented legislatures from creating a converting mechanism, or an effective pathway to citizenship.⁹⁸ Instead, legislatures have passed covering mechanisms, which are short and medium-term solutions to these long-term problems. As discussed above, DACA was passed to delay the deportation of undocumented immigrants that were brought to the United States as children and, as of September 2017, 690,000 immigrants were enrolled in the program.⁹⁹ Instead of granting these immigrants citizenship, Congress covered them with limited rights—to work, obtain a driver's license, and enroll in college—without fear of deportation or guarantee of eventual citizenship.¹⁰⁰

Until 2017, DACA was successful in helping undocumented young people in the United States assimilate more easily.¹⁰¹ For example, DACA holders were more likely to work in administrative jobs than manual labor or construction jobs, "showing that DACA can be a means to occupational

⁹⁴ Yoshino, *supra* note 56, at 837.

⁹⁵ *Id.*

⁹⁶ *See generally* Elias, *supra* note 37.

⁹⁷ Gustavo López & Jens Manuel Krogstad, *Key Facts About Unauthorized Immigrants Enrolled in DACA*, PEW RES. CTR. (Sept. 25, 2017), <https://www.pewresearch.org/fact-tank/2017/09/25/key-facts-about-unauthorized-immigrants-enrolled-in-daca/>.

⁹⁸ Paul Kane, 'Get So Close — and Nothing Happens': Congress's Record on Immigration Is Repeated Failures, WASH. POST (June 23, 2018), https://www.washingtonpost.com/powerpost/get-so-close—and-nothing-happens-congresss-record-on-immigration-is-repeated-failures/2018/06/23/702660c0-7624-11e8-b4b7-308400242c2e_story.html.

⁹⁹ López, *supra* note 97.

¹⁰⁰ Catherine E. Shoichet, Susannah Cullinane & Tal Kopan, *US Immigration: DACA and Dreamers Explained*, CNN (Oct. 26, 2017), <https://www.cnn.com/2017/09/04/politics/daca-dreamers-immigration-program/index.html>.

¹⁰¹ In 2017, the Trump administration rescinded the DACA program, but courts entered a nationwide injunction to determine whether the decision to end the program was lawful. The Supreme Court heard oral argument for the case on November 12, 2019. Nina Totenberg, *Supreme Court May Side with Trump on 'DREAMers'*, NPR (Nov. 13, 2019), <https://www.npr.org/2019/11/13/778545559/supreme-court-may-side-with-trump-on-dreamers>.

mobility.”¹⁰² However, because the program was not a means of conversion, its covering power is limited to the current administration’s willingness to continue the program, making it a short-term solution to a long-term problem. For example, since the discontinuation of this program by the Trump administration, DACA recipients cannot renew their status, stripping those limited rights from 915 immigrants per day.¹⁰³ Like DACA, temporary covering programs are meant to make assimilation easier for immigrants,¹⁰⁴ but still prevent full integration because there is an understanding that the rights the program covers can easily be taken away.

i. Municipal Identifications

Municipal identification cards are one of the most effective forms of covering in the United States. To remedy the disenfranchisement of undocumented immigrants, municipalities began to issue municipality identification cards.¹⁰⁵ These say nothing about the holder’s legal immigration status, only that the holder is a resident of the issuing city.¹⁰⁶ Unlike state identification cards, which require proof of U.S. citizenship, municipal identification cards are attainable with proof of citizenship in any country and proof of residency in the allocating municipality’s bounds.¹⁰⁷ This system has been successful in creating a safer environment for vulnerable populations, as Elias describes:

[T]he opportunity to use such cards to open bank accounts has purportedly led to increased community safety. In communities where undocumented immigrants are unable to produce the requisite identification documents to open bank accounts, immigrants routinely carry large sums of cash on their persons or store large sums of cash in their homes, making them easy targets for criminals. These same immigrants are wary of any contact with police officers, because of their lack of formal immigration status. As a consequence, when they are the victims of crime—whether muggings or burglaries—they are unlikely to report the crime to the authorities, leading to unchecked criminal activity and widespread threats to public safety. Anecdotal accounts from localities that have

¹⁰² JIE ZONG ET AL., MIGRATION POLICY INST., FACT SHEET: A PROFILE OF CURRENT DACA RECIPIENTS BY EDUCATION, INDUSTRY, AND OCCUPATION (2017).

¹⁰³ *Id.*

¹⁰⁴ Grace Tatter, *Why DACA Works*, HARV. GRADUATE SCH. EDUC. (Sept. 17, 2018), <http://www.gse.harvard.edu/news/18/09/why-daca-works>.

¹⁰⁵ THE CTR. FOR POPULAR DEMOCRACY, *supra* note 84, at 11.

¹⁰⁶ *Id.*

¹⁰⁷ *Id.*

introduced their own local identification documents suggest that those municipal or community ID cards have considerably ameliorated this problem.¹⁰⁸

This locally implemented plan has demonstrated considerable amounts of success and a potential pathway for mass implementation of other forms of identification.¹⁰⁹ Municipal identification cards demonstrate a need for identification cards divorced from rights and immigration status.

Municipal identifications are not meant as a temporary measure, but they also are not used to cover the holder with rights. Instead, the identification card allows access to social opportunities that allow for fuller integration outside of the bars of immigration.¹¹⁰ For example, unlike DACA, a municipal identification card would not change the status of its holder's eligibility to work or prevent the holder from being deported, but would allow someone who may previously have been uncomfortable calling the police to report a crime for fear of deportation an identification to present that eschews immigration status.¹¹¹

Decentralized, blockchain-based identification systems would be a wider scale implementation similar to the municipal identification cards—these cards would bestow no rights onto the holder, but the holder would have greater access to social opportunities and be more able to assimilate into the host country and culture. Because of the success of municipal identification cards as a remedy to the dangers of passing, identification cards that are not solely distributed to indicate rights can solve some of the problems facing undocumented populations.¹¹²

¹⁰⁸ See Elias, *supra* note 37, at 845.

¹⁰⁹ THE CTR. FOR POPULAR DEMOCRACY, *supra* note 84.

¹¹⁰ *Id.*

¹¹¹ For example, New Haven created the Elm City identification card in 2007. City officials estimated that roughly ten percent of the city's population was undocumented immigrants. The police ordered officers that they could not ask witnesses or victims of their immigration status but relied solely on the information on their municipal identification. Crime decreased about twenty percent around the city and reports of crimes that did occur increased. Thomas MacMillan, *Elm City ID Card Turns 5*, NEW HAVEN INDEP. (July 23, 2012), https://www.newhavenindependent.org/index.php/archives/entry/id_card_anniversary/; see also *Municipal ID Cards Help Undocumented Residents, Boost Local Economies*, POLICYLINK, <https://www.policylink.org/blog/municipal-id-cards> (last visited Nov. 26, 2019).

¹¹² Humenansky, *supra* note 33.

III. SYRIAN REFUGEES AND DOCUMENTATION

Seventy percent of Syrian refugees in 2017 did not have legal identification documents.¹¹³ Getting a new passport or identification card is often impossible for refugees without access to their home government's services.¹¹⁴ The Norwegian Refugee Council reports:

Another man, who could not afford to pay for a passport for his daughter who lacked an identity card, said that he "tried to get the new passport [at the Syrian embassy in Jordan] with the help of some people, but it didn't work out." NRC staff also reported that some police stations have not accepted expired Syrian passports as proof of identity. The cost of a new Syrian passport, issued by the Syrian embassy in Amman, is USD 400, while renewal of a passport costs USD 200.¹¹⁵

The price of a new passport, lack of current identification, and not having any identification at all are huge barriers for refugees trying to get valid identification.¹¹⁶

This issue also disproportionately affects young displaced Syrians.¹¹⁷ More than twenty percent of children under five are not properly registered by international guidelines.¹¹⁸ In Syria, children are registered into family booklets instead of birth registration and birth certificates.¹¹⁹ In camps and host countries, Syrian parents are often unaware of the birth registration process, so many children born in camps are completely unregistered.¹²⁰ The NRC highlights the consequences of these phenomena, saying:

The absence of these documents prevents the registration of subsequent vital events such as marriage, divorce, birth and death and creates a huge barrier for obtaining legal residency

¹¹³ NOR. REFUGEE COUNCIL, SYRIAN REFUGEES' RIGHT TO LEGAL IDENTITY: IMPLICATIONS FOR RETURN (2017), <https://www.nrc.no/globalassets/pdf/briefing-notes/icla/final-syrian-refugees-civil-documentation-briefing-note-21-12-2016.pdf> [hereinafter NOR. REFUGEE COUNCIL, SYRIAN REFUGEES' RIGHT].

¹¹⁴ *Id.*

¹¹⁵ NOR. REFUGEE COUNCIL, SECURING STATUS: SYRIAN REFUGEES AND THE DOCUMENTATION OF LEGAL STATUS, IDENTITY, AND FAMILY RELATIONSHIPS IN JORDAN (2016).

¹¹⁶ NOR. REFUGEE COUNCIL, SYRIAN REFUGEES' RIGHT, *supra* note 113.

¹¹⁷ *Id.*

¹¹⁸ *Id.*

¹¹⁹ *Id.*

¹²⁰ Kishnadev Calamur, *The Flourishing Black Market in Syrian Passports*, ATLANTIC (Nov. 18, 2015), <https://www.theatlantic.com/international/archive/2015/11/fake-syrian-passports/416445/>.

in the country of exile. In addition, where replacement of this documentation is impossible, for example due to the destruction of civil registries inside Syria, refugees might be at risk of becoming stateless.¹²¹

Trying to harmonize the former family booklet registration process with the new birth registration process while registering the still-unregistered children born in the camps are huge projects that inhibit the rights and mobility of Syrian children;¹²² however, not addressing this problem leaves those children vulnerable. The issues facing countries welcoming Syrian refugees are similar to those faced by the U.S. with respect to undocumented immigrants.

Central government-sponsored covering or converting legislation in a refugee's country of exile can address these issues only when the refugee has already been granted entrance into that country.¹²³ Without proper documentation, however, refugees will have a difficult time proving their identities and central governments will have a harder time balancing national security and the global forced-migration epidemic.¹²⁴

Undocumented refugees are subject to passing and covering tactics that are also similar to undocumented immigrants in the United States. Conversion to a country of exile could be a possibility for refugees, as many asylum provisions for refugees contain a pathway to eventual citizenship.¹²⁵ However, for asylum to be granted, most countries require identity documents, creating a barrier for many refugees.¹²⁶

There are few passing options for undocumented refugees.¹²⁷ Perceiving the necessity of identification for survival, around seventeen percent of Syrian refugees resort to buying false identification.¹²⁸ However, these fake passports have created a national security crisis in Europe.¹²⁹ Reports from multiple countries have found that terrorists, especially from the Islamic State (ISIL), have taken advantage of this movement to join the waves of migrants and have entered European countries.¹³⁰ At least one of the individuals involved in the

¹²¹ NOR. REFUGEE COUNCIL, SYRIAN REFUGEES' RIGHT, *supra* note 113, at 2.

¹²² *Id.*

¹²³ *See generally* Elias, *supra* note 37.

¹²⁴ Calamur, *supra* note 120.

¹²⁵ LUIS ACOSTA, THE LAW LIBRARY OF CONGRESS, REFUGEE LAW AND POLICY IN SELECTED COUNTRIES (2016).

¹²⁶ *Id.*

¹²⁷ Elias, *supra* note 37.

¹²⁸ NOR. REFUGEE COUNCIL, SYRIAN REFUGEES' RIGHT, *supra* note 113.

¹²⁹ Calamur, *supra* note 120.

¹³⁰ H.R. COMM. ON HOMELAND SEC., 114TH CONG., SYRIAN REFUGEE FLOWS: SECURITY RISKS AND COUNTERTERRORISM CHALLENGES, PRELIMINARY FINDINGS OF A HOUSE HOMELAND SECURITY COMMITTEE REVIEW 7 (2015), <https://www.hsdl.org/?abstract&did=788551> [hereinafter SYRIAN REFUGEE FLOWS].

Paris attacks on November 13, 2015 was carrying a Syrian passport authorities believed to be fake, and there is evidence that the others entered the country on migrant ferries.¹³¹ Passing through fake identification is not only dangerous for refugees, who subject themselves to deportation and criminal charges, but also for global national security.¹³²

IV. BLOCKCHAIN TECHNOLOGY

Blockchain technology was first introduced as the foundation for Bitcoin in a white paper written by mystery author Satoshi Nakamoto in 2008.¹³³ The goal of blockchain technology was to support a currency which could be traded without a third-party financial institution and rely only on peer-to-peer actions and verification.¹³⁴ In its perfect form, the technology would be faster and cheaper than traditional currency.¹³⁵

The original inception of Bitcoin and blockchain technology was a direct reaction to the 2008 financial crisis and distrust of centralized banks and other institutions.¹³⁶ Part of what makes Bitcoin so appealing to investors is that there is a finite amount of coins to be put in circulation, directly contrasting with government-printed money used to bail out the banks in 2008.¹³⁷ Removing third-party financial institutions also shields depositors and investors from the risks of traditional investing.¹³⁸ Banks make money by lending out and investing money from deposits.¹³⁹ However, leading up to 2008, deregulation led financial institutions to make increasingly high-risk investments. This system eventually defaulted, leading to a massive international economic

¹³¹ *Paris Attacks: Who Were the Attackers?*, BBC NEWS (Apr. 27, 2016), <https://www.bbc.com/news/world-europe-34832512>.

¹³² SYRIAN REFUGEE FLOWS, *supra* note 130.

¹³³ SATOSHI NAKAMOTO, BITCOIN: A PEER-TO-PEER ELECTRONIC CASH SYSTEM (2008); *see also* Sophie Bearman, *Bitcoin's Creator May Be Worth \$6 Billion—But People Still Don't Know Who It Is*, CNBC (Oct. 27, 2017), <https://www.cnbc.com/2017/10/27/bitcoins-origin-story-remains-shrouded-in-mystery-heres-why-it-matters.html>; John Biggs, *US Copyright Office Says It Does Not 'Recognize' Craig Wright as Satoshi*, COINDESK (May 22, 2019), <https://www.coindesk.com/us-copyright-office-says-it-does-not-recognize-craig-wright-as-satoshi>.

¹³⁴ NAKAMOTO, *supra* note 133.

¹³⁵ *Id.*

¹³⁶ Sahil Baghla, *Origin of Bitcoin: A Brief History From 2008 Crisis to Present Times*, ANALYTICS INDIA MAG.: OPINIONS (Mar. 19, 2017), <https://www.analyticsindiamag.com/origin-bitcoin-brief-history/>.

¹³⁷ *Id.*; *see also* Mike Collins, *The Big Bank Bailout*, FORBES (July 14, 2015), <https://www.forbes.com/sites/mikecollins/2015/07/14/the-big-bank-bailout/#4913c5102d83>.

¹³⁸ Baghla, *supra* note 136.

¹³⁹ Simon Zhen, *Finance 101: How Do Banks Make Money*, MONEY UNDER 30, <https://www.moneyunder30.com/how-banks-make-money> (last modified Apr. 11, 2019).

recession.¹⁴⁰ Bitcoin allowed investors to take charge of their money and invest without a third-party, helping individual investors control their money without the risk of profit-driven financial institutions.¹⁴¹

The blockchain refers to a formation of grouped transactions that are publicly visible on the distributed ledger, which is a record that each member of the network can access.¹⁴² When a transaction is made, it is timestamped and recorded in the system.¹⁴³ Once a transaction is recorded, it cannot be changed or retracted.¹⁴⁴ Networked transactions are stacked together into a “block,” which is then encrypted using a cryptographic hash and distributed to everyone in the ledger.¹⁴⁵

The hash function is what makes blockchain so secure.¹⁴⁶ Essentially, hashing is an algorithm which changes basic inputs into inscrutable letters and numbers; no matter the length or content of the input, the information will be encrypted into the same code length as all other inputs in the network.¹⁴⁷ Part of the security of the encryption is that minute changes in the input will completely change the output, meaning that knowing the output of one transaction does not mean one would understand the output of a similar transaction.¹⁴⁸ Bitcoin works by decoding the encryption and proving that an entire block has the same hash function, or that the same algorithm was applied to all other parts of the block and not tampered with after the fact.¹⁴⁹ This process is called “mining.”¹⁵⁰ Once a block is verified, meaning the hash function is confirmed, the block is added to the chain, giving this technology the name “blockchain.”¹⁵¹

Blockchain has a few unique features that make it a powerful technology. It is immutable and secure, meaning that, in theory, it is virtually un-hackable and cannot be manipulated after processing.¹⁵² Once a block is distributed to the ledger, the information is independently recorded on the ledger of each

¹⁴⁰ Joel Havemann, *The Financial Crisis of 2008*, ENCYC. BRITANNICA (Feb. 2, 2009), <https://www.britannica.com/topic/Financial-Crisis-of-2008-The-1484264>.

¹⁴¹ Baghla, *supra* note 136.

¹⁴² Corin Faife, *Bitcoin Hash Functions Explained*, COINDESK (May 19, 2017), <http://www.coindesk.com/bitcoin-hash-functions-explained>.

¹⁴³ *Id.*

¹⁴⁴ *Id.*

¹⁴⁵ *Id.*

¹⁴⁶ *Id.*

¹⁴⁷ *Id.*

¹⁴⁸ *Id.*

¹⁴⁹ Andrew Tar, *Proof-of-Work, Explained*, COINTELEGRAPH (Jan. 17, 2018), <https://cointelegraph.com/explained/proof-of-work-explained>.

¹⁵⁰ *Id.*

¹⁵¹ *Id.*

¹⁵² KARIM SULTAN, UMAR RUHI & RUBINA LAKHANI, *CONCEPTUALIZING BLOCKCHAINS: CHARACTERISTICS & APPLICATIONS* 51 (2018), <https://arxiv.org/pdf/1806.03693.pdf>.

person on the network.¹⁵³ Instead of a central server, in order to hack into the ledger and make massive changes, a hacker would have to change the over half of the ledger of each person on the network, or at each “node.”¹⁵⁴

A blockchain gains its secure, immutable nature by combining two innovations: a cryptographic link between records that makes changes progressively more difficult the longer the chain is, and the distribution of the data to all participating nodes on the decentralized network in which it is expected honest nodes outnumber potential attackers.¹⁵⁵

Centralized servers can be easily changed or destroyed by a single hacker.¹⁵⁶ A decentralized ledger with many points of verification makes hacking much more difficult and changes to previous transactions impossible.¹⁵⁷ Decentralized ledgers also do not use a central verification source.¹⁵⁸ In a traditional server network, if a central server containing a network of information is destroyed, the information is destroyed.¹⁵⁹ Comparatively, because decentralized servers do not store all of the information in one central location, even if many nodes are destroyed, the information is still completely accessible at every other node in the network.¹⁶⁰

V. UNIVERSAL IDENTIFICATIONS VIA BLOCKCHAIN

Refugees without documentation need access to valid identification documents.¹⁶¹ Without their own government to assist them, however, they need a non-centralized identification system which would contain basic information to prove who they are and their country of birth or origin. Note, however, that refugees are not the only population lacking identification cards. Over one billion people globally lack formal identification documents.¹⁶² The United

¹⁵³ *Id.*

¹⁵⁴ *Id.*

¹⁵⁵ *Id.*

¹⁵⁶ *Id.*

¹⁵⁷ *Id.*

¹⁵⁸ *Id.*

¹⁵⁹ *Id.*

¹⁶⁰ LISK, *What is Decentralization?*, <https://lisk.io/academy/blockchain-basics/benefits-of-blockchain/what-is-decentralization> (last visited Nov. 26, 2019).

¹⁶¹ Aburass, *supra* note 12.

¹⁶² *Unpacking the Challenges*, ID2020 ALLIANCE, <https://id2020.org/digital-identity> (last visited Dec. 9, 2019).

Nations has addressed this by including universal identification documents for all by 2030 in its Sustainable Development Goals.¹⁶³

A universal identification system would not be distributed based on rights or from a central government, unlike our current system.¹⁶⁴ Private and public-sector organizations have joined to develop identification systems via blockchain technology.¹⁶⁵ The ID2020 Alliance is at the forefront of making this goal a reality. According to Accenture, one of the ID2020 Alliance members, the goal of ID2020 is to create “personal, private and portable, empowering individuals to access and share appropriate information when convenient and without the worry of using of losing paper documentation.”¹⁶⁶

Because these digital identification documents would not be granted by a central government, or at least not only by central governments, they would not be inherently tied to rights from those governments.¹⁶⁷ Host governments could attribute various privileges to these new forms of identification, but their original purpose would not include this function. Instead, digital identification documents would include basic information at the enrollment stage (name, birthdate, address, etc.) and, through the life of the holder, more information could be added.¹⁶⁸ Information could be verified by a central government through registries such as a census to validate that the registered persons match the registrations and identifications granted.¹⁶⁹ Accenture outlined the proposed identification procedure as follows:

At an enrollment station, [User’s] biometrics are securely captured through his fingerprints, voice, face or an iris scan. Then several steps are taken to create a unique identifier using multiple security protocols. This identifier is then recorded on the blockchain which acts as an index with links to all applicable data. This makes it easy to locate, access, and share information without [Users’] personal data being stored on the blockchain.

Using an application on his phone, [User] creates a personal profile that is multi-factored and authentication secured. The

¹⁶³ G.A. Res. 70/1, Transforming Our World: The 2030 Agenda for Sustainable Development, 16.9 (Sept. 25, 2015).

¹⁶⁴ Humenansky, *supra* note 33.

¹⁶⁵ *Alliance*, ID2020, <https://id2020.org/alliance> (last visited Dec. 9, 2019).

¹⁶⁶ *ID2020: Digital Identity with Blockchain and Biometrics*, ACCENTURE, <https://www.accenture.com/us-en/insight-blockchain-id2020> (last visited Dec. 9, 2019).

¹⁶⁷ Humenansky, *supra* note 33.

¹⁶⁸ IDENTIFICATION FOR DEVELOPMENT: A WORLD BANK GROUP, TECHNICAL STANDARDS FOR DIGITAL IDENTITY SYSTEMS FOR DIGITAL IDENTITY 3 (2017), <http://pubdocs.worldbank.org/en/579151515518705630/ID4D-Technical-Standards-for-Digital-Identity.pdf>.

¹⁶⁹ *Id.* at 4.

app allows [User] to generate his own set of public and private keys which he can use to sign the data he sends to others. That way third parties can be absolutely certain the information is his.

[User] shares the public key using a QR Code. When he scans his QR Code at the enrolment station an official attestation is added to his profile and signed by a private key. This is the beginning of [User]'s living identity, an identity that he will build with each stamp he collects from his university, his employer or from government and non-government agencies. The major benefit of this identity system is that [User] is always in control of his own personal data. He determines which information is shared, who see[s] it and for how long. Instead of multiple paper documents, he can use a single, easy to use and manage app.¹⁷⁰

The Accenture platform underlines the importance of the User's control over their data, the security necessary to access that data, and its manageability in a digital, portable form.¹⁷¹ The accessibility and security of blockchain make it the best existing technology with which to distribute these identifications.¹⁷²

ID2020 has not formally reported what technology it will use to create digital identification for aspects outside of its pilot program, but other identity platforms and companies such as the Digital Identification Foundation (DIF) have reported that the digital identifications should be "anchored" to blockchain.¹⁷³ Microsoft, a member of both DIF and the ID2020 Alliance announced via a company blog post that public blockchains would be the best platform to build decentralized identifications.¹⁷⁴ The goal of using this technology is to both create usable identifications for disenfranchised persons and protect current technology users from huge data collection and breaches on a global scale.¹⁷⁵

¹⁷⁰ *Building a Trusted Identity: Blockchain ID Demo*, ACCENTURE (2018), https://www.accenture.com/_acnmedia/pdf-73/accenture-building-a-trusted-identity.pdf#zoom=50.

¹⁷¹ *Id.*

¹⁷² Humenansky, *supra* note 33.

¹⁷³ DECENTRALIZED IDENTIFICATION FOUNDATION, <https://identity.foundation/> (last visited Oct. 10, 2018).

¹⁷⁴ Alex Simons, *Decentralized Digital Identities and Blockchain: The Future as We See It*, MICROSOFT 365 BLOG (Feb. 12, 2018), <https://www.microsoft.com/en-us/microsoft-365/blog/2018/02/12/decentralized-digital-identities-and-blockchain-the-future-as-we-see-it/>.

¹⁷⁵ *Id.*

The system created is one of “self-sovereign” identifications, where the holder has the power to decide who can access their information.¹⁷⁶ All of the user’s information is stored within the application, but, during each transaction, the user decides what information is shared.¹⁷⁷ To be digitized, the information is broken into shards, or pieces of data are broken down into smaller, unintelligible sections that are stored on the blockchain.¹⁷⁸

When the user transacts using shard data, only the pieces of data that are necessary to the transaction are passed to the receiving party, but only those shards.¹⁷⁹ They are reconstituted with permission of the user, and therefore only the relevant information is decoded and transferred to the receiving party.¹⁸⁰ One can verify the data to transfer, for example one’s age, without showing a passport or other form of identification showing unnecessary personal information.¹⁸¹ Instead, transferring specific data points could be likened to giving someone a driver’s license to verify age where the age and photograph are visible, but all other information, such as address or driver’s license number, is covered. Self-sovereign identification documents keep personal information not necessary for a transaction safe while still securing the accuracy of the transferred data.¹⁸²

Outside of the potential for self-sovereign identifications, blockchain technology’s inherent features make it secure and portable, ideal for identification systems.¹⁸³ Because blockchain is a decentralized system, hacking becomes statistically impossible, effectively eliminating large-scale identity breaches.¹⁸⁴ In a self-sovereign system, data would not be transferred to companies to the degree that it is currently transferred. Hacks to centralized corporations that transact using blockchain would only have access to the shards of data shared from the person’s data instead of that person’s full identification.¹⁸⁵ Identification via blockchain would solve many of the issues of the

¹⁷⁶ Roger Aiken, *IBM Blockchain Joins Sovrin’s ‘Decentralized’ Digital Identity Network to Stem Fraud*, FORBES (Apr. 5, 2018), <https://www.forbes.com/sites/rogeraitken/2018/04/05/ibm-blockchain-joins-sovrins-decentralized-digital-identity-network-to-stem-fraud/#793b88e915ed>.

¹⁷⁷ *Id.*

¹⁷⁸ SURYANI CHANG & NATHANIEL TSANG MANG KIN, IAME: IDENTIFICATION FRAMEWORK FOR CRYPTOCURRENCY TRANSACTION—VERSION 2.1, IDENTIFICATION FRAMEWORK FOR CRYPTOCURRENCY TRANSACTION 12 (2018).

¹⁷⁹ *Id.*

¹⁸⁰ *Id.* at 13.

¹⁸¹ *Id.*

¹⁸² ARTHI KANCHANA MANOHAR & JO BEIGGO, IDENTITY MANAGEMENT IN THE AGE OF BLOCKCHAIN 3.0 (2018), <https://core.ac.uk/download/pdf/157581793.pdf>.

¹⁸³ *Blockchain Identity Management: Sparking a Data Security Revolution*, TOPTAL: INSIGHTS, <https://www.toptal.com/insights/innovation/blockchain-identity-management> (last visited Nov. 26, 2019).

¹⁸⁴ *Id.*

¹⁸⁵ CHANG, *supra* note 178.

current documentation and data systems and revolutionize humanity's understanding of data and access to our personal information.

VI. REFUGEE DIGITAL IDENTIFICATIONS

Digital decentralized identifications would be the first step to re-franchising Syrian refugees.¹⁸⁶ In refugee camps in Jordan, Syrian refugees hope that the immutable record of their transactions may help host countries feel comfortable granting asylum after viewing a thorough record of where the refugee had been.¹⁸⁷ Implementations of these programs have been very successful worldwide.¹⁸⁸

A. *The World Food Program*

The World Food Program (WFP) has had reliable record keeping and has cut transaction costs by sending cash transfers to refugees via the blockchain system.¹⁸⁹ Instead of using a mobile money transfer, as was used before the Building Block's initiative introduced blockchain, the WFP started sending cash transfers to a digital wallet which refugees can access through a biometric iris scan.¹⁹⁰ As the program grows, the U.N. foresees expanding its use of blockchain to include digital identity management.¹⁹¹ One of the benefits to the WFP has been less data transferred to third parties, allowing the transaction to be more direct and secure by removing third-party financial institutions like mobile banking applications.¹⁹² This more direct program allows for more privacy for refugees and reduces costs to the WFP.¹⁹³ The WFP estimates that reducing intermediaries has saved them \$4,000 per month while serving 10,000 refugees.¹⁹⁴

¹⁸⁶ Joe Liebkind, *How Blockchain Technology Can Prevent Voter Fraud*, INVESTOPEDIA, <https://www.investopedia.com/news/how-blockchain-technology-can-prevent-voter-fraud/> (last updated June 25, 2019).

¹⁸⁷ Russ Juskalia, *Inside the Jordan Refugee Camp That Runs on Blockchain*, MIT TECH. REV.: CONNECTIVITY (Apr. 12, 2018), <https://www.technologyreview.com/s/610806/inside-the-jordan-refugee-camp-that-runs-on-blockchain/>.

¹⁸⁸ Liebkind, *supra* note 186.

¹⁸⁹ *Building Blocks*, WORLD FOOD PROGRAMME, <https://innovation.wfp.org/project/building-blocks> (last visited Dec. 9, 2019).

¹⁹⁰ UN WORLD FOOD PROGRAMME INNOVATION ACCELERATOR, ANNUAL REPORT 2017 (2018), <https://innovation.wfp.org/year-review-2017/docs/WFP-innovation-accelerator-2017-annual-report.pdf>.

¹⁹¹ *Id.*

¹⁹² *Id.*

¹⁹³ *Id.*

¹⁹⁴ *Id.*

B. Estonian e-Residency

Estonia has put its official identification cards on blockchain technology.¹⁹⁵ It has implemented KSI blockchain technology to store all government records without a third-party intermediary.¹⁹⁶ In advancing government security, Estonia boasts, “not hackers, not system administrators, and not even government itself – can manipulate the data and get away with that.”¹⁹⁷ Estonia also developed “e-Residency,” or a government-issued identification from Estonia that is available to anyone on the planet.¹⁹⁸ The program is aimed mainly at corporations that are not location-dependent, so a corporation can apply to be an EU company and transact remotely without having to appoint a local director or open a local office.¹⁹⁹ An e-Resident has limited Estonian rights and obligations compared to a traditional Estonian citizen.²⁰⁰ In order to apply for e-Residency, the applicant must provide a government-issued identification, so the program operates as a secondary citizenship rather than as a primary citizenship or government identification.²⁰¹

In the future, Estonia foresees creating programs to expand the scope of how companies and services can hold information in order to allow for more cross-border exchange of information.²⁰² On its future technology goals, the Estonian government says, “[i]magine a Swedish ER doctor being able to instantly access the medical records of a patient from Hungary, or an Italian company digitally signing a contract with a counterpart in the UK.”²⁰³ By allowing all companies or all persons to have an Estonian identification, Estonia has tried to expand its borders instead of knocking down the cross-country borders already present.²⁰⁴ While there is still a central government establishing the identification, the implementation actually looks closer to a

¹⁹⁵ Kersti Kaljulaid, *Estonia Is Running Its Country Like a Tech Company*, QUARTZ (Feb. 19, 2019), <https://qz.com/1535549/living-on-the-blockchain-is-a-game-changer-for-estonian-citizens/>.

¹⁹⁶ *Technology*, GUARDTIME, <https://guardtime.com/technology> (last visited Dec. 9, 2019).

¹⁹⁷ *Security and Safety*, E-ESTONIA, <https://e-estonia.com/solutions/security-and-safety/ksi-blockchain/> (last visited Dec. 9, 2019).

¹⁹⁸ *Become an E-Resident*, REPUBLIC OF EST.: E-RESIDENCY, <https://e-resident.gov.ee/become-an-e-resident/> (last visited Dec. 9, 2019).

¹⁹⁹ *Id.*

²⁰⁰ *What is E-Residency?*, REPUBLIC OF EST.: E-RESIDENCY, <https://learn.e-resident.gov.ee/hc/en-us/articles/360000711978-What-is-e-Residency> (last visited Dec. 9, 2019).

²⁰¹ Kaljulaid, *supra* note 195.

²⁰² *Cross-Border Data Exchange*, AMBITIOUS FUTURE, <https://e-estonia.com/> (last visited Dec. 9, 2019).

²⁰³ *Id.*

²⁰⁴ *Id.*

decentralized government method.²⁰⁵ The listed residents of Estonia are not actual Estonian citizens, but companies interacting with Estonian permission.²⁰⁶

C. Finland's MONI Program

Finland's refugee agency has adopted blockchain technology to create digital wallets attached to a digital identity form for cash transfers to unbanked refugees.²⁰⁷ MONI, an application designed to create a digital wallet via blockchain technology, tracks the transactions of refugees while still keeping their identity private from third parties.²⁰⁸ Much like the program built by the WFP, cash transfers through MONI do not require financial intermediaries.²⁰⁹ The program has helped Finnish refugees assimilate in two ways. First, refugees previously unable to open up bank accounts are better able to pay bills or deposit paychecks from jobs.²¹⁰ Second, Finnish authorities can track the transaction of refugees, which furthers national security and promotes a better understanding of what refugees are buying so that the government can better anticipate their needs.²¹¹

Thus far, the Finnish-MONI program has been very successful. Reduced transactional costs, increased assimilation for refugees, and authenticated identifications have allowed Finland to accept refugees efficiently and circumvent the issues of undocumented refugees. When asked about refugees arriving without identification, the director of the Finnish Immigration Service, Jouko Salonen, believes the issue has been "solve[d]."²¹²

²⁰⁵ See generally LISK, *supra* note 160.

²⁰⁶ *Cross-Border Data Exchange*, *supra* note 202.

²⁰⁷ Mike Orcutt, *How Blockchain Is Kickstarting the Financial Lives of Refugees*, MIT TECH. REV. (Sept. 5, 2017), <https://www.technologyreview.com/s/608764/how-blockchain-is-kickstarting-the-financial-lives-of-refugees/>.

²⁰⁸ Tristian Rayner, *How Finland is Using Blockchain to Revolutionise Financial Services for Refugees*, RESET DIGITAL FOR GOOD: NEWS (Oct. 5, 2018), <https://en.reset.org/blog/how-finland-using-blockchain-revolutionise-financial-services-refugees-05102018>.

²⁰⁹ Jerry Bowles, *How Blockchain is Providing 'Proof of Existence' for the World's 1.1 Billion Refugees*, DIGINOMICA (Mar. 22, 2018), <https://diginomica.com/blockchain-providing-proof-existence-worlds-1-1-billion-refugees>.

²¹⁰ Rayner, *supra* note 208.

²¹¹ Kevin O'Brien, *Displaced Communities Are Finding Hope Through Blockchain and NGOs*, BITCOINIST: NEWS (Sept. 26, 2018), <https://bitcoinist.com/displaced-communities-are-finding-hope-through-blockchain-and-ngos/>.

²¹² Orcutt, *supra* note 207.

D. Zug, Switzerland

The Swiss city of Zug began a blockchain municipal identification card in later 2017.²¹³ Residents of Zug download an application, “uPort,” and the user is given a private key, which is available to her whether or not she continues to manager her identification on the registered device.²¹⁴ The app also employs a “controller contract,” which helps recover a user’s private key if it is lost through back-up security authentications on the user’s device.²¹⁵

The Zug identification system relies heavily on verification by the Swiss government.²¹⁶ Zug citizens must use their passport number to create an account, and within two weeks they are called for an appointment at the citizen registration office for in-person verification of the user’s identity.²¹⁷ However, once logged in, users can use the information for all interactions with the city or other connected apps, including the ability to vote electronically.²¹⁸

Essentially, the Zug system demonstrates a successful municipal identification, but it still requires heavy central government involvement on the outset.²¹⁹ Creating municipal identifications via blockchain acceptable to governments will likely involve central governments facilitating and verifying data from the beginning.²²⁰ However, the successes of Zug can demonstrate why this may be a worthwhile investment for governments that already have a form of physical identification in place.

E. Bitnation

Bitnation is “the world’s first Decentralised Borderless Voluntary Nation (DBVN).”²²¹ Bitnation membership begins when individuals create an account during which they “opt-in” to the rules of the organization.²²² Bitnation

²¹³ Paul Kohlhaas, *Zug ID: Exploring the First Publicly Verified Blockchain Identity*, MEDIUM: UPORT (Dec. 6, 2017), <https://medium.com/uport/zug-id-exploring-the-first-publicly-verified-blockchain-identity-38bd0ee3702>.

²¹⁴ *Id.*

²¹⁵ *Id.*; see also Pelle Braendgaard, *What is a uPort Identity?*, MEDIUM: UPORT (Feb. 27, 2017), <https://medium.com/uport/what-is-a-uport-identity-b790b065809c>.

²¹⁶ *Id.*

²¹⁷ *Id.*

²¹⁸ David Meyers, *Blockchain Voting Notches Another Success—This Time in Switzerland*, FORTUNE (July 3, 2018), <http://fortune.com/2018/07/03/blockchain-voting-trial-zug/>.

²¹⁹ Kohlhaas, *supra* note 213.

²²⁰ *Id.*

²²¹ *Enter Pangea*, BITNATION GOVERNANCE 2.0, <https://tse.bitnation.co/> (last visited Dec. 9, 2019).

²²² SUSANNE TARKOWSKI TEMPELHOF ET AL., BITNATION GOVERNANCE 2.0, PANGAEA JURISDICTION AND PANGAEA ARBITRATION TOKEN (PAT) (2017), <https://eliott.teissonniere.org/assets/files/bitnation.pdf>.

founder Susanne Tarkowski Tempelhof believes that the unique features of Bitnation make it the best gap-filler for the pitfalls of traditional identification systems.²²³ For example, members of Bitnation can transact across national borders without the barriers of government regulations.²²⁴

Bitnation has created a Refugee Response Network which grants blockchain-based identification documents to refugees.²²⁵ Family members and friends verify identities, which builds a trust network and an avenue where displaced persons can more easily find loved ones with whom they have been separated.²²⁶ The identification was coupled with a prepaid Visa card that was loaded with Bitcoin, but can be used as a traditional Visa to withdraw cash and pay bills.²²⁷ The idea was to provide refugees without access to formal banks with access to financial resources to start their lives in their home countries.²²⁸ However, the prepaid Visa program was ultimately unsuccessful and shut down.²²⁹

There were two major logistical issues the prepaid Visa program.²³⁰ The first issue was that distributing the cards was slow due to bureaucratic red tape and costs. Bitnation identification documents can be processed immediately, but governments have rules and restrictions on money entering traditional borders.²³¹ Another issue was that, although these cards were given to refugees for free, each card cost 12€ to create, which was funded solely through donations.²³² The organization attempted to solicit the donations necessary to fund these cards to match need, but was unsuccessful.²³³

The program also could not educate refugees effectively about the program and the basics of blockchain.²³⁴ Tempelhof said that the need for this education will always be the largest hurdle in the universal implementation and

²²³ Gautham, *Exclusive: An Interview with Susanne from Bitnation*, NEWS BTC, <https://www.newsbtc.com/2015/10/04/exclusive-an-interview-with-susanne-from-bitnation/> (last visited Dec. 9, 2019).

²²⁴ *Enter Pangea*, *supra* note 221.

²²⁵ Erin Lace, *Bitnation Registers First Refugees on the Blockchain*, COINTELEGRAPH (Sept. 18, 2015), <https://cointelegraph.com/news/bitnation-registers-first-refugees-on-the-blockchain>.

²²⁶ Luke Parker, *Blockchain Company Helping Syrian Refugees, Delivering on The United Nations Vision*, BRAVE NEW COIN (Oct. 3, 2015), <https://bravenewcoin.com/insights/blockchain-company-helping-syrian-refugees-delivering-on-the-united-nations-vision>.

²²⁷ *Id.*

²²⁸ *Id.*

²²⁹ Annie Nova, *Some Cryptocurrency-Backed Debit Cards Dropped from Visa Network, Leaving Users Scrambling*, CNBC (Jan. 5, 2018), <https://www.cnbc.com/2018/01/05/some-cryptocurrency-backed-cards-dropped-from-visa-network.html>.

²³⁰ Parker, *supra* note 226.

²³¹ *Id.*

²³² *Id.*

²³³ *Id.*

²³⁴ *Id.*

success of these Bitnation programs.²³⁵ For example, because the prepaid Visa cards were loaded using Bitcoin, in order to use the Visa and reload it to pay bills a refugee would need to know the basics of the program, encryption, Bitcoin, and the power of their identification documents themselves.²³⁶ Tempelhof set up informational seminars for refugees in camps, but the organization faced problems recruiting ambassadors to lead these sessions.²³⁷

These various implementations of digital, blockchain-based identification systems demonstrate the power of this technology to create more opportunities for refugees and all members of the international community, and its limits.²³⁸ Covering programs such as MONI and the WFP have created ways for refugees to interact and assimilate into their host countries. Estonia, however, has created one of the first covering programs to create international identification documents for companies to allow non-EU companies join the European market.²³⁹ By putting these interactions on the blockchain, companies, governments, and individuals have found a secure, inexpensive way to maintain records that can be accessed immediately without the fear of hacking.

However, it's important to recognize the limitations of implementation and attempting to create mass, immediate technological change. The Bitnation identification program has continued, but its most ambitious program, and arguably its most needed, ultimately failed not because of shortcomings of the technology, but human error in using it.²⁴⁰ Learning from the failures of Bitnation will help future digital identification and refugee aid programs anticipate some of the issues they may face when transitioning from the idea to implementation phase.

VII. CRITICISMS

As with the advent of all technology, blockchain technology has been met with a mixture of reverence and reproach.²⁴¹ In its outset, blockchain's critics have primarily focused on its energy inefficiency and potential security risks after reports of a high-profile hack.²⁴²

²³⁵ *Id.*

²³⁶ *Id.*

²³⁷ *Id.*

²³⁸ *Id.*

²³⁹ Kaljulaid, *supra* note 195.

²⁴⁰ *See generally* Parker, *supra* note 226.

²⁴¹ *See generally* Roger Huang, *How Blockchain Can Help with the Refugee Crisis*, FORBES (Jan. 27, 2019), <https://www.forbes.com/sites/rogerhuang/2019/01/27/how-blockchain-can-help-with-the-refugee-crisis/#3b823f406562>.

²⁴² Mike Orcutt, *Blockchains Use Massive Amounts of Energy—But There's a Plan to Fix That*, MIT TECH. REV: CONNECTIVITY (Nov. 16, 2017), <https://www.technologyreview.com/s/609480/bitcoin-uses-massive-amounts-of-energy-but-theres-a-plan-to-fix-it/>.

A. Blockchain Energy Efficiency

One of the features that makes blockchain so secure is also what makes it energy inefficient.²⁴³ Because of the constant verification between all nodes on a network, or “mining,” blockchain technology uses large amounts of energy compared to traditional central server technology.²⁴⁴ This is called a “proof of work” system and is the customary verification process for blockchain applications.²⁴⁵

Engineers argue that the energy use of mining does not only keep the network secure but is also a disincentive for hackers to alter transactions.²⁴⁶ As Christian Catalini, founder of MIT’s Cryptoeconomics Lab explains, “[y]ou’re putting between you and the attacker a barrier. The barrier is a massive amount of electricity. If I need to spend \$100 million in electricity to try to alter a bitcoin transaction worth \$1 million, then I have no incentive to do so.”²⁴⁷ The fact that blockchain currently uses so much energy acts as an asset to the system, instead of bug. However, the verification-by-mining system also slows transaction speeds, making it not yet suitable for full-scale implementation for all international identification transactions.²⁴⁸

There is currently no solution to the energy inefficiencies of blockchain, but engineers are considering multiple ways to reduce blockchain energy consumption.²⁴⁹ The first proposed solution is to move from the “proof of work” system to a “proof of stake” system which would select validators based on their investment in the technology, or what they have “at stake.”²⁵⁰ Unlike cryptocurrencies where a participant can invest into as many units as he or she chooses subject only to their availability, in blockchain, each person can only have one identification.²⁵¹ This makes no person the holder of a higher stake than another.²⁵²

Another solution to the massive energy consumption in the proof of work model is to switch to a “proof of elapsed time” model.²⁵³ Proof of elapsed time

²⁴³ *Id.*

²⁴⁴ *Id.*

²⁴⁵ *Id.*

²⁴⁶ Helen Zhao, *Bitcoin and Blockchain Consume an Exorbitant Amount of Energy. These Engineers Are Trying to Change That*, CNBC (Feb. 23, 2018), <https://www.cnbc.com/2018/02/23/bitcoin-blockchain-consumes-a-lot-of-energy-engineers-changing-that.html>.

²⁴⁷ *Id.*

²⁴⁸ *Id.*

²⁴⁹ *Id.*

²⁵⁰ Rayner, *supra* note 208.

²⁵¹ Rohan Pinto, *How Blockchain Can Solve Identity Management Problems*, FORBES (July 27, 2018), <https://www.forbes.com/sites/forbestechcouncil/2018/07/27/how-blockchain-can-solve-identity-management-problems/#531659f913f5>.

²⁵² *Id.*

²⁵³ *Introduction*, SAWTOOTH, <https://sawtooth.hyperledger.org/docs/core/nightly/0-8/intr>

(PoET) works by sending out a transaction to be validated to the network.²⁵⁴ The validator with the shortest wait time to begin validating, or elapsed time, is elected to validate the transaction.²⁵⁵ Unlike proof of work which has many validators expending energy validating the same transaction or proof of stake which uses the same major stakeholders to verify transactions, the PoET model distributes the verification into a lottery, reducing the energy consumption by reducing the number of verifiers but not concentrating validation power to the most invested.²⁵⁶ PoET also keeps the network secure by keeping the verifying nodes unpredictably.²⁵⁷

There are other potential verification models including a “proof of luck” model which acts similarly to the PoET model, but instead of first validator, the transaction is sent randomly to any validator.²⁵⁸ Others propose a “proof of space” model which sends the transaction to validators that have allocated a certain amount of memory to transaction validation.²⁵⁹ As blockchains are built for their specific uses, engineers will have to decide which validation model is most appropriate. Blockchain’s current energy inefficiency should not be prohibitive to developing these applications because of the alternative options developed by researchers.

B. Security

Blockchain’s immutability and security are the keys to its future applications and successes. In its perfect form, the verification mechanisms and public decentralized ledger makes it impossible for transactions to be altered.²⁶⁰ However, actual applications of blockchain have been hacked, opening up questions of whether blockchain is actually as secure as its advocates claim.²⁶¹

duction.html#proof-of-elapsd-time-poet (last visited Dec. 9, 2019).

²⁵⁴ *Id.*

²⁵⁵ *Id.*

²⁵⁶ *Id.*

²⁵⁷ *Id.*

²⁵⁸ MITAR MILUTINOVIC ET AL., MIDDLEWARE ‘16 17TH INT’L MIDDLEWARE CONF., PROOF OF LUCK: AN EFFICIENT BLOCKCHAIN CONSENSUS PROTOCOL (2016), <https://arxiv.org/pdf/1703.05435.pdf>.

²⁵⁹ Stefan Dziembowski et al., *Proofs of Space*, IACR-CRYPTO-2015 (2015), <https://eprint.iacr.org/2013/796.pdf>.

²⁶⁰ Brakeville & Perepa, *supra* note 32.

²⁶¹ Mike Orcutt, *Once Hailed as Unhackable, Blockchains Are Now Getting Hacked*, MIT TECH. REV. (Feb. 19, 2019), <https://www.technologyreview.com/s/612974/once-hailed-as-unhackable-blockchains-are-now-getting-hacked/> [hereinafter Orcutt, *Once Hailed*].

i. DAO Hack

The decentralized autonomous organization (DAO) hack is the most famous hack thus far in blockchain history.²⁶² The DAO was an organization using the Ethereum blockchain where people could contribute their tokens, or ether, to crowd-fund projects that would be built on the Ethereum blockchain.²⁶³ Each token had the same value and a vote, and projects receiving the most votes were funded by the total value of votes; if a project had a return on the investment, the token holder could take out their portion of the dividends, or reward.²⁶⁴ In 2016, a hacker drained the DAO account, taking \$55 million in ether coins in the process which exploited a mistake in the code created for DAO members to access their rewards.²⁶⁵ In order to solve the issue, DAO engineers had to drain the DAO and revamp it.²⁶⁶ Much like taking the money out of an old bank account and opening a new one, engineers created a “hard fork” creating a clone of the system without the mistake and distributing new coins that were the same value as the original.²⁶⁷ What resulted was the new Ethereum replacing what is now called “Ethereum classic.”²⁶⁸

The DAO hack created doubts about whether blockchain was as secure as advocates claimed.²⁶⁹ However, as in the DAO case, many of the systemic vulnerabilities of blockchain are in the possible coding issues in the original immutable code.²⁷⁰ Because DAO was storing the ether coins of members in a centralized account, it also became a target along with current centralized servers.²⁷¹ Instead of having to change more than half of the nodes of the network, which makes blockchain so secure, the centralized hub of ether with a backdoor coding error made it an ideal target for a hacker.²⁷² It is up to companies and governments to anticipate and test for coding issues and recognize potential vulnerabilities when using blockchain-based identification systems outside of their original purposes before launching new applications.

²⁶² Matthew Leising, *The Ether Thief*, BLOOMBERG (June 13, 2017), <https://www.bloomberg.com/features/2017-the-ether-thief/>.

²⁶³ *Id.*

²⁶⁴ *Id.*

²⁶⁵ *Id.*

²⁶⁶ *Id.*

²⁶⁷ *Id.*

²⁶⁸ *Id.*

²⁶⁹ *Id.*

²⁷⁰ Wilton Thornburg, *The DAO Hack and Blockchain Security Vulnerabilities*, COINCENTRAL (July 8, 2018), <https://coincentral.com/blockchain-security-vulnerabilities/>.

²⁷¹ *Id.*

²⁷² *Id.*

ii. *Private Key Encryption*

Another potential weakness in blockchain security is the mechanism with which the individual accesses and interacts in the network: the private key.²⁷³ Blockchain networks have two sets of keys: the private key and public key.²⁷⁴ A public key is like a user name, where other actors have an address where information can be sent.²⁷⁵ Unlike a username, however, sending data to one's public key will encrypt that data in such a way that only that user's private key can decrypt it.²⁷⁶ The encrypted messages cannot be decrypted with the public key alone because the message is meant for one specific person; that person's public key will perfectly be encrypted to match only the decrypting private key.²⁷⁷

The public key is just that—public.²⁷⁸ Each transaction is recorded with a public key on the ledger, like an anonymous sending and receiving address, which is then verified by the network promoting the transparency and security of the ledger.²⁷⁹ Anyone with access to the ledger can see a user's private key each time it is used in a transaction, however, the key is an encrypted, long string of numbers and letters which does not give any identifying information.²⁸⁰ Because of the dual encryption, an actor's public key would not decrypt the messages on the network being sent to that person; only a private key can unlock those messages.²⁸¹

Blockchain users worry about hackers stealing private keys.²⁸² This fear stems from the questions of data and digital security after major data breaches of passwords and usernames which have led to instances of identity theft.²⁸³ The Equifax breach, for example, led to the exposure of over 200,000 credit card numbers and other piece of identifying information for roughly the same number of individuals.²⁸⁴ Essentially, data is stolen from a centralized server;

²⁷³ *A Deep Dive on End-to-End Encryption: How Do Public Key Encryption Systems Work?* SURVEILLANCE SELF-DEF. (May 9, 2018), <https://ssd.eff.org/en/module/deep-dive-end-end-encryption-how-do-public-key-encryption-systems-work> [hereinafter *A Deep Dive*].

²⁷⁴ *Id.*

²⁷⁵ *Id.*

²⁷⁶ *Id.*

²⁷⁷ *Id.*

²⁷⁸ *Id.*

²⁷⁹ *How do Bitcoin Transactions Work?*, COINDESK (Jan. 29, 2018), <https://www.coindesk.com/information/how-do-bitcoin-transactions-work/>.

²⁸⁰ *Id.*

²⁸¹ *Id.*

²⁸² *A Deep Dive, supra* note 273.

²⁸³ *Data Breach*, IDENTITY THEFT RES. CTR. (2018), <https://www.idtheftcenter.org/data-breaches/>.

²⁸⁴ *The Equifax Data Breach: What to Do*, FED. TRADE COMM'N: CONSUMER INFO. (Sept. 8, 2017), <https://www.consumer.ftc.gov/blog/2017/09/equifax-data-breach-what-do>.

centralized servers that store massive amounts of information tend to be the targets of major hacks.²⁸⁵ Centralization of information has and will continue to leave information exposed to potential hacks.²⁸⁶

Data stored via blockchain is more secure than its centralized server counterpart.²⁸⁷ Because data is not stored in a single server, there is no single access point in which data is singularly stored and easily hackable.²⁸⁸ Each node is an access point which verifies the transaction recorded in the block; over half of the nodes would have to be changed to submit a fraudulent transaction.²⁸⁹ Simultaneously changing over half the nodes held on the private devices by different people by the time the transaction would be processed is impossible.

Blockchain is secure from third-party manipulators who would intercept a transaction, but if a third party has access to a user's private key, that actor can transact and manipulate a user's account, much like stealing a password to a bank or another secured account.²⁹⁰ If a transaction is done with one person's private key and is verified by the network, it cannot be voided or undone, even if it was done in bad faith.²⁹¹ This system makes the security of a private key of the utmost importance for a blockchain user.²⁹² However, private keys are not as easily decoded as a normal password.²⁹³ If a hacker wanted private information from an account on a blockchain network, he or she would not only need the public key, but also the private key.²⁹⁴

The process of key creation is very secure because, given a public key, it is practically impossible to come up with the corresponding private key. In other words, there is no way other than guessing and checking different private keys. With the current computing resources we have, it would take an extraordinarily long time to find the correct private key. Assuming that a classical computer tested a trillion keys a second, it

²⁸⁵ George Avetisov, *The Equifax Data Breach Shows the Limitations of How Our Data is Stored*, ENTREPRENEUR (Sept. 12, 2017), <https://www.entrepreneur.com/article/300175>.

²⁸⁶ *Id.*

²⁸⁷ SULTAN, *supra* note 152.

²⁸⁸ *Id.*

²⁸⁹ Ray King, *Blockchain Explained: The Ultimate Guide to Understanding How Blockchain Works*, BITDEGREE (June 21, 2019), <https://www.bitdegree.org/tutorials/blockchain-explained/>.

²⁹⁰ *A Deep Dive*, *supra* note 273.

²⁹¹ Orcutt, *Once Hailed*, *supra* note 261.

²⁹² Adrienne Jeffries, *How to Steal Bitcoin in Three Easy Steps*, VERGE (Dec. 19, 2013), <https://www.theverge.com/2013/12/19/5183356/how-to-steal-bitcoin-in-three-easy-steps>.

²⁹³ *A Deep Dive*, *supra* note 273.

²⁹⁴ *Id.*

would take up to 1.09×10^{19} years to guess the correct answer.²⁹⁵

The encryption method used for private keys makes traditional forms of hacking next to impossible.²⁹⁶ Even if a hacker has access to the ledger and to the public key of an individual, without extraordinary levels of computing power not currently available to the private consumer, the hacker could not access any identifying information.²⁹⁷

VIII. THE FUTURE IMPLEMENTATION: GOALS

Current programs have begun making universal blockchain-based identifications a reality for refugees and other vulnerable communities.²⁹⁸ The most developed and prominent is ID2020, which announced its first pilot program to establish digital, blockchain-based identifications for refugees in the Mae La Camp in Thailand.²⁹⁹

ID2020 has identified access points in the stages of life where people tend to encounter a central government at which that government can register persons and grant them a digital identification.³⁰⁰ These include “birth registration, vaccination/healthcare, primary school eligibility, passport issuance, mobile phone, driver’s license, bank account, voter registration, refugee status, property/business registration.”³⁰¹ At these points, when an individual approaches a central government without identification, international organizations, most of which are agencies of the U.N., work directly with national agencies to create universal identifications that meet the identity standards created by the alliance.³⁰²

The pilot program, a joint effort between the ID2020, International Refugee Commission in Thailand, and iRespond, will initially be in Mae La to improve access to healthcare for refugees by using data stored via blockchain and only accessible through an iris scan.³⁰³ As the program grows

²⁹⁵ Toshendra Kumar Sharma, *Can Blockchain Private Key Be Hacked?*, BLOCKCHAIN COUNCIL (Oct. 6, 2018), <https://www.blockchain-council.org/blockchain/can-blockchain-private-key-be-hacked/>.

²⁹⁶ *Id.*

²⁹⁷ *Id.*

²⁹⁸ Huang, *supra* note 241.

²⁹⁹ Emily Rutland, *ID2020 Alliance Launches Inaugural Pilots, Welcomes New Partners at Annual Summit*, PR NEWSWIRE (Sept. 14, 2018), https://www.prnewswire.com/news-releases/id2020-alliance-launches-inaugural-pilots-welcomes-new-partners-at-annual-summit-300713089.html?tc=eml_cleartime.

³⁰⁰ *Id.*

³⁰¹ ID2020 ALLIANCE, *supra* note 162.

³⁰² *Id.*

³⁰³ *Id.*

identification will expand to include professional and educational certificates that will be readily accessible to prove their qualifications to third parties without having to wait for an institution to constantly verify their certifications.³⁰⁴ Thus far, the program has received support internationally.³⁰⁵ Refugees will be able to use their identification documents to access services within the camp, but, as of the publication of this article, no global central government currently recognizes these identification documents as equivalent proof of identification to those granted by a central government.³⁰⁶ As the programs grow, ideally governments will work with ID2020 to address the specifics of these identification systems to adapt them to the government security standards to induce their acceptance as a form of identification.³⁰⁷

The Internet Bar Organization (IBO) has created a pilot program named The Invisibles and also has planned to use blockchain identifications to register refugees from Rohingya.³⁰⁸ It has begun to create a database of Rohingya refugees living in Bangladesh from a refugee's initial interaction with an On-Site Actor.³⁰⁹ An On-Site Actor is a professional, such as a doctor, in that camp who is not necessarily a representative of IBO.³¹⁰ Information entered by the On-Site Actor is taken and stored into a database which is reviewed by a Verifier. The details of who qualifies as a Verifier and what data verification entails have not been fully determined.³¹¹ When the data is verified, the information will be stored on a decentralized identifier blockchain vault.³¹² The system will also include an Online Dispute Resolution system for either incorrect information or improper sharing.³¹³

The IBO's Invisible's project is in its earliest inception.³¹⁴ The project has identified the core questions of what digital identifications entail.³¹⁵ That being said, the program has a long way to go until it is fully developed. A large component to the barriers of the international implementation and recognition of blockchain for refugees is the assurance that the data given by refugees is

³⁰⁴ Rutland, *supra* note 299.

³⁰⁵ See generally Peggy Johnson, *Partnering for a Path to Digital Identity*, MICROSOFT BLOG (Jan. 22, 2018), <https://blogs.microsoft.com/blog/2018/01/22/partnering-for-a-path-to-digital-identity/>.

³⁰⁶ *On the Road to Digital Identity*, GBG: GLOBAL INSIDE, <https://www.gbglc.com/inside/un-programme> (last visited Dec. 9, 2019).

³⁰⁷ Johnson, *supra* note 305.

³⁰⁸ Daniel Rainey, IBO Board Member, *Digital Identity for Refugees and Disenfranchised Populations: The "Invisibles" and Standards for Sovereign Identity Presentation at the Offices of Eleven Publishers at The Hague* (May 1, 2019).

³⁰⁹ *Id.*

³¹⁰ *Id.*

³¹¹ *Id.*

³¹² *Id.*

³¹³ *Id.*

³¹⁴ *Id.*

³¹⁵ *Id.*

verified.³¹⁶ Not having a determination of how to verify either biometric or paper identification materials would hinder the progress of identification long term. However, the early collection of data will allow this program to research those issues and quickly upload that information to the optimal platform.³¹⁷

International eyes will be turned to ID2020 and IBO as they oversee these pilot programs before global mass implementation for all people without a legal identification. These digital identifications will be important factors to deciding the future of many vulnerable people.

IX. DIGITAL IDENTIFICATIONS AND COVERING

The blockchain-based identification systems created by programs such as ID2020 should become the formal international form of covering for refugees, undocumented immigrants, and stateless persons. Unlike covering programs instituted by federal governments, a permanent, international covering program would not be subject to repeal by national governments.³¹⁸ Programs like DACA and refugee protections passed by national legislatures are subject to political shifts which could lead to their revocation, undermining the security that these programs supposedly imbue.³¹⁹ Not only would international bodies be less likely to repeal a covering program, the permanence of these identification documents would decrease the ability for central governments to repeal them.³²⁰

International covering mechanisms would also solve the issue facing central government covering programs of the reluctance of vulnerable populations to identify themselves as non-citizens depending on the culture of their host country.³²¹ For example, some DACA recipients feared enrolling because of the belief that the undocumented immigrant's information would be exploited by the government if the program was later repealed.³²² Covering programs that are not contingent on a central government will not be subject to that level of uncertainty. If the program is successful as described in its most ideal form, vulnerable persons would be afforded greater protection partly because of the success of the program, but also because they may be more likely to participate in the program compared to any national counterparts.

However, as with all international agreements, each participating country will in some way have to consent to the identification system, meaning the

³¹⁶ Aburass, *supra* note 12.

³¹⁷ Rainey, *supra* note 308.

³¹⁸ Elias, *supra* note 37, at 851.

³¹⁹ *Id.*

³²⁰ *Id.*

³²¹ *Id.*

³²² Dara Lind, *Immigrants Gave the Government Personal Details to Get DACA. Will It Be Used to Deport Them?*, VOX (Sep 8, 2017), <https://www.vox.com/policy-and-politics/2017/9/8/16256982/daca-application-ice-deport-privacy>.

program is still susceptible to the same weaknesses of national covering programs.³²³ Citizenship and central government-granted rights could be layered onto the digital identifications and then could replace the central government paper identifications altogether. However, central government would have to agree to the basic system. In that way, this covering device could still suffer from the change of government administrations and their subsequent policies.

Digital identification advocates have begun to address this issue.³²⁴ Members of Bitnation, a governance model in which members apply for a decentralized passport for Pangea, a nation without borders or a traditional citizenship application, have begun to tackle the idea of governments accepting these digital identification forms.³²⁵ One idea a member postulated was to bargain with small countries which have few to no travel restrictions.³²⁶ If some smaller countries begin to recognize the Bitnation passport, it could open the door to official international recognition of non-governmental identification documents.³²⁷

International digital identification systems may not be ratified and adopted federally to replace passports and endow federal protections, but could still offer protection on a state or municipal basis.³²⁸ State governments and municipalities have seemed open to state-sponsored passing and covering mechanisms in the creation of sanctuary cities and municipal identifications.³²⁹ Pushing state and local law enforcement officials to accept digital identifications not including immigration status could have the same effects of lowering crime rates and decreasing racial profiling, benefitting sanctuary cities and cities with municipal identifications.³³⁰ The success of municipal identification documents alone has paved the way for local governments to utilize these identifications for access to social opportunities even when the identification is not federally adopted.³³¹

³²³ Vienna Convention on the Law of Treaties art. 9, May 23, 1969, 1155 U.N.T.S. 331, 8 I.L.M. 679.

³²⁴ See generally Rainey, *supra* note 308.

³²⁵ *Passport or Other Travel Document for BITNATION Citizens*, BITNATION GOVERNANCE 2.0 (Aug. 1, 2017), <https://bitnation.consider.it/passport-or-other-travel-document-for-bitnation-citizens?results=true>.

³²⁶ *Id.*

³²⁷ *Id.*

³²⁸ Cade, *supra* note 88, at 471.

³²⁹ *Id.*

³³⁰ *Id.* at 471–72.

³³¹ THE CTR. FOR POPULAR DEMOCRACY, *supra* note 84, at 11–22.

X. CONCLUSION

Identification documents are the key to many areas of social participation and mobility.³³² Vulnerable populations have suffered from lack of identification, leading to immigrants and refugees being delegated to passing, covering, and converting mechanisms to assimilate into their new countries.³³³ In order to discourage refugees from relying on passing mechanisms, states should provide safe forms of covering to aid refugees' assimilation. Having access to financial institutions and other social opportunities would ideally make living in new countries safer for immigrants and benefits the country by decreasing crime rates. The United Nations providing international identification documents may alleviate a burden on states and protect vulnerable immigrants from having to come forward with their status. The social benefits of having universal identifications that are easily verifiable and accessible range from the possibility of a having stable migrant workforce to the potential reducing crime targeted at immigrant populations comparable to the benefits seen in communities with municipal identifications.³³⁴

Unlike an identification form granted by a centralized government, digital identifications do not inherently hold the same rights as a traditional identification.³³⁵ Instead, the identification would be a form of immigrant and refugee covering allowing a refugee to more easily assimilate to their host country. These identifications would be like an electronic form of a municipal identification where the holder could have access to healthcare and banks without having to identify themselves immediately as undocumented or stateless. Specifically, programs like ID2020 are aimed at reducing the barriers to social mobility created by lack of identification.³³⁶ These programs would help migrant populations and society writ large.

Blockchain technology is the best platform to create this system because of its effectiveness and accessibility. The security features of blockchain make it the optimal storage space for identification documents, which have been vulnerable to centralized-server hacks. Additionally, data-sharding eliminates the need for massive amounts of data being passed for basic interactions, protecting the holder's nonessential information.

Early applications of digital identifications have been very successful. The WFP and Finland's MONI Program have created covering programs that use blockchain to aid refugees. Bitnation and Estonia's e-Residency program have implemented a conversion mechanism to create borderless online nations that

³³² Aburass, *supra* note 12.

³³³ *Id.*

³³⁴ See THE CTR. FOR POPULAR DEMOCRACY, *supra* note 84.

³³⁵ *The Need for Good Digital ID Is Universal*, ID2020, <https://id2020.org/digital-identity> (last visited Dec. 9, 2019).

³³⁶ *Id.*

will allow for users to more easily transact without the hassles of various national red tape; Bitnation has begun the process of working with international governments to have its passport recognized internationally. Each of these programs has addressed different aspects of digital identification.

The most comprehensive program to address this issue is the ID2020 pilot. With this program's success, the international community can understand how these identification systems can be beneficial for international and vulnerable populations.³³⁷ It is truly the first step towards finding an international solution to the growing migrant populations and to modernizing our archaic centralized identification system for an increasingly globalized world.

Technology was and is revered for how it addresses the concerns of its time to make people's lives better. From the industrial revolution to the invention of the iPhone, the importance of technology and its effects on human existence have transformed how people interact with the world and each other. Having identification easily accessible from anywhere may be a simple change for some, but for Sama, Ghada, and the other millions of refugees without documentation, it could be the difference between life and death.

³³⁷ *Id.*