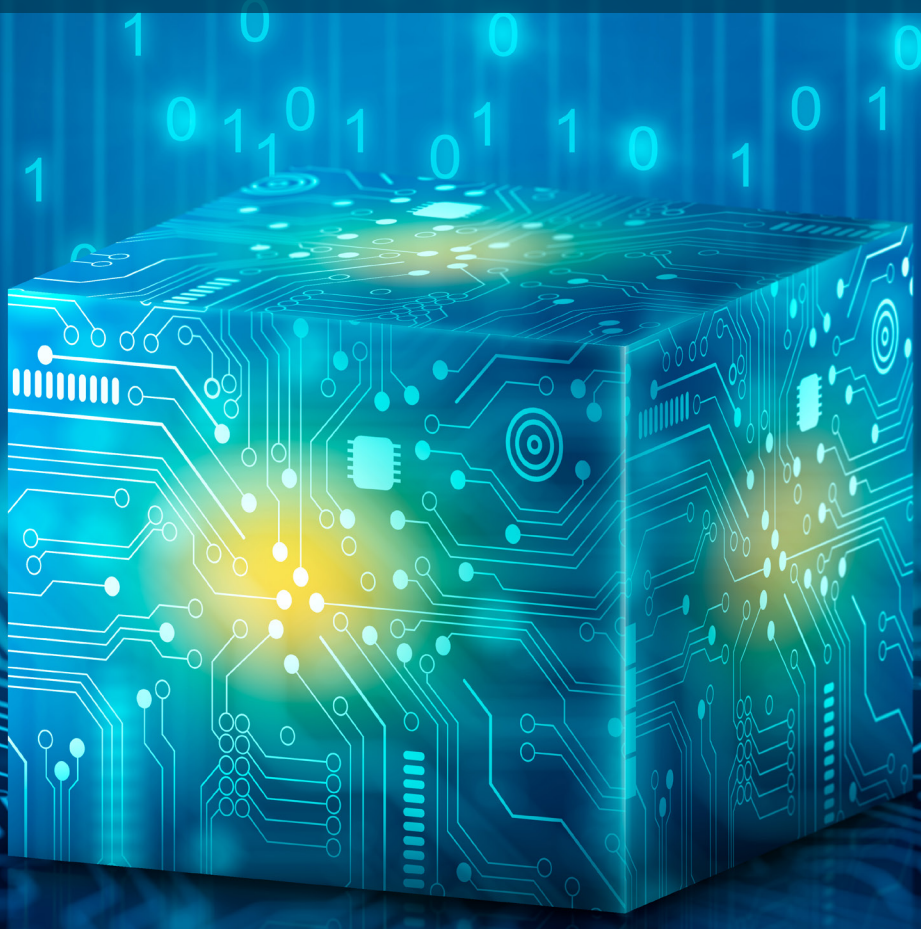
BLOCKCHAIN
BLUEPRINT SERIES

A companion document to the study:
Blockchains for a Sustainable Postal Future



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FACILITATING COST-EFFECTIVE REMITTANCES

Introduction

For the unbanked and underbanked populations, the possibility to receive funds from family members and across borders could be beneficial to get access to financial products and services. It is because of this that remittances and a postal solution in this area could play an important role in increasing financial inclusion levels within target population.

Providing people with a secure, near-instantaneous and low-cost way to transfer funds between each other has been identified as a priority use case by the UPU as part of its financial inclusion programme and its priority policy for postal services development. Remittances have been previously mentioned as an ideal use case for the potential use of cryptocurrencies by Posts (Khan, 2019).

As remittances can be divided into domestic and international non-commercial transfers of money, it is of importance to consider the role of Posts as the enablers of transactions and possibly as cash agents. Moreover, it is crucial to bear in mind the added challenge of currency exchange for those transfers done between different fiat currencies.

With the increasing numbers of people migrating internationally to help support their families, the following sections will look into the instance of international remittances enabled by distributed ledger technologies (DLTs). Examples on how to deal with currency exchanges have also been included as part of the technical architecture.

The examples presented below showcase how the use of DLTs, more specifically cryptocurrencies, can facilitate remittances at lower costs and with near-instantaneous transfer of funds. Partnerships that lead to standardization and interoperability between Posts, as described in the publication "Blockchains for a Sustainable Postal Future", are highly encouraged in order to reap the most benefits for both Posts and users when using a DLT remittance solution.

The first option being explored is that of using existing established cryptocurrencies to allow users to send and receive funds. Posts would need to account for different levels of digital savviness in their users, as some may already be owners of cryptocurrencies themselves and thus would not need assistance in converting their funds before sending them abroad. On the other hand, it could be the case that the Posts would need to support the transfer and delivery of the remittance.

The sections below also explore the possibility to use DLTs as a tool to facilitate transactions in terms of recording debt between autonomous postal operators for international remittances managed and delivered by the UPU to the Posts.

The primary benefits and challenges for each of these two options, which will be explained in more detail further on, can be summarized in Table 1.

The role of DLTs in facilitating cost-effective remittances

Given the Posts' central and trusted role in society, they are in an excellent position to explore alternatives to current remittance practices, such as cryptocurrency based money transfers. Where feasible, Posts could act as a cash merchant for its clients by exchanging cryptocurrencies for fiat currencies using its extensive network of physical locations.

Although remittance services are already offered by many Posts, DLT based remittances would allow them to work towards its societal mission of increased financial inclusion by decreasing costs and transfer times for senders. At the same time, Posts can create an opportunity to increase their own revenues, despite lower remittance fees, by being able to target a larger clientele.

DLT solutions enable an integrated system with the same currency throughout, in which not only the transaction is

processed, but information on both senders and beneficiaries is recorded too. As a result, Posts that act as financial service providers will be able to easily comply with their domestic know-you-customer (KYC) and anti-money laundering (AML) standards. KYC/AML standards are a requirement for financial service providers to authenticate their client's identities before providing financial services. In turn, this increases transparency, traceability and speed at a reduced cost.

DLT based solutions offer the possibility to lower transaction costs significantly (Qui et al., 2019). Both the increased speeds and low costs for remittances enabled by DLTs pose an attractive alternative for postal clients when compared to other financial institutions. High transaction costs are due to the currently slow and multi-step process behind sending funds internationally. In some international corridors, transfers need to be processed using different payment systems which are not always available during the same time zones nor operating hours (Mejia-Ricart et al., 2019). As discussed in the "Blockchains for a Sustainable Postal Future", the costs for remittances are on average 7.95 percent of the value sent, much higher than the aim of three percent set by the UN for 2030 (World Bank, 2020).

For Posts that offer remittance services through the domestic and international postal network, having a single platform that processes the transfer of value and eliminates the need to use multiple banks' payment systems is vital to decrease costs. DLTs do not only offer the opportunity to decrease the costs associated with the actual transfer of value but also leads to a simplified process by removing other intermediaries besides the Posts relevant to the transaction.

In addition, there is the possibility of decreasing the value lost from currency exchanges through the use of DLTs for remittances. In a pilot done by Ripple, financial institutions who participated saved between 40 and 70 percent in foreign exchange costs by using their DLT based cross-border payments solution (Mejia-Ricart et al., 2019). This is possible due to the removal of intermediaries who would need to do a currency exchange before transferring the funds themselves until the money got in the hands of the receiver.

Table 1: **Benefits and challenges associated with the use of cryptocurrencies for remittances**

	Option 1: Use existing cryptocurrencies	**Option 2:** Implementing a custom postal DLT solution managed by the UPU
BENEFITS	Infrastructure already present (pay per transaction, smaller initial investment)	Could later be expanded for non-payment use cases too
	Easier to close the economic loop	Greater control on the supply and management of tokens
	Does not require a big time and money investment to set up and get it running	Posts would be able to play a role in the strategic design from a start
		Design may be easily altered to remain compliant
		Ability to later use crypto for general settlements between Posts
CHALLENGES	Relatively new territory from a legal perspective	Requires significant coordination and investment to set up
	Some forms of cryptocurrencies suffer from relatively high price volatility, exchange and transfer rates	Slightly weaker immutability guarantee
	Posts may feel as though their private transactions are being exposed	No clear standards, legal barriers and licensing requirements in some countries and for international transfers
	No clear standards, legal barriers and licensing requirements in some countries and for international transfers	Need to account for different levels of technological maturity and legacy systems
	Some countries have already issued restrictions or banned the use of (some) cryptocurrencies	

More transparency on the exchange rates used between currencies will enable Posts to better understand where value is lost due to currency exchanges. As it will be described later, the use of stablecoins pegged to a strong currency could also decrease the volatility associated with other cryptocurrencies such as bitcoin or ether.

Information on the use and benefits of DLTs for remittances have already been explained in the publication "Blockchains for a Sustainable Postal Future". More technical advantages and challenges of using such a solution are explained in the following sections.

High-level technical architecture

Process wise, a remittance consists of multiple steps, always involving at least two essential parties: a sender and a recipient.

Since DLT use cases for postal services in financial inclusion are considered, the focus is on international remittances where the recipient is to receive local currency physically (i.e., bills, coins) and thus would need to visit their local postal office to collect their funds. The system could be easily expanded to also support domestic remittances and remittances sent to a bank account rather than a physical address.

Receiving some form of DLT based (crypto) currency would instead fall into the "digital wallet" use case, more information on this use case can be found in the publication "Blockchains for a Sustainable Postal Future" and thus is not explored here.

The sender could use any supported form of money to initiate the payment (e.g., digital fiat money, physical money, cryptocurrency, bonds) as long as they are accepted by the receiving postal office.

There are two main ways to realize a remittance infrastructure based on DLTs, either using existing cryptocurrencies or implementing a custom "Post-to-Post" DLT solution. Each will be described in separate sub-sections.

The primary design objectives considered are:

- the speed and fees of internal transactions (i.e., those within the DLT solution using cryptocurrency),
- the external costs incurred such as foreign exchange fees and the costs of running the solution,
- the ease of joining for new Posts, and
- the ease of interfacing with non-Post participants.

Each proposed solution will be compared the to a bilateral clearing system that uses fiat currency. That is, a system where every pair of participating countries track the monetary exchanges between them and settle the difference at the end of some term (e.g., month or year) in a prearranged manner using some sort of invoice.

Option 1: Using existing cryptocurrencies

The current process surrounding remittances is complicated by rules and regulations multiple intermediaries need to follow relating to the movement of value across national borders. Contrary to most existing forms of money, cryptocurrencies (hereafter also referred to as "cryptos") are not yet inherently limited by any particular country's laws or regulations. This makes cryptocurrencies, specifically those with low fees, a logical tool to consider when attempting to lower the transfer and operational cost of remittances.

However, there are a couple of countries who have banned the use of cryptocurrencies (e.g., Algeria, Bangladesh, Bolivia, Egypt, Iraq, and Nepal) or has introduced regulations that are designed to limit the use of cryptos (e.g., Costa Rica, Czech Republic, El Salvador, India, and Venezuela). Before looking into using any form of cryptocurrencies, Posts need to verify that it is possible to do so in the context of their domestic legislation (Falk, 2021)

The simplest scenario when using cryptocurrencies is for a sender to buy crypto on their own and send it directly to their family's wallet (i.e., the recipient).

However, this will not be realistic for many people. Using cryptocurrencies poses several hurdles as many potential users still lack technical competence, have a hesitant attitude towards a new type of money and merchants often have a poor level of adoption. The postal network could assist in making this way of using crypto more accessible in various

ways, depending on the level of crypto-savviness of the sender and receiver of the remittance.

On the other end of the spectrum where both the sender and receiver are not familiar with the use of crypto, Posts would handle all interactions with cryptocurrencies, freeing users from the burden of having to deal with anything but their native currency. In the resulting process, Posts transfer cryptocurrency between each other, which they then exchange to and from local currency when interacting with the sender and the recipient.

A schematic view of the resulting process in Figure 1 shows the exchange operation twice for a single remittance procedure. In practice, however, batched conversions and local cash reserves would be used to save on fees.

There would be a reduced number of participants as the use of DLTs would mean that each country's central bank would not need to be involved for currency exchanges as well as the intermediary banks that enable the transaction. The only players involved would be the country's Posts and their corresponding postal offices plus the sender and recipient.

When using existing cryptocurrencies, Posts could choose between different cryptos such as bitcoin, altcoins or stablecoins. As funds are still exchanged twice in the scenario above, the choice of crypto is important when considering the best way to prevent a high amount of value lost due to currency exchanges.

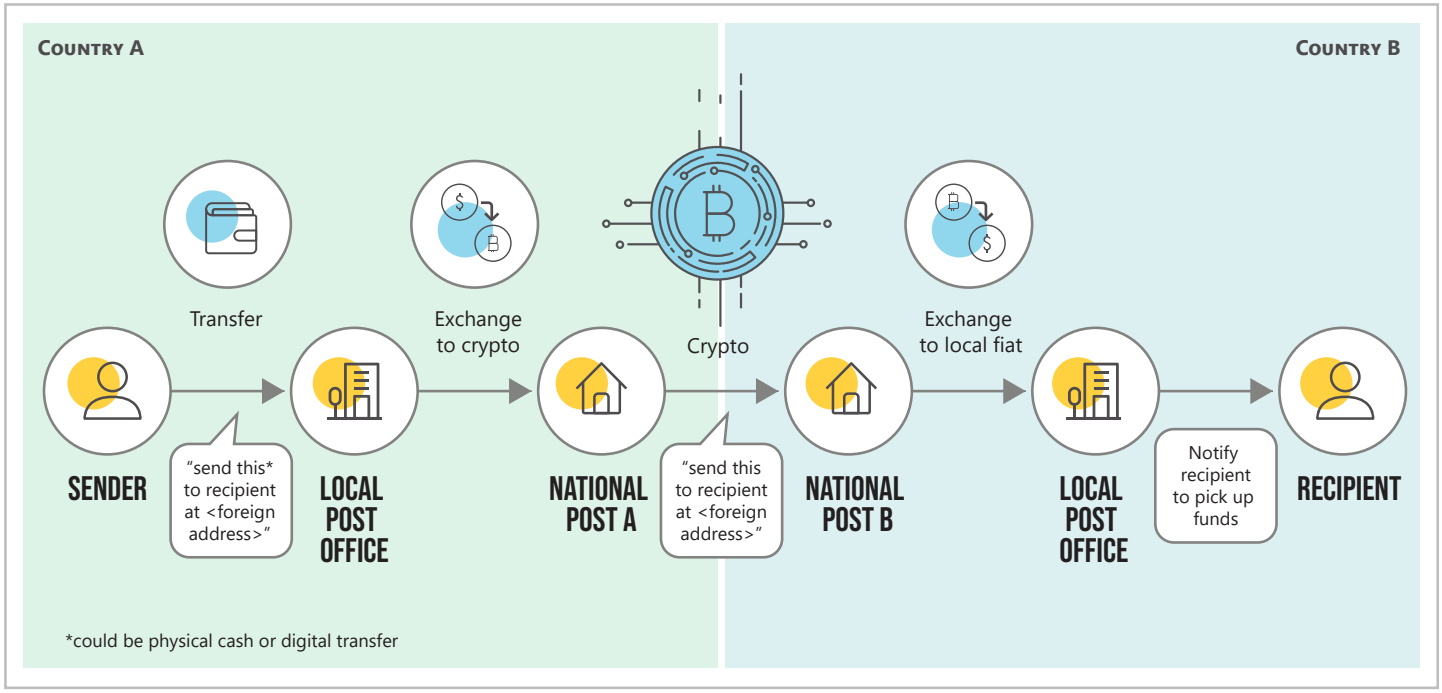
Posts could acquire crypto from existing exchange platforms that already have an established position in their domestic market, such as Binance, Coinbase or Kraken. Posts need to take into account other national regulations applicable to them as a provider of financial services using cryptocurrencies. For example, Posts need to investigate if they would need to apply for a license or if there is a limit to the amount of crypto they can own and transact with.

When using existing cryptocurrencies and exchange platforms, it is important to keep in mind that most of the risk would be taken by the Posts, when compared to other stakeholders. As each Post would need to create a DLT wallet to exchange, receive and transfer funds, the choice of platform will play a pivotal role in the resilience of the solution. The chosen platform needs to be compliant with domestic regulations and have the capacity to adapt the platform according to new ones.

Posts, as the sole owners of the wallet, will be responsible for the funds within it. Ensuring the ability to retrieve funds and exchange them to fiat is decisive in the selection of a platform.

Even with near-instantaneous remittances, the intra-day volatility of bitcoin and altcoins (e.g., ether) make them a complex option for remittances. In order to decrease uncertainty on the change of value in a digital currency, it would be interesting for Posts to consider using stablecoins (e.g., USDT, DAI, USDC, EURS). Stablecoins are pegged to a strong (external) currency (e.g., US dollar, euro) and some of their supply are linked to a reserve, thus making it a currency that is more resistant to volatility between the time it is exchanged to a crypto and then back to fiat.

Figure 1: **Post supported cryptocurrency remittance**



Some senders may not need support when interacting with cryptocurrencies and are independently able to purchase crypto or may already own it. If so, the Post of Country A might not necessarily be involved at all, save perhaps for regulatory compliance (as seen in Figure 2).

It may be the case that the national Post from Country A can still play a role in the above scenario where a sender already owns cryptocurrency and has a personal wallet. If the sender utilizes a wallet that allows them to connect to decentralized exchanges or decentralized apps (dapps) (e.g., MetaMask, Coinbase Wallet, Trust Wallet) then Posts could create a decentralized app and/or web platform that allows for senders to connect their wallet and transfer funds to other Posts so these can be sent to recipients.

In this way, the national Post of Country A would also play a role in the remittance flow, allowing senders to easily find and transfer funds to the national Posts of other connected countries, as seen in Figure 3.

The two user flows shown in Figures 1 and 2 respectively could coexist. However, a solution would need to be found for referring senders from Country A to Post B directly without violating regulation (such as national KYC/AML standards) in Country A.

For an initial pilot, the second scenario (as shown in Figure 1) should be considered first since it would be the best solution for reaching the most vulnerable population groups within a country. It is unlikely a majority of vulnerable population groups will be able to use cryptocurrencies directly nor are

Figure 2: **Remittance flow if sender already owns cryptocurrency**

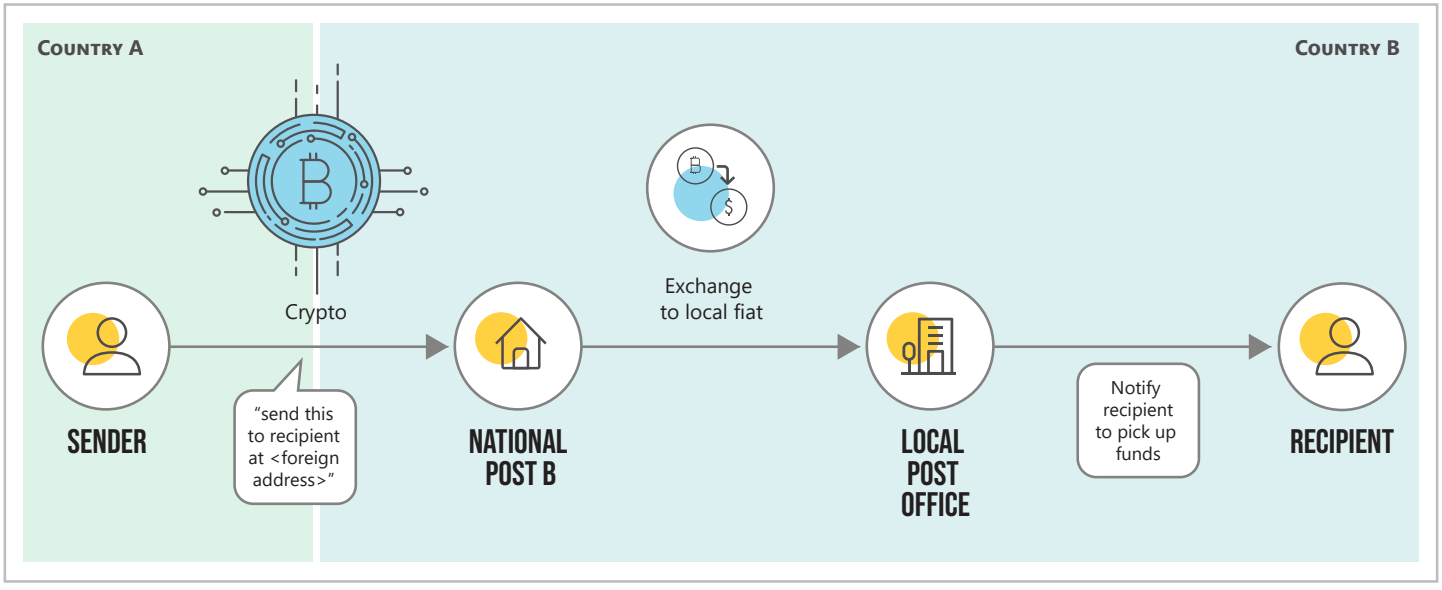
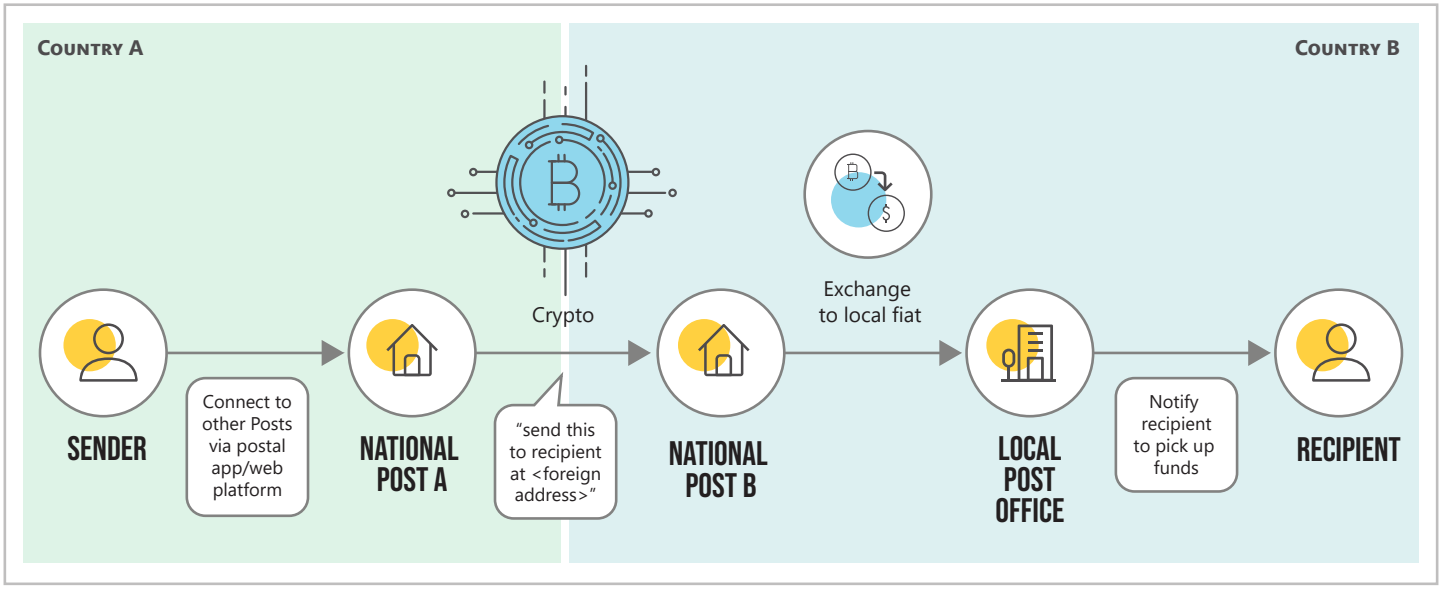


Figure 3: **Remittance flow if sender already owns cryptocurrency and utilizes a postal platform**



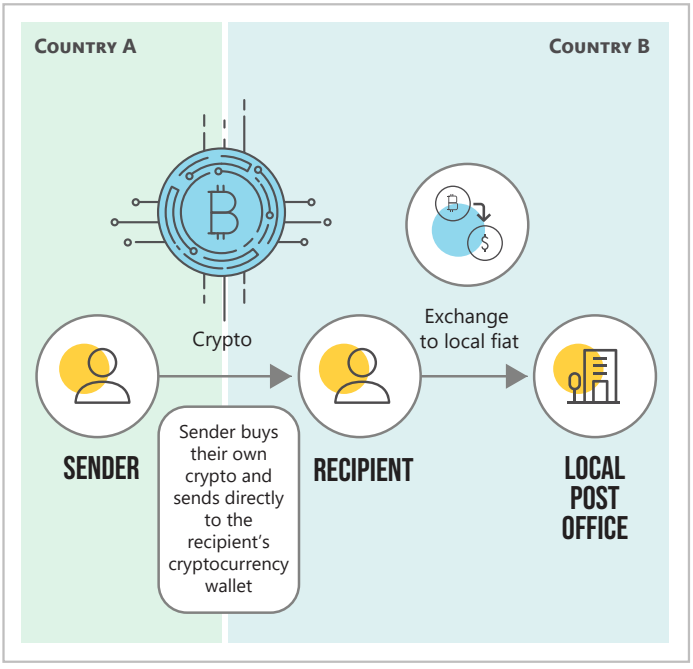
familiar with the concept. The option for direct payment with cryptocurrencies could be added later.

Finally, if recipients also have the ability to use crypto wallets, the Post could still serve a purpose as some form of exchange office as shown in Figure 4. This use case has previously been mentioned in another publication by the UPU, *Potential Use Cases of Cryptocurrencies by Posts* (Khan, 2019).

As transaction costs are low, the greatest risk on loss of value for Posts come from the exchange of fiat to crypto and vice versa. To reduce this possible loss of value, it is important for Posts to adopt risk management techniques that will enable them to exchange between cryptos and fiat the least number of times possible. This could be done by having a reserve on cryptocurrencies in the Post's digital wallet that can be easily available and traded between postal accounts while keeping a cash at the offices. In this case, the use of a ledger would play the role of a notarial ledger where transactions and transfer of value are recorded but it would mean that the Posts would need to have a higher investment that is locked in the ledger.

If fiat is withdrawn from the platform more often, Posts should look into different partners or platforms they could use in order to get low fees. Although many platforms and exchanges have low deposit fees for fiat (sometimes even none), withdrawal fees may be charged either as a flat rate or a percentual fee. In case of a flat rate, Posts would benefit the most from withdrawing a bulk of transactions instead of focusing on single ones to spread out the costs between transactions, so it is almost negligible.

Figure 4: **Use of a cryptocurrency wallet that allow exchange to local fiat at local postal offices**



Evaluation of the solution

Speed and fees of internal transactions (i.e., those within the DLT solution using cryptocurrency)

Some cryptocurrencies (e.g., gas prices for ether in the Ethereum blockchain) have fees that are too high for this use case, but plenty exist with fees of under a penny. Some high fee cryptocurrencies support layer 2 solutions that reduce the fees. Note that cryptocurrency fees are typically not percentual but "flat" – the total value transmitted usually has no impact on the fees paid.

Almost all cryptocurrencies have near-instantaneous transaction transmission. It takes some time before the payment becomes practically irreversible; however, but for many use cases it is not necessary to wait for that.

It should be possible to find a cryptocurrency or layer 2 solution for which both fees and transaction times are very low in the context of remittances. However, performing the exact an evaluation at the time of piloting is crucial as the best option in terms of crypto or layer 2 solutions is subject to change according to geography and the fast-paced field developments.

External costs incurred such as foreign exchange fees and the costs of running the solution

Cryptocurrencies run themselves so there are no recurring fees. However, transacting in crypto requires one to integrate a crypto wallet (open source) or some commercial service into the existing IT infrastructure. This costs effort and thus money.

Furthermore, Posts would require fiat on and off ramps. Exchanging fiat money to and from cryptocurrency often incurs costs. However, the costs are quite minimal. As an example, Coinbase, one of the popular cryptocurrency companies lists the following prices, indicating there is no proportional fee:

Table 2: **Coinbase fees for deposits and withdrawals**

	Deposit (Add Cash) Fee	Withdrawal (Cash Out) Fee
ACH	**Free**	**Free**
Wire (USD)	**$10 USD**	**$25 USD**
SEPA (EUR)	**€0.15 EUR**	**€0.15 EUR**
SWIFT (GBP)	**Free**	**£1 GBP**

Assuming a Post can find an off and on ramp for their native currency, this would mean the exchange fees could be greatly reduced compared to traditional fiat foreign exchange rates. Posts could also offer other postal services that could be paid in crypto (e.g., stamps, postcard, delivery) in order to keep turnover of crypto without having to exchange it to and from fiat.

Ease of joining for new Posts

Cryptocurrencies may pose regulatory challenges causing a hurdle for Posts adopting them as they will not remove the need to have formal and legal agreements that would likely need to be formed between Posts bilaterally anyway.

New Posts that would like to offer a cryptocurrency-based remittance service in this way would not require to have a high initial investment. It is of high importance to train the personnel that will be helping senders and recipients use the platform. Employees who face customers need to be able to answer questions they may have and ease concerns on the use of the service.

Each new Post would need to create a wallet where they can exchange fiat to crypto and vice versa. Posts would not need to open a wallet or an account in the same exchange in order to send funds between each other.

It is important to look at the available options within a Post's country as these may differ on geography and regulatory frameworks. Posts need to explore whether they are allowed to provide cryptocurrency-based remittance services within heir regulatory context. This includes knowing whether there are any licenses involved, how treasure float is managed, how to protect the Post's wallet and individual's identity, and who can operate such a platform.

Ease of interfacing with non-Post participants

Relatively easy because once someone is using a cryptocurrency, you can exchange value with everyone in that cryptocurrency and, in fact, the entire cryptocurrency space considering the ease with which cryptos can be converted into each other.

Option 2: Implement a custom Post-to-Post DLT solution

An alternative option would be to implement a DLT solution in which the Posts can transfer value using a custom token that is managed and delivered by the UPU for Posts. This system would be used as a clearance system that tracks, in real-time, monetary transactions between Posts for transactions such as remittances. In such a system, transactions are practically free and are completed in a matter of seconds or minutes. However, significant costs can be caused by transporting traditional (fiat) money in and out of the system. That is why there should be an attempt to minimize:

- the amount of money that needs to be settled outside of the DLT solution, and
- how often settlement (that is, withdrawing/depositing value from/into the system) is performed.

The two main ways to implement a value transaction system is either through debt, or, by introducing a new postal token or currency. The latter requires value to be injected into the system for it to work (i.e., the total sum of all value in the system will be positive). In the former, the total value in the system is zero meaning on average half of the participants will have a negative balance. Those participants would have to settle their debt before leaving the network.

A way to reduce the number of settlement transactions, and their average value as well, is to centralize these among all participants. With a custom token this is inherently true. In a debt-based system, assuming a single settlement currency (or alternative asset such as SDR[1]) can be chosen amongst the participants, settling all debt in the entire system only requires at most N-1 transactions, where N is the number of participants. In other words, it amounts to two, one or zero

1 An example of such an asset would be the use of Special Drawing Rights (SDRs) created by the International Monetary Fund (IMF). SDRs are an international reserve asset which uses a basket of the top five world's leading currencies (i.e., the US dollar, Euro, Chinese Yuan, Japanese Yen, and the British Pound). SDRs are already used for a number of different cross-country transactions such as in the payment of loans, obligations, pledges and other transactions that involve the IMF.

payments for each participant, averaging at slightly below one transaction. The scheme can be further optimized by not requiring a perfect zero settlement at the end of a term, in which case only N-2 transactions would be required.

Reducing the total value that needs to be settled can be further improved upon if the economic loop is as closed as possible – that is – participants that accrue a lot of value in the system are able to trade it for potential goods and services and thus not have to resort to extracting the value out of the DLT system and back into fiat money. The more participants are involved in the system and the more diverse they are in terms of their function, the more closed the economic loop tends to become.

A DLT solution with many participants favours the custom token approach since the debt-based approach requires enforcing rules such as all participants to settle their debt before leaving the network. Doing so becomes harder to enforce as the number of participants grows. Especially if the system is to eventually become some sort of public DLT ecosystem, it must have some sort of native token to work.

Custom tokens, however, have their own challenges. There are three types of custom tokens that will be described for this option:

market based tokens,

stablecoins, and

CBDCs.

Tokens with a free floating, market-based value suffer from volatility, especially if the market cap is low. This intra-day volatility also means that trading prices can fluctuate a lot during the day. For example, payments transferred from point A, can rise or lower in value by the time they arrive at point B. Users of such a system may resist making payments in this system when the value of the token is deemed unpredictable.

Additionally, users will likely want to cash out the value transfer to them when it hits a favourable price point, if they were to know the type of token used.

Tokens can be pegged to a stable asset (also referred to as "stablecoins"), but this requires faith in some authority to maintain the peg or some intricate system of smart contracts similar to MakerDAO's stablecoin "DAI". These digital assets are designed to keep their value and therefore experience smaller price swings when compared to market-based tokens. Stablecoins can be pegged to another asset to stabilize them, such as the US dollar, crypto assets or other neutral assets.

The UPU could use its position of trust as leverage to validate a token of their own. As inter-Post settlements are inherently international transfers of value, it would be worthwhile to consider using an asset that is not limited to a single currency such as SDR.

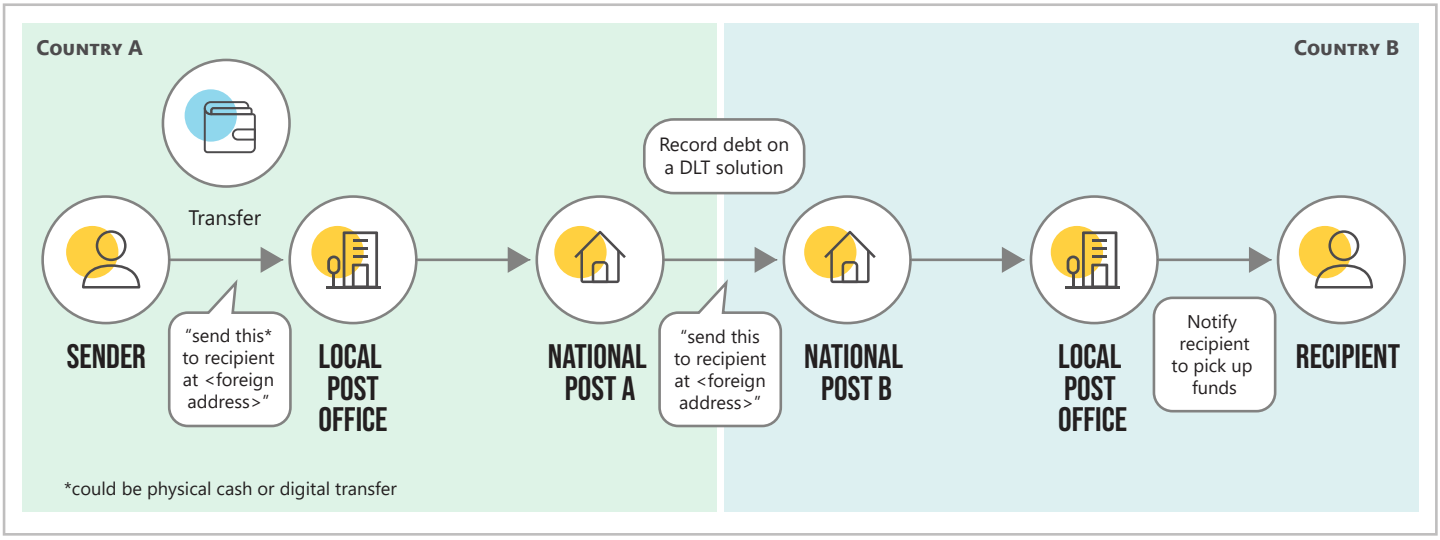
In the case of transfer of value and settlements, the custom postal coin that would be traded between Posts could be pegged to a reserve of SDRs such as one postal coin is equal to one SDR. However, in order to increase trust in the token, the UPU would need to have a reserve of SDRs to represent the total supply of the token.

Another option is to explore the use of Central Bank Digital Currencies (CBDCs) which are stablecoins that are issued by central banks and are tethered to the local fiat currency. Several countries have already started exploring the use of CBDCs including China, the Bahamas, France, Japan, the Philippines, Sweden, Switzerland, and Turkey (Coin Insider, 2020). Posts can examine the use of CBDCs to integrate them with a postal DLT solution or can use mechanisms such as eDinars as in Tunisia.

CBDCs may offer more certainty, as they are a form of digital cash, issued and supplied by a country's central authority and pegged to the country's national currency and might acquire an official legal tender status in the near future. Since CBDCs are backed by a central bank, they provide a higher level of trust in DLTs, especially amongst consumers with low trust in banks in general (Bijlsma et al., 2021).

However, adoption of CBDCs by the UPU comes with several obstacles. Consumers are likely to regard a token backed by certain countries as more trustworthy that those backed by others. As a result, the intricacies of geopolitical relations

Figure 5: **Using a DLT solution to record inter-Post debt**



and individual perceptions on foreign countries might inadvertently get involved, complicating adoption.

More importantly, CBDCs are still largely under development, meaning that immediate action cannot be taken. Furthermore, the development of CBDCs may not lead to tokens that fit in with the requirements set by the UPU. Finally, even if a trustworthy CBDC is developed, it may still take some trial and error before UPU can fully utilize its potential.

Besides choosing the type of cryptocurrency to be used to reduce the value lost to volatility, and thus be able to reduce total costs, another method to reduce the fees is simply to find the cheapest method to convert fiat currencies into the potential postal token and vice versa. Additionally, using a single clearance system for all inter-Post financial activity (not just remittances) will result in a more efficient system. However, DLT has no direct impact on these factors and as such they are considered out of scope for this document.

An example flow for a postal coin is shown in Figure 5.

The general architecture would involve each country's national Post running one or more nodes of the DLT solution. A local postal office would connect to its country's infrastructure which ultimately connects to the node(s) of the country, and in turn, the nodes of the rest of the system. The UPU itself could also run a node which could provide analytics and contribute to the robustness of the system. The UPU node could have some elevated privileged associated for instance with minting new tokens. However, in any DLT solution it is considered best practice to limit elevated privileges to only absolute necessity to preserve the decentralized nature of the system.

Whichever method is chosen, it is important to set up an ecosystem by onboarding as many other parties as possible. In this manner, adoption of the system becomes more attractive to a larger variety of consumers, as they from this interconnectivity to transfer their payments, make deposits or gain access to remittances at a lower price.

Evaluation of the solution

Speed and fees of internal transactions (i.e., those within the DLT solution using cryptocurrency)

Fees are practically non-existent for private and permissioned DLTs and transactions are processed practically instantly.

External costs incurred such as foreign exchange fees and the costs of running the solution

Contrary to using cryptocurrencies, a custom DLT would have to be designed and built, which would require a significant initial investment.

The other main cost factor will be currency exchange fees. Posts that send far more remittances than they receive will amass a high balance in the DLT solution. If this balance has

no direct benefits within the system, converting it to a local currency is the only option, which will incur foreign exchange fees.

Ease of joining for new Posts

Since the system would be specifically for Posts, the hurdle of joining should not be very high. Especially since it does not need to be mandatory for every country to run a node in the system. So the initial technical commitment would not need to be higher than any traditional non DLT system.

Ease of interfacing with non-Post participants

This will be the most challenging aspect since it impacts the system's design, as well as change its regulatory requirements. If a solution is designed only for inter-Post transactions and settlements in mind, it might prove to be cumbersome to include other non-Post participants in the already existing ecosystem.

In the case that the UPU acts as the provider of such a solution when using a private and permissioned platform, new participants would need to be screened before being added into the ecosystem and before giving them access to the already existing data enclosed in the ledger. This may also include negotiations with the new participants and the need to look if they can participate in such transactions due to the governing regulatory frameworks.

Partner selection and pilot considerations

For a pilot to be successful in the area of remittances, the following steps need to be taken into account:

- Investigate the different system configurations described in this research and choose the most applicable solution
- Find partners in the following domains:
  - DLT platform technical
  - Business development
  - Legal and regulatory
  - Security and privacy
  - Fiat on/off ramps (for cryptocurrency)
- Define prerequisites and vet the participating countries and Posts
- Run pilot
- Evaluate

From the second step, it could also be the case that a single partner could bring talent and expertise in all of the five domains necessary for a successful pilot. For the technical capabilities, the potential partner needs to be able to:

- design the architecture and system according to the needs of the Post,
- support with in-house stack providers for DLT (e.g., Hyperledger, Corda),
- readiness to run and maintain the platform,
- ability to integrate with existing systems, and
- provide custody solution and key management solutions.

When considering using existing cryptocurrencies, as per the first provided option, it is important for Posts to identify and assess the platform providers that already have experience with international value transfers. Finding the right partner will take the longest time, as negotiations will need to take place to decide the level of involvement from both parties, where Posts should aim to become active decision makers in the strategic direction of the pilot and take lead in the business development. This does not mean that the partner should not have experience in this domain, as they could bring insights into the technological side of the solution.

In order for the Posts to maintain the strategic pillar in house, it is important to consolidate a group of people within the Post who will be involved during the selection process of potential suppliers and the negotiation stages. It would be beneficial for the selected individuals to continue

with the pilot as their priority task, where they can act as the managers of the project to answer any questions other employees may have and oversee the progress of the pilot.

Posts should keep the strategic dependency on the service provider at a minimum, so that they can have a strong influence on the direction of the pilot.

The postal employees selected for the strategic pillar, as the postal financial inclusion expert, should provide guidance throughout the designing and promotion of the solution to create a positive impact instead of focusing on potential revenues.

To leverage as many benefits as possible from the use of existing cryptocurrencies, Posts need to select the partners that would bring about the most value for them (e.g., lower transaction and exchange fees). The number of potential partners will change according to each country and Posts will need to carry out a throughout market assessment. As DLT and cryptocurrency platforms and exchanges can interact with each other based on wallet addresses, it is not essential for all Posts to have the same technical partner.

When designing their pilot strategy and deciding the value that will be marketed to potential customers, Posts should also consider the following:

- costs for customers due to amount charged per transaction (i.e., flat or percentual fee) as well as the deposit and withdrawal fee that will be charged to the customer (if the service provider also provides fiat to crypto exchange services),
- ability to connect with other platforms and exchanges for international transactions, and
- time required to confirm a transaction.

On the other hand, if implementing a Post-to-Post DLT solution for remittances, Posts would only need to invest on the training of their personnel in utilizing the service platform. In this option, the UPU would be to act as the solution provider instead of having each Post create a partnership with a service provider as with the previous option.

The UPU would then create and manage a DLT based inter-Post remittance settlement platform, instead of having Posts come together to create it due to restricting regulatory frameworks. By providing this service to the Posts, the UPU would oversee and audit the transactions and settlements while also administering the float, volume and cash out value through the creation of a closed loop cryptocurrency or "postal coin".

With the UPU acting as the provider of the solution, the ability of a potential partner to scale up becomes crucial. Besides the previously stated characteristics that a provider must have, if the UPU were not to create this solution internally, there are other characteristics that must be looked for in a provider:

- ability to provide remittance services across multiple geographies,
- willingness to create a custom and permissioned DLT portal for Posts, and
- capacity to keep a single fee for transactions, deposit and withdrawals for all participating Posts.

This option would enable the UPU to stay in a strong position to contribute to the strategic decision making and design of the solution.

Enabling conditions

Very few real additional prerequisites assuming remittances are already being facilitated by the Post in the target region(s). Target users do not necessarily need to interact with any DLT/crypto directly, nor do local post offices. The digital maturity of Posts who wish to join this initiative has a relatively low minimum requirement (e.g., have access to an Internet connection).

However, integrating new technologies such as DLT and crypto is a lot easier if the Post has development and operations (DevOps) capabilities to focus on providing value to customers, experience working with external APIs, and, applying advanced techniques such as cryptography.

If the Post does not offer remittances or financial services yet, **it may need to be registered as a financial institution beforehand.** However, due to the novelty of cryptocurrencies, it could be possible for the Post to offer this service without being registered as a formal financial institution first.

More research would need to be done on this before offering such a service.

Security and data protection issues

As per any data that is saved within a DLT solution, data privacy regulations should be considered from the design and strategy phase.

Even though not all countries need to comply with consumer protection regulatory frameworks, **privacy-by-design should be the de facto standard for any solution that seeks to use sensitive data such as in the case of monetary transactions.** The proposed DLT solution should also make domestic legislation such as KYC/AML applicable, which mandates the collection and storage of sensitive personally identifiable information (PII). As there is not a set of global standards and policies for this, Posts will need to be adherent to national KYC/AML rules.

In the case of the creation of a custom DLT remittance solution for Posts, if parties outside of Posts can join, extra privacy and protective measures would likely need to be implemented. When using a permissioned DLT solution, different rights to read or write data can be given to new parties. This is important when limiting the amount of data that is accessible to everyone in the ecosystem, to protect the privacy of the customers.

When choosing a type of token to be used to record debt and transfer value between accounts, a major security consideration is that of maintaining the value of the token. If a pegged token is used, maintaining the peg is an incredibly important part of the process. Any abuse of this system could damage the trust in the entire system and lead to a high volatility, which is what is being avoided by using a stablecoin.

In order to protect the identity of users who decide to send cryptocurrencies themselves, or even that of the Posts, their digital identities can be pseudo anonymized. However, in order to comply with national KYC/AML requirements, it is also possible to partially de-anonymize identities by using chain analysis.

One of the biggest threats would be the possibility of hackers breaking into the system, as they will have a direct incentive to do so if a high quantity of cryptos are stored to easily be sold and transferred. A custody solution would have to be built or a custody partner would have to be found.

Another area to consider, for both options, is that of the interoperability between the chosen service provider and Posts, which could be provided through the use of APIs. Especially in the latter case, when Posts decide to partake in a custom Post-to-Post solution, taking into account the existing technical infrastructures of multiple Posts and their ability to connect with the solution will play a pivotal role in the adoption of such product. The service provider needs to take into consideration the different systems used by Posts and be clear on the possible risks that Posts could face or what is the required investment needed to utilize the product.

Both Posts and the UPU need to consider the service provider's ability to ensure proper performance in the selection process, may it be only to create and utilize a wallet in an existing platform or to create a new one from scratch for the postal sector.

Establishing a standard and the proper requirements for interoperability should be part of the initial conversations and should be audited by the postal stakeholders in charge of the pilot.

FACILITATING DIGITAL IDENTITY MANAGEMENT

Introduction

Close to 1.7 billion adults worldwide remain unbanked, meaning they do not possess a bank account at a financial institution. For both the unbanked and underbanked populations, two of the main factors hindering their financial inclusion are the lack of a formal means of identification and a verified credit history (Miller, 2018).

Digital identity management can potentially accelerate financial inclusion for the unbanked and underbanked populations by providing them with a formal identification and a verified credit history. Access to financial services can help raise individuals out of poverty levels, which is essential to improve the living conditions of vulnerable populations.

Similarly, small businesses may benefit from being part of and utilizing a decentralized identity management platform. Barriers of entry would diminish for those companies who rely on the use of personal information and need to do KYC/AML screenings as costs and times related to these would be decreased. Moreover, organizations would gain access to a bigger customer base by being able to authenticate an individual's information from pre-existing validations.

Facilitating digital identity management allows this target group to prove their identity or attain one. In turn, this verifiable identity can be used to gain access to financial services such as opening a financial account, having a recognized audit trail or participating in saving schemes (PwC, n.d.).

Posts can employ a DLT based digital identity management solution to improve user experience, minimize information silos, and implement services that they would not be able to facilitate without any proof of identity. A DLT solution in this space would also allow individuals to share only the information that is needed, instead of source documents or complete identification documents that often contain more information than strictly required. Identity credentials could be connected to biometric data, enhancing security for processes where confirmation that there is only one credential per individual is essential.

As a trusted national institution, Posts could play an important role in the facilitation of digital identity management. For instance, they could verify all information required in the onboarding of new users and share this with other organizations the users allows access to.

The following sections will look into the technical architecture of digital identity management, in which two alternatives of decentralized identity systems will be illustrated, **consisting of a federated managed identity (FIM) and a self-sovereign identity (SSI).**

The main difference between both options lies in who stores and provides data to organizations that individuals choose. In a FIM solution, individuals choose a trusted provider who will store their information to prove claims on identity with other organizations. SSI gives the opportunity for individuals to use a decentralized system to collect their credentials and prove claims to third parties themselves, maintaining full control on their data.

A summary on the benefits and challenges associated with both options has been consolidated in Table 3.

Table 3: **Benefits and challenges associated with different identity management systems**	**Option 1:** Federated identity management system	**Option 2:** Self-sovereign identity system
BENEFITS	Faster transaction speed	Complete control of identity for individuals
	Higher scalability	Increased data security
CHALLENGES	Limited control on identity	Key management will be difficult to incorporate
	More centralized as (at least initially) there is dependence on one identity provider	

The role of DLTs in facilitating digital identity management

The Post and its employees provide an important point of contact for people in both urban and rural areas, acquiring a position of trust that is unmatched by any other company, government or bank (UPU, 2019). Their reach into all levels of society can help foster financial and social inclusion, through implementing a DLT digital identity management solution.

As cybercrime becomes more sophisticated and more people become vulnerable to identity theft, the need for a solution that fosters secure and confidential identity information sharing becomes essential. A novel characteristic of DLT solutions is their ability to share information only when there is consent from the owners of the data. In other words, organizations would be able to share specific identification data of their clients only when they allow so. Some solutions even allow for the sharing of credentials based on verifiable information on the ledger instead of sending organizations data.

This increased control of people on their personal data opens the door to new opportunities where individuals decide what information is shared with whom. A DLT solution in this area could seek to empower its users with the tools necessary to feel more comfortable by not providing full documents with more information than the one that is necessary.

Posts could establish a single platform where an individual's personal credentials such as identification documents (e.g., birth certificate, passport information, driving license) and certificates (e.g., professional certifications and education credentials) can be linked to their identity.

By validating these before they are recorded in the ledger, the need for multiple KYC screenings can be eliminated. This would lead to savings in the costs associated to verification procedures such as onboarding and authentication.

This would also mean that the fragmentation of information across intermediaries and information silos would be prevented. The risk for a single point of failure would also be eliminated as information would be stored in multiple nodes, thus strengthening the integrity of the solution. It would be easier to link data to an individual and to trace the use of digital signatures and the access of different organizations to personal data.

For a DLT enabled identity management solution, and depending on national regulations and legislation, **Posts might not need to be certified as an identity service provider.**

The role of Posts would be to be a verifier of existing identification documents instead of providing individuals with a new one. If Posts would like to focus on the latter, they would need to check with their country's regulators if becoming certified as an identity service provider would be needed in order to provide individuals without any proof of identification with a trusted identity.

A DLT use case in the area of identity management would also bring about benefits in other areas. If the platform's functionalities were to be extended for postal logistics services, Posts would be able to easily identify customers and link a package with the information of a known customer.

By allowing packages to be linked to an individual's identity, Posts will be able to easily identify ownership transfers and know who they know as (previous) customers and who they do not (e.g., for foreign mail from partner Posts). Posts could ensure higher levels of security in postal logistics processes and be able to comply with regulations and work with customs agents. In such a case, senders would only be required to share the information required for customs forms and, in the case of being requested more information, choose if it they want to share the data or just credentials that validate it.

Another area of opportunity for Posts is to extend a solution in this area to governmental services. Governments could benefit from the Post's physical network and have Posts act as a point of contact where they can provide services on behalf of the government and other institutions. This would require Posts to establish a governance model with clear cooperation requirements and clarify how decisions are made regarding critical elements of the solution.

High-level technical architecture

For a decentralized identity solution, exploring a DLT-based identity management platform would produce benefits on the area of citizen empowerment and eliminate the need to rely on a single trusted central provider.

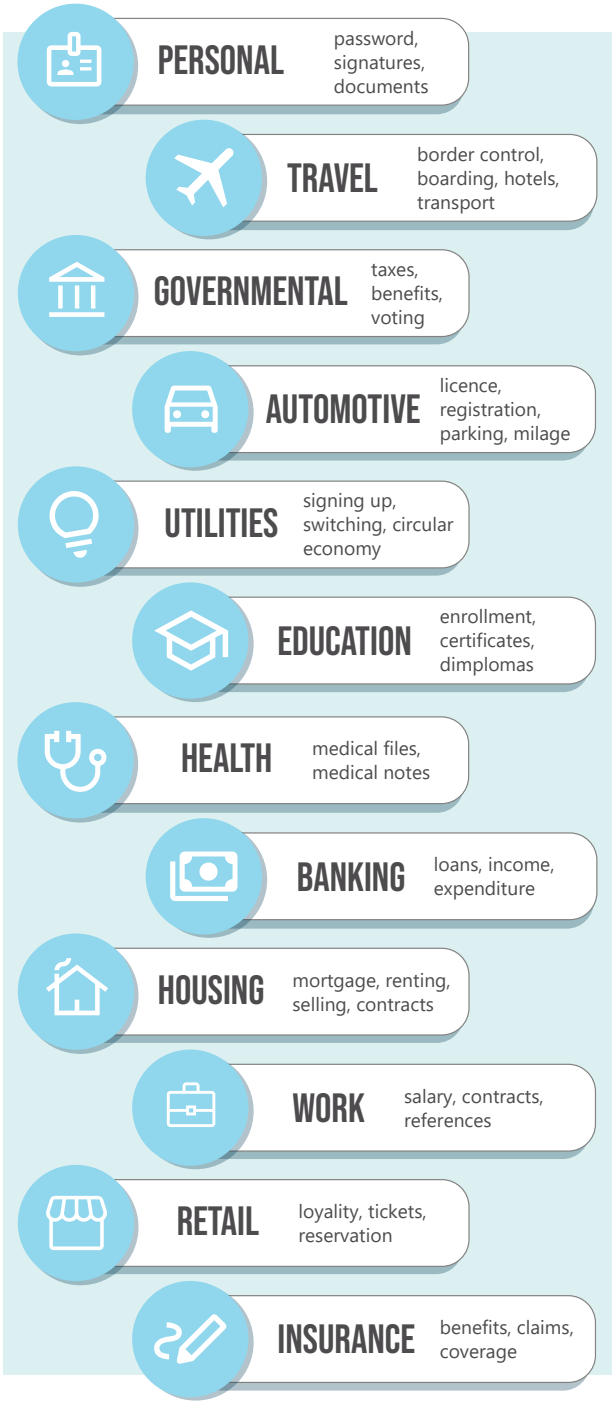
An important consideration with this use case is the fact that an identity platform is not useful by itself but needs an application on top of it. An identity application consists of a data subject (i.e., a holder), whose data, coming from a reputable source (i.e., an issuer or authority), can be used in a business process of a third party (i.e., a requestor or verifier) that requires a citizen's identity data.

For example, the application of a "digital identity document" used only for proof of identity would involve:

- the municipality that provides the identity document (i.e., the issuer or authority);
- a citizen, whose identity is the one being described by the document (i.e., the holder); and
- a party who requires the holder to show their identity document (i.e., the requestor or verifier).

However, a municipality issued identity document is far from the only identity application that could be realized. Other use cases in multiple industries are shown in Figure 6.

Figure 6: **DLT-based identity use cases**



When attempting to launch an identity solution, the application is paramount. It is not the infrastructure that will be the main driving factor for adoption. This phenomenon could also be observed in the early days of the internet, where the main reason for its popularity ended up being the websites that people found useful or entertaining. If the application fails to get traction, any identity pilot could turn out unsuccessful, no matter how well the infrastructure works.

A verifiable data registry with a DLT component could bring focus to different alternatives:

Revocation of individual credentials, schemas or subjects: Revocation is essential to combat abuse of identity information. Without revocation, credentials would only be able to have a predetermined expiry date which is not flexible. In the case of identity theft, the compromised identity must be invalidated as soon as possible. Waiting until all corresponding credentials are expired is not an option.

Record credential taxonomy, manage certifications and governance on issuance: Allows verifiers to subscribe to specific restricted credential types which follow certain data standards and enforce issuers to be vetted and explicitly approved before issuing.

Name resolution and public key infrastructure: Linking cryptographic keys to human readable (domain) names can be done directly inside the registry, removing the need to use external systems such as the web's certificate authority based public key infrastructure.

Track token balances: The DLT could also built-in tokens to facilitate an identity related economy such as facilitating a revenue stream from those using identity data in business processes to the issuers of that identity data.

When discussing the storage and sharing of personal identities using DLTs, there are two types of solutions that come to mind:

a DLT-based federated identity management (FIM) solution, or

a self-sovereign identity (SSI) solution.

A DLT-based FIM solution allows for a decentralized system where citizens store identity information with a provider they trust. This information is used to prove claims on identity to third parties through their identity provider. Data is then authenticated across multiple domains without the need of an individual to share their information with multiple entities.

On the other hand, an SSI solution is a decentralized system where citizens can collect identity information (i.e., credentials) using their own device and prove claims to third parties on their own accord. Citizens can choose who to share their credentials with and have full control on their information.

As both solutions rely heavily on the ability to onboard (multiple) service providers and provide access to individuals, the ability of the solution to work with possibly different existing systems and communicate properly between them is decisive in measuring the success of the solution. This will also influence the initial adoption levels and provide users with a sense of security in knowing that they are getting the most updated information.

DLT-based federated identity management (FIM) solution

A DLT-based FIM solution can be considered a logical step in the transition to an SSI solution. In a federated system, users store their identity data with one or more providers. Providers adhere to the same standards, resulting in an ecosystem – similar to how e-mail works.

In a FIM solution, one organization serves as the identity provider who then also stores and shares it with other organizations by establishing a relationship based on trust on their validation processes for an identity.

It may also be the case that other service providers can submit further attributes to a credential. For example, a bank may provide proof of income or payments to a loan as evidence that the individual has been actively been using their services for a certain period of time. This would build on top of the previously authenticated credential, providing more proof of existence and accountability. The degree to which other organizations can submit attributes is decided by the identity provider and thus the owner of the FIM solution.

The biggest decision, then, lies on choosing who will be the identity provider.

In this type of solution, the Post can act as trusted party within the network that can store information about entities and prove claims about individuals for the access to financial services. Hence, Posts would act as the identity provider and the owner of the DLT FIM solution. Other service providers such as banks, hospitals, insurance providers and education organizations may be added to the ecosystem in later stages.

The ability of the identity provider to ensure interoperability becomes pivotal in the selection process. In order to account for other Posts and different service providers there is a need for a solution that can be coupled with different systems or allows for the access to the DLT solution via, for example, (open) APIs.

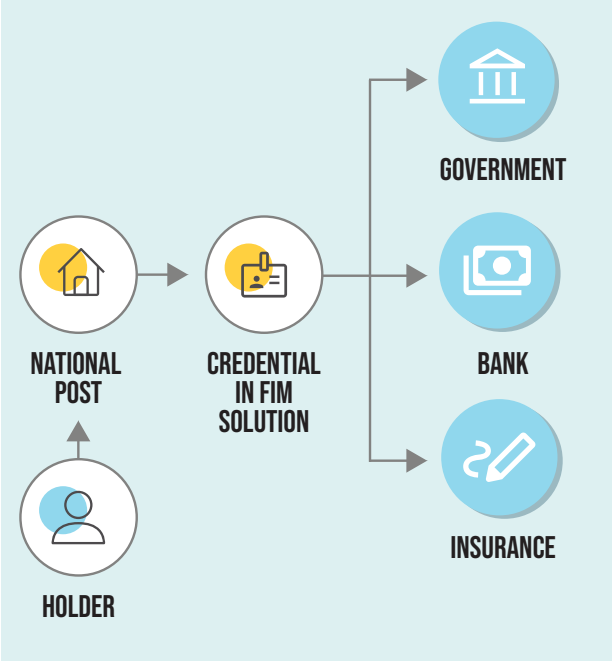
The creation and distribution of authenticated credentials may be summarized in four main steps:

- An individual goes to the identity provider (e.g., postal offices from Posts) to request the creation of an authenticated credential.
- The user requests access to another service provider through the identity provider's platform, or through the use of an API which connects the service provider to the FIM solution.
- The service provider will request through the FIM solution for the authenticated certificate and the individual's access rights before giving them access to their platform and/or services.
- After approval of the certificate, the user can obtain access without sharing their data with other organizations besides the identity provider.

A DLT FIM solution can be represented schematically as shown in Figure 7.

In terms of financial services, this solution is the closest in similarity to the current bank system as they also use a federated system. In order to access financial services, an individual would need to have a contract with a financial entity to access them or make transactions with other organizations. The chosen financial entity makes sure that the national KYC/AML procedures take place for the individual and shares the information with the other organizations. In the absence of global standards, such as in the case of KYC/AML regulations, it is important to make sure that national regulation and standards are considered.

Figure 7: **Example structure of a FIM solution**



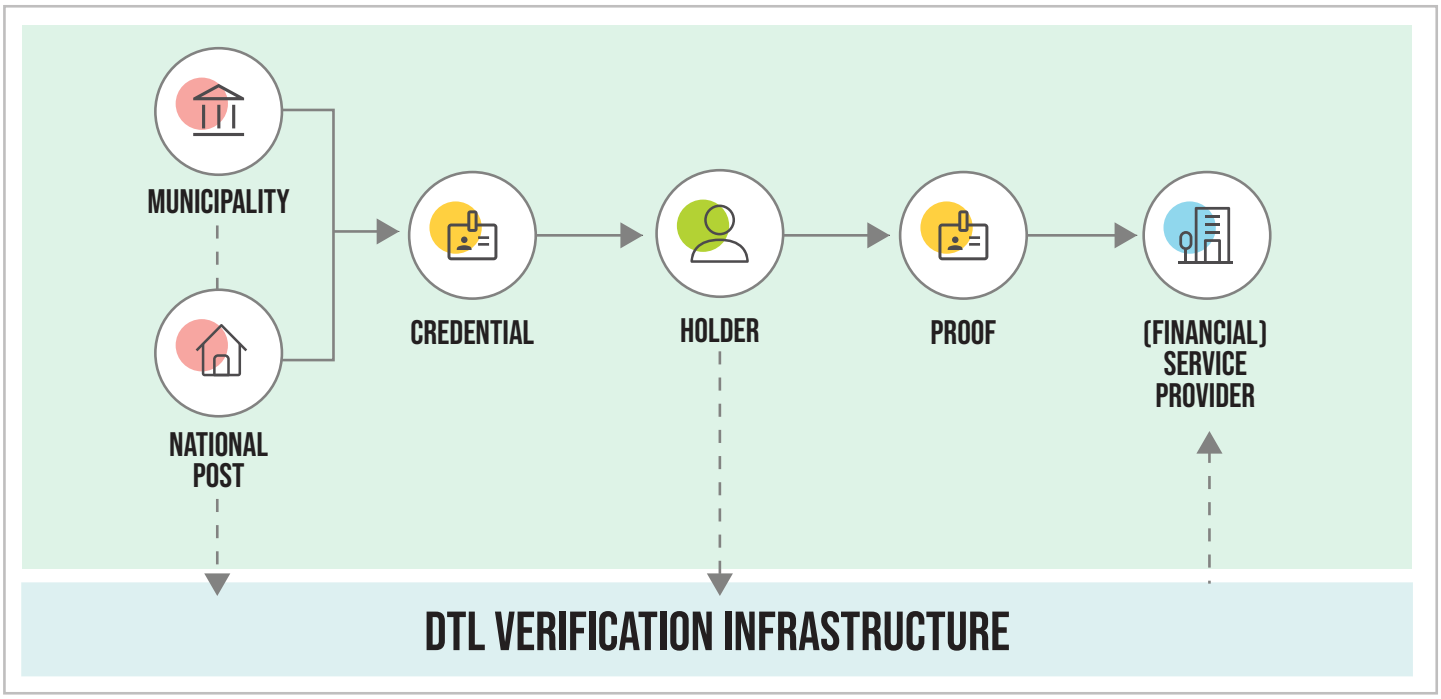
As this shows, a DLT FIM solution would still resemble a centralized solution utilizing a decentralized platform for the easy sharing and issuance of validated credentials. This means that the individual whose credential is shared has limited control on the identity certificate and would need to consult the identity provider for the revocation of the certificate for a particular service provider.

On the other hand, having a DLT FIM solution would lead to faster transaction speeds in terms of the distribution of the authenticated certificate. Moreover, having an identity provider who is the only entity responsible for onboarding new service providers means that there is an opportunity to scale quickly while decreasing the costs associated with doing so.

A better customer experience would lead individuals to gain more trust in Posts and their services, which could also drive loyalty and higher revenues from the usage of more postal (financial) services.

In the long term, Posts could use a DLT FIM solution as a stepping stone towards providing individuals with more control of their own credentials. The previously FIM solution could then evolve into becoming an SSI one.

Figure 8: **Example solution overview for a SSI solution**



Self-sovereign identity (SSI) solution

The strong point of SSI solutions is that they allow individuals to be in control of their own digital identity. Contrary to the DLT FIM solution, identity information is managed on a device owned by the data subject.

Even in a self-sovereign ecosystem, not everyone will be able to manage their own wallet independently.

For instance, some people who do not have any internet connected device and would need to use some physical medium (e.g. a flash drive, smart card or some sort of hardware wallet) to transport their digital identity. Creating and updating such a physical medium and mailing it or having someone pick it up could be handled by the local Posts.

Validating a person's identity physically and/or enhancing it with biometric data (such as a photo or fingerprint) is an effective mechanism to improve the quality of digital identity solutions when creating a trusty credential to be shared with other organizations. Posts could play a role in this as well by providing in-person authentication and validation services and adding the information to an individual's credential.

As some residents of countries that the Post is active in have no physical identification documents, **a possible solution is to register these individuals based on identifiable information such as biometrics.**

A comparable situation occurred in a Jordan refugee camp as seen in the World Food Programme's (WFP) Building Blocks programme, as refugees were forced to leave their homes and leave everything behind including identification documents. In the shelter camps, refugees would scan their iris and have this information linked to their registered identity.

This information is linked to an identity wallet on the blockchain, where refugees receive crypto tokens from the UN to spend inside the stores of the refugee camp. No cards are required, as an iris scan at the checkout validates the individual's identity and writes these transactions to the blockchain. The digital wallet is stored on a mobile phone, filled with a digital identity document, transaction history and access to financial accounts, enabled by distributed ledger technology and access to these wallets provided by biometric information.

Moreover, biometrics can serve as an unique identifier in SSI wallets. Posts can develop a similar digital identity wallet with the inclusion of biometric information that is unique for every person, creating a digital identity for people who currently do not own one. At the creation of this digital identity wallet, users would be able to decide with which participating organizations they would like to share their credentials with.

Posts would benefit from taking the role of the provider of an SSI solution. Due to its social agenda, Posts would make the ideal identity provider. A solution in identity management with SSI, although it has potential to increase revenues (as discussed further in the next section), should focus on improving customer journeys and simplifying customer onboarding processes. This can be achieved by increasing trust on privacy, facilitating efficient data processing and higher data reliability.

Partner selection and pilot considerations

First and foremost, in the case of a DLT identity management solution there should be a primary focus in identifying a use case to run on the network. Determining a suitable business case will ultimately shape the criteria to identify and score possible technical partners and should define who the target users, data providers and data recipients are (i.e., who are the holders, issuers, and verifiers).

When selecting an identity use case, Posts should consider **those options that have an inherent physical aspect but that may also be employed digitally.** Without any physical interaction, it is hard to associate traits such as biometrics to an individual.

Moreover, this will ensure that Posts will play an active role in the creation and validation of identifications while promoting the use of its network to reach out to the unbanked and underbanked populations.

Posts have two options to choose from when searching for potential partners. They could either choose between developing a DLT identity solution from scratch with the partner that utilizes the Post's strategic guidance, or they could choose a partner who can use an existing tool or solution.

In the latter, while discussing a potential partnership, **Posts should emphasize that they are looking for a provider of technical capabilities.**

In either case, Posts should keep strategic talent in-house to guide, strategize, and give direction to the pilot taking the interests of the Post as a priority.

The team who will be overlooking the pilot should be involved early during the partner selection process and the negotiation stages. During the pilot, this team would take on the role of managers and work closely with the selected partner to oversee the pilot, answer questions and evaluate its progress.

Alongside the selected partner, Posts need to determine the stakeholders that need to be involved to create the minimum viable ecosystem for the pilot. This will also shed light on the desired degree of (de)centralization of the DLT solution and the roles of the stakeholders. The need, and location for compliance with local regulatory frameworks, of centralized database for data storage should also be discussed with the technical partner.

Another important consideration is that of deciding which stakeholders will be required to hold a node. This decision may have a great influence in the inclusion levels of the size of organizations seeking to connect to the ledger. Additional costs would be incurred for those organizations who will be required to hold a node as they would need to invest on hardware to run them when validating network transactions.

In a solution where every participant would be required to hold a validating node smaller institutions may be put in a disadvantageous position. There are technological and financial constraints that need to be taken into consideration in order for these institutions too set up a node to participate in the solution. This could be prevented by using a tired network that allows for some participants to have access to the ledger and the verified information in it without being a validator (European Central Bank, 2017).

Although a single postal DLT identity management platform may be desired, an initial pilot in this area should focus on a single geographical region or country. The lessons learned from this pilot may be later expanded to include more countries or for other Posts to do their own pilots. This is important in order to test the solution without taking into consideration privacy and data sovereignty laws from multiple locations.

In addition, the digital maturity of a country and its population's access to an internet connection needs to be considered for an initial pilot. All participants in the network need to have an internet connection and a similar technological maturity. Posts need to consider use cases where individuals may gain access to an internet connection in local establishments in order to utilize their digital identity or if they should be provided with tangible means to prove their identity when visiting service providers physically.

There are **four revenue models** that Posts could choose from as the service provider:

issuer based,

request-based,

consumer freemium, and

consumer cashback.

If the Post were to be only the identity solution provider and there is another organization who acts as the issuer, in the issuer-based scheme the issuer would pay a fee to issue the individual attributes to the Post. The costs are covered by the fee of the issuing party, for protecting the authenticity of the data and preventing fraud.

In the second revenue scheme, the service provider (i.e., the entities that accept the information in the DLT identification solution) pays a fee per transaction to the service provider. Costs would differ based on the type of transaction, the data type requested, functionality, or other characteristics that are previously decided upon.

Thirdly, in a consumer freemium scheme the consumer would receive free access to the basic functionalities and receive premium functionalities for a fee. Premium fees would mostly cover the cost of the platform and potentially be covered with a small fee from the service providers.

Lastly, in the consumer cashback scheme the consumer would receive a cashback based on the information that they share with the Post. This cashback could work as an initial incentive for individuals to want to partake in the solution and share their information for the pilot. The Post, as the service provider, would incur additional costs for compensating the consumer when compared to a transactional or subscription-based pricing models.

A hybrid of these revenue models is also possible and is dependent on the technical provider that is chosen for the pilot. Moreover, the choice between these revenue models, including a hybrid form combining several elements, depends on several conditions of the design of the solution and the selected partners.

Security and data protection issues

For a successful DLT solution in the area of identity management, there is a need for clear governance and establishment of standards. Clear guidelines on information sharing and validation measures would diminish the risk of fragmentation. Moreover, this will ensure interoperability and an easy onboarding of new participants.

Although standards may be established through the use of open-source projects, this may not necessarily be the best approach as there are different open source codes that may be used and thus it may not ensure proper interoperability.

Posts would need to have a novel approach in the area of data protection and privacy. In order to share information using a DLT, a certain transparency level is implied and needs to be kept in mind. This is especially the case when there are multiple validators who should have access to information to update it, which is at odds with the current methods utilized to assure confidentiality of personal information.

Luckily, solutions for higher data privacy in DLTs have already been developed which would allow for a solution in this space to stay compliant with data protection regulations. A DLT solution's governance framework can be arranged to only permit authorised entities creation and access rights to personal data (e.g., regulators, participants, validators such as Posts).

Recently, developments in the area of zero-knowledge proofs allow for the validation of encrypted data. As data does not need to be decrypted to be processed, it also allows for a higher level of privacy as long as it is known that the data that has been submitted has been validated and is trusted.

In order to comply with data privacy regulations such as Europe's General Data Protection Regulation (GDPR) and the "right to be forgotten", personal information can also be stored outside of the ledger while transactions and proof of validation is stored within. For example, in the case of using biometrics, an individual's personal data could be saved off ledger but linked to a validated certificate by the use of eye scans, fingerprints, or others which are not stored

in the ledger. If an individual then opts for any link to their data to be removed, it would be possible to only keep the proof of validation in the immutable ledger instead of all the identifying data.

For Posts to ensure that the risk of identity fraud is decreased, they could act as a physical touchpoint to validate and record biometrics. By utilizing its last mile network, a broader customer base would then obtain access to identity verification processes and thus increase security in the transactions that utilize them.

Unless international standard setting organizations come up with common standards in the area of digital identity, then Posts must consider national regulations and standards. This includes any developments and work with the chosen service provider to keep developing the product to comply to these.

Posts should keep strategic talent in-house to guide, strategize, and give direction to the pilot taking the interests of the Post as a priority.

ENABLING AND SUPPORTING DIRECT CASH TRANSFER PROJECTS

Introduction

Direct cash transfer projects enable individuals to purchase what they need by directly transferring subsidies and other benefits to them. In developing nations, direct cash transfers can have a great impact for humanitarian aid as they provide people with crucial access to necessary goods and services. Besides helping in day-to-day situations, cash transfer projects can also be utilized in times of crises, where individuals rely on government or non-governmental resources to get by or survive. The proper execution and quick delivery of benefits are therefore essential and can be supported by the use of DLT solutions.

Posts already play a large role in many direct cash transfer programmes, as their last-mile connectivity makes them an ideal actor in ensuring that fiat currency reaches the unbanked and underbanked populations. Such examples include case studies conducted by the UPU in Kenya, Morocco, Ethiopia, Mali, Laos, Tanzania, Uganda, Brazil and Italy (UPU, 2013; UPU, 2016)

Direct cash transfer projects can be divided into two types: conditional and unconditional cash transfers. In the former, beneficiaries are restricted in the products or services they can purchase with the money given to them. There are no such criteria in the latter. Posts can enable both types of cash transfers where DLT solutions can support in, for example, ensuring accountability when using conditional cash transfers.

Despite their convenience and utility, **direct cash transfer projects commonly experience difficulties in their day-to-day operations.** Such difficulties range from handling the many bank fees associated with money transfers and conversions, to the financial instabilities of banks in developing nations.

The use of DLTs has been identified as an opportunity to solve these complexities (WFP, 2017). DLTs can help circumvent such costs and instabilities, as they allow for a drastic cutting of fees when converting money from one currency to another or when transferring money between accounts.

Another common setback in many direct cash transfer projects is the lack of access beneficiaries have to financial resources, such as being able to acquire and maintain a checking account. By utilizing DLTs, beneficiaries can receive funds without the need for a bank account, thereby drastically improving accessibility to unbanked and underbanked populations.

However, such direct cash transfers require the possession of a digital wallet, which is out of the scope for this use case. More information on digital wallets can be found in "Blockchains for a Sustainable Postal Future".

Thus, the following sections will delve further into role of Posts as a cash agent, where they connect beneficiaries with third-parties such as governments and NGOs. Posts could move from a cash agent role to a provider of digital wallets at a later stage, thereby diversifying their offer.

By utilizing DLTs, Posts can utilize their unique position to foster financial inclusion due to the size of their physical network of postal offices and their capacity to reach into all levels of the population. Therefore, Posts can enable cash transfer projects by providing a trustworthy network and technology for senders and recipients to transfer and access funds. Furthermore, Posts can act as a point of contact for recipients without a bank account, where they can obtain funds sent to them by a third-party and offer support in authenticating individuals at a physical location.

There are several options that DLT solutions currently provide. For example, Posts can either rely on CBDCs, stablecoins or they can develop their own token. These options come with their own advantages and disadvantages when it comes to direct cash transfers (see table 4).

Due to the high volatility associated with bitcoin and altcoins (e.g., ether), this option was deemed too complex for direct cash transfer programmes and thus was not explored further. As a cash agent, it might be difficult for Posts to explain why the value of transfers have increased or decreased from the time resources were sent to when they were received by the recipients.

Additionally, given that direct cash transfers may not always be used instantaneously, as resources may be held back for usage during natural disasters or due to beneficiaries having to validate potential conditions attached to direct cash transfers, volatility poses a larger problem to direct cash transfers when compared to, for example, remittances.

CBDCs offer a stable and trustworthy option, depending on which central bank backs the token. However, most CBDCs are still under development or in the piloting stage, meaning that Posts may not immediately have access to a token that suits their needs.

In order to decrease uncertainty on the change of value in a digital currency, it would be interesting for Posts to consider using stablecoins (e.g., USDT, DAI, USDC, EURS). Stablecoins are pegged to a strong (external) currency (e.g., US Dollar, Euro) or asset (e.g., gold, oil), thus making it a currency that is more resistant to volatility between the time it is exchanged to a crypto and then back to fiat.

Table 4: **Benefits and challenges associated with DLT-based direct cash transfer projects**

	Option 1: Stablecoins	**Option 2:** Central Bank Digital Currencies (CBDCs)	**Option 3:** Custom token
BENEFITS	Backed by a stable asset	Backed by a central bank	More control and say over the architecture, use and its security
	Decreased volatility	Decreased volatility	More involvement from the Post
	Supply is community driven	Maintain a constant value in relation to the domestic fiat currency	Ability to choose a (reserve) asset(s) to peg the token to
			Allows for a standardized procedure using a single platform/token
CHALLENGES	Would require to choose a single currency to be used throughout for better auditability	Requires its users to trust a central authority	Requires hard-to-obtain resources, skills and knowledge to set up
	Need to choose from tokens pegged to a variety of assets	CBDCs are still in development and may not be readily available	Building trust with other partners and beneficiaries might be difficult
	Some stablecoins, such as USDT, say they have a reserve of the asset to back up the value of the stablecoin but there is no way to verify this	Will always have dependence on a third party	Supply is dependent on the solution provider
		Exposed to the same volatility trends as fiat (e.g., inflation, socio-economic trends)	
		Use may be limited to geographical borders	

However, the use of stablecoins can backfire if trust in the third-party wanes. Additionally, this option has limited room for customization to the specific needs that Posts may have.

To attain high customizability, Posts could develop their own postal token in collaboration with each other or with the UPU. Given the Posts' position of trust, especially by its users, it can create room for trustworthiness where there might be none. Despite the increased freedom provided by a postal token, it might lack proper backup in the eyes of other parties in the ecosystem.

DLT solutions provide for an integrated system that uses the same currency throughout and records information on both senders and recipients. Posts that provide financial services will be able to quickly comply with their national know-your-customer (KYC) and anti-money laundering (AML). As a result, there is more transparency, traceability, and speed at a lower cost.

The following sections will look into the role of DLTs in facilitating direct cash transfer projects. The examples presented below also showcase how the use of DLTs can be utilized by Posts to facilitate direct cash transfer projects.

The role of Posts and DLTs in facilitating direct cash transfer projects

The lack of a trustworthy network is a problematic component in adopting DLT-based solutions in direct cash transfer operations.

Posts can serve as a trusted provider of a system for connections, enabling the standardization of processes and thereby fostering collaborations on different projects by multiple actors.

As explored in the publication "Blockchains for a Sustainable Postal Future", current cash transfer projects often experience difficulties in their daily operations, these issues range from:

- an inability to monitor participant spending,
- limited privacy considerations,
- handling financial instabilities within developing nations,
- bank fees associated with money transfers and conversions,
- interoperability issues, and
- lack of access by beneficiaries to financial services.

DLT-based direct cash transfer projects, provided by Posts, can alleviate most of these issues. In return, this provides Posts with ways to work towards its societal mission, through assisting the delivery of monetary resources to individuals in need. At the same time, Posts can aid third parties involved in direct cash transfer projects such as NGOs and governments by facilitating the distribution and access to these services.

Beneficiaries of conditional cash transfer programmes are restricted in the products or services they can purchase with the money given to them. DLT based solutions can provide such accountability, thereby likely increasing support for such programmes.

When transferring cash to vulnerable groups it is important to do so while keeping the identity of individuals private. With a DLT solution, it is possible for participants to identify themselves with a pre-verified method that is accepted throughout the ecosystem, as could be the case with the creation and distribution of a physical card or the use of biometrics linked to the digital solution (for more information on a DLT-based identity management solution please refer to [Facilitating digital identity management]). Posts could provide in-person verification services to ensure that the individuals receiving the funds are the ones entitled to them.

Another benefit of DLT solutions is the inherent auditability and transparency features of the technology. By recording all transactions on the ledger, participating organizations can verify that the money intended for someone actually reaches this individual while making it harder to commit fraud by any member of the ecosystem.

By using a DLT solution, the time and resources spent on confirming identities of recipients is reduced and therefore ensures a larger proportion of humanitarian funds will be used for their intended purpose (Schellhase, 2018). The organization who sends the funds can see the status of transactions near real-time and ensure that funds are received in a timely manner.

DLT solutions can also mitigate financial instabilities that occur in developing nations due to the national currency or bank strength in the country. This is due to the ability to use cryptocurrencies that are associated to a stronger currency, for example by using stablecoins.

Costs associated to transfers are also decreased by using cryptocurrencies. Bank fees can be avoided, allowing for drastic cuts in fees associated to converting money from one currency to another or when transferring money between accounts.

DLT solutions enable an integrated system, thereby promoting interoperability between ecosystem members and fostering collaboration. By encouraging the use of standardized procedures in a decentralized platform, different parties such as Posts, NGOs, governments and other third-parties can work together on different projects while still using different financial systems internally.

Most importantly, many potential beneficiaries lack access to financial services such as bank accounts, and therefore cannot obtain funds from cash transfer programmes they are eligible for. Given that even the most remote parts of the world often have a postal office, Posts could provide this last mile connection in both, playing a critical role in facilitating and monitoring the delivery of cash transfers for both conditional and unconditional programmes and recording these in a DLT platform.

More information on the use and benefits that the use of DLTs could bring about for the use case of direct cash transfers can be found in "Blockchains for a Sustainable Postal Future". The following section delves deeper into the technical advantages and challenges that Posts need to consider when looking into exploring this use case further.

High-level technical architecture

There are two main ways to realize a direct cash project infrastructure based on DLTs: 1) using existing cryptocurrencies and 2) implementing a custom DLT solution. Each option will be described in its respective sub-section.

Using existing cryptocurrencies

It is also possible to leverage already existing DLT based cash transfer networks, known as cryptocurrencies. As opposed to the more restricted DLT ecosystem described in the previous section, using cryptocurrencies could improve financial inclusion by helping beneficiaries partake in the flourishing, worldwide crypto economy. However, despite cryptocurrencies having a broader economic potential than a custom DLT solution, they also bring more risks.

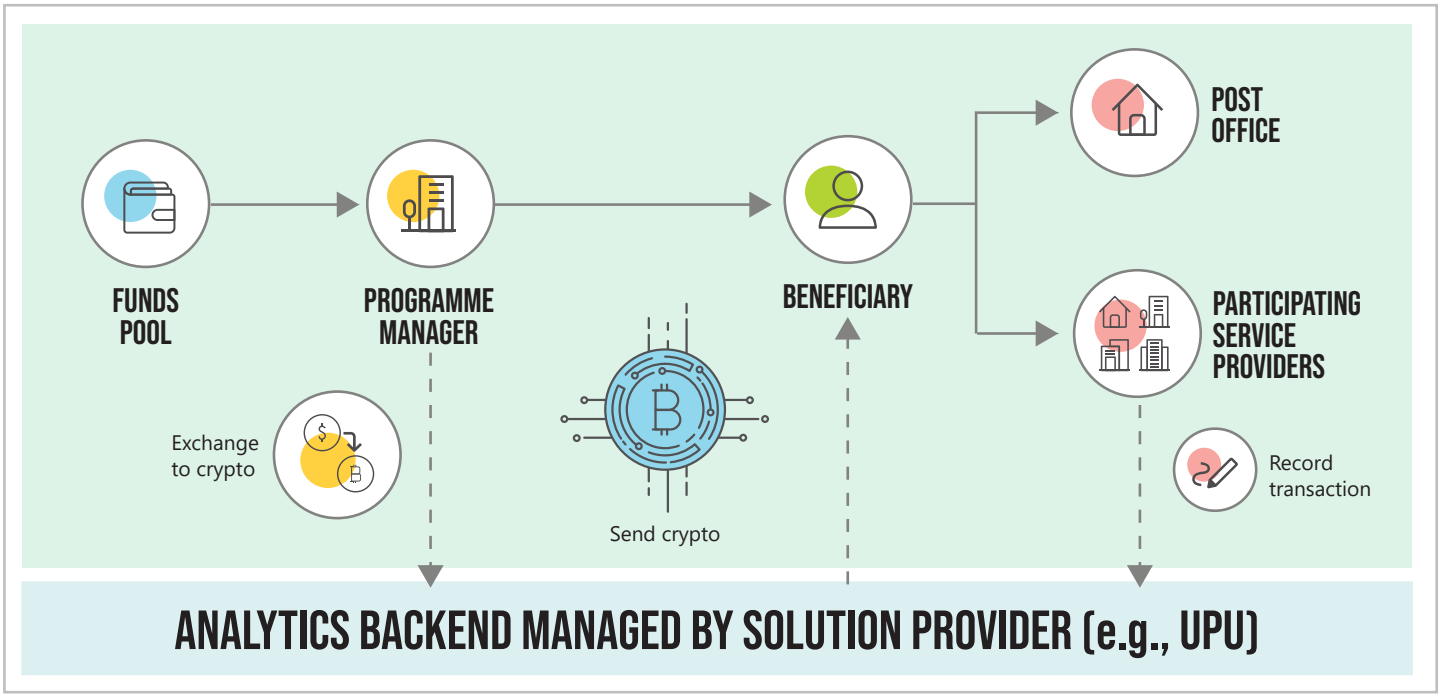
One of the risks associated with cryptocurrencies is that of volatility and uncertainty, especially with those tokens that are well-known to the public such as bitcoin. However, many organizations and governments have started to explore a mitigation against volatility known as stablecoins – tokens that mirror the value of another, more stable, asset, preventing high price volatility. There are two ways that stablecoins maintain a value that is constant compared to some stable asset such as a strong currency (e.g., US dollar, euro) or an asset (e.g., gold, oil):

Centralized: one or more trusted institutions guarantee the peg between the token and the underlying asset. They will vouch that at any time, parties can exchange their tokens back to the representing asset.

Decentralized: by having a system of smart contracts that guarantee that the tokens are backed by assets that are in total worth more than the value of the tokens.

The most common currency to which the most traded stablecoins are pegged to is the US dollar with examples of stablecoins including Tether (USDT), USD Coin (USDC) and TrueUSD (TUSD). An example of a stablecoin that is pegged to the euro is EURS.

Figure 9: **Direct cash transfer programme with cryptocurrency**



On the other hand, using DLTs has created the opportunity to have stablecoins that do not require to link the token to a physical or external asset. An example of such a token is Maker Decentralized Autonomous Organization's (MakerDAO) DAI token which uses a complex systems of smart contracts and external oracles (i.e., an information source that verifies and sends external occurrences to store relevant data in the ledger and trigger smart contracts) to maintain a constant value of one USD.

Besides price volatility, stablecoins offer the opportunity to enable a borderless financial system which would be beneficial for cash transfer programmes that require international transfer of funds. Global financial inclusion is also facilitated by reducing costs related to these types of transfers. This is achieved through lower transaction fees associated to cryptocurrency-based transfers plus shorter transfer times.

While stablecoins are created by private entities, their public counterpart which are issued by central banks are referenced to as Central Bank Digital Currencies (CBDCs). As a form of digital cash issued and initially distributed by a central bank, these types of tokens will always include a third party or a middle man. In contrast to the DAI token and similar stablecoins, the supply of the tokens will not be community driven but controlled by the central bank.

Moreover, as CBDCs seek to follow the same price volatility as the fiat currency, their price will also be exposed to the same trends, inflation and socio-economic effects.

Several governments have started to explore the use of CBDCs within their domestic markets, especially focused on settlements between financial institutions. These tokens may provide more security for participants who question the stability of the value of the tokens they receive.

Nonetheless, CBDCs are still in the early stages of exploration and development which means that adoption is relatively low. It may also be worth considering that some users may favour one country's CBDC over the other. As a result, the complexities of geopolitical relations and individual opinions of other nations may become entangled, causing adoption to become more difficult. It will also need to be discussed if the CBDC token can be used outside of the country's borders and see if participating stores or service providers accept a token backed by a central bank other than their own.

Aside of volatility, cryptocurrencies bring the risk that there is limited oversight. To improve this, it is possible to have important stakeholders report (anonymous) statistics in order to have some overview of the cash transfers programs. A possible architecture is shown in Figure 9.

Creation of a custom (postal) token

Posts could take a greater role in the processes associated for direct cash transfer programmes by creating a custom DLT solution and token. A DLT platform could be enabled by Posts and shared between the ecosystem players to allow for the use of a single solution that connects everyone. In this situation, Posts that offer in-person identification solutions and also act as cash agents for the network can have immediate access to individual's fund information, record transactions and write data.

An international organization, such as the UPU, could be in charge of launching such a solution and making sure that pre-established standards and regulations are laid out. This would mean that a lower degree of decentralization would initially exist throughout the solution but could increase trust in it and the value of the custom token.

As the ecosystem grows, the question of a private versus public DLT becomes more relevant. Considering the nature of the proposed DLT system, it is worthwhile to design the solution in such a way that despite it being private at first, it can ultimately run as a public blockchain. This would allow for greater transparency and improve the ease of joining.

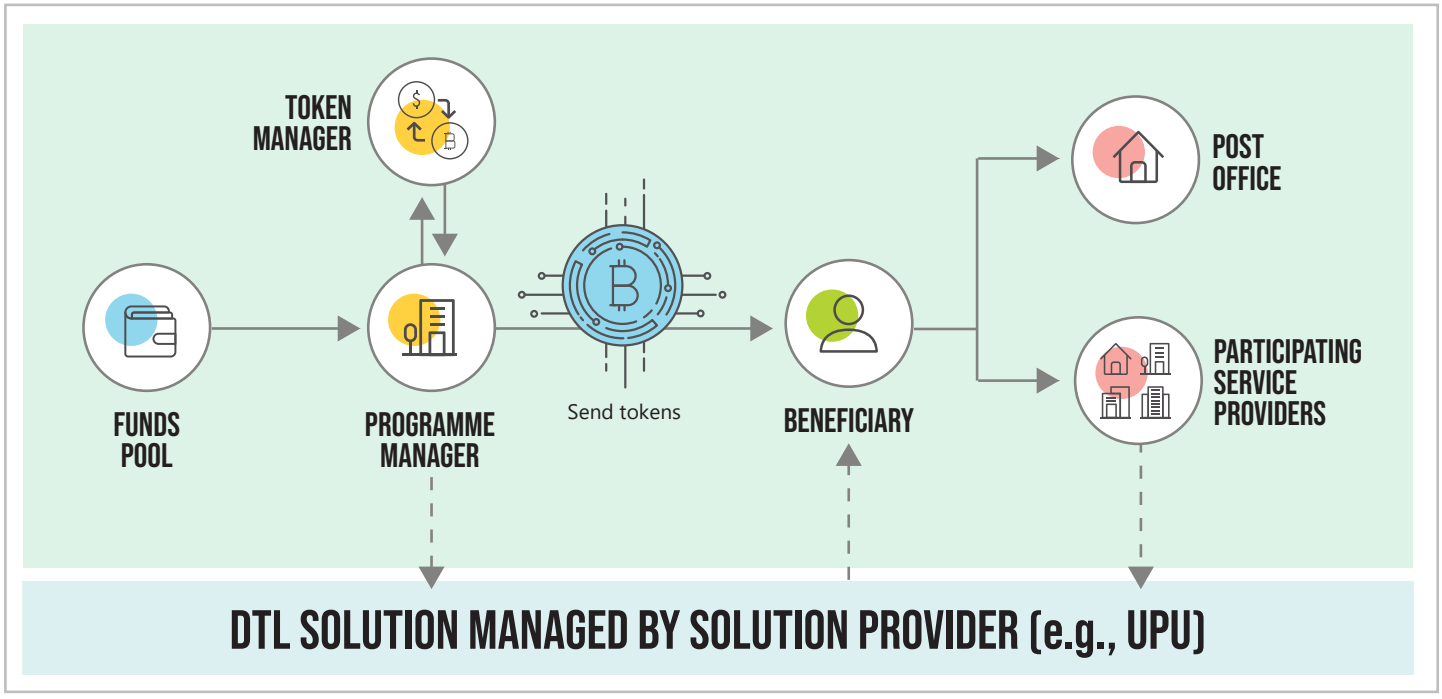
Scalability wise, DLTs that focus solely on token transfers have better scalability than those offering arbitrary smart contract capabilities. A direct cash transfer focused DLT would not need to support complex smart contracts. Simple smart contracts (such as time locks, multi-signature accounts and escrow) could be valuable, however, those could be supported with a limited scripting capability, similar to bitcoin, limiting overhead (caused by for instance a "gas" scheme) and improving scalability.

Figure 10 showcases an example flow for a simple cash transfer programme where we assume the programme manager (e.g., WFP, UNICEF, UNHCR) has already gathered funds and allocated them to a specific programme.

Once the funds are available for transfers, the programme manager sends the funds via the DLT platform to the beneficiaries in the form of the selected token. The beneficiary is able to spend these tokens at participating service providers after authenticating to the DLT platform. In the case where the beneficiary does not have an account that can be accessed through some physical medium such as a smart card or smartphone, an alternative course of action would be for the beneficiary to collect the funds at their local post office, where the tokens would be converted to cash.

In turn, service providers would need to be able to exchange or spend tokens they obtain. Here, Posts could also play a role in exchanging the tokens back to fiat. Posts could also offer beneficiaries to pay with their tokens in exchange for postal services.

Figure 10: **Direct cash transfer programme example process flow**



The platform and token manager would be able to report back and provide (anonymous) analytics to the programme provider to see which programme is associated with the tokens that beneficiaries received as well as how or where they were spent if merchants are part of the ecosystem.

In this case, the UPU would initially be responsible for the issuance and control on the supply of the custom tokens. A clear set of criteria for new entrants would need to be defined and shared from the beginning to streamline onboarding processes for those entities that wish to be part of the solution.

As the ecosystem grows, these tasks may also be delegated. For instance, multiple tokens could exist based on different national currencies, each having a different issuing organisation.

The ecosystem could benefit from a stable token that is country neutral. In that case, it can be pegged to a secure asset such as Special Drawing Rights (SDRs). The use of an asset such as SDRs that are not limited to a single fiat currency pose an interesting case for a stable coin. SDRs, created by the International Monetary Fund (IMF), are a reserve asset composed of a basket of five strong currencies, namely the US dollar, euro, Chinese yuan, Japanese Yen, and the British pound.

If one token is equal to one SDR, Posts that act as a cash agent can easily translate the value of the tokens to the domestic fiat currency. The use of a single token throughout the platform would also provide the opportunity to later extend the amount of use cases that can be supported by the platform. Auditability on spending and donation distribution would also be easily comparable between organizations and programmes.

In a custom DLT postal solution, the UPU and/or the solution provider would need to run nodes. The UPU's node(s) could initially have a higher privilege than that of other participating organizations associated with special rights such as the creation of new tokens to increase their supply. Organizations that provide cash transfer programmes can also rode nodes each to access and provide analytics and protect the pre-defined consensus rules.

For an initial pilot, a single organization, and the beneficiaries of one programme may be onboarded. The results from the pilot may be utilized later in discussions with other organizations and possibly stores to show the value that the solution brings to all its users.

Partner selection and pilot considerations

Receiving cryptocurrency-based cash transfers will not be realistic for many people. Using cryptocurrencies poses several hurdles as many potential users still lack technical competence, have a hesitant attitude towards a new type of money and merchants often have a poor level of adoption.

Additionally, there is an uncomfortably large incentive to steal cryptocurrency since it can be sold easily and relatively anonymously. Overall, it is hard to generate alerts based on suspicious activities in a cryptocurrency-based system. A permissioned system is easier to monitor. That is why for cash transfer projects a custom DLT solution would be the most plausible option.

Beneficiaries will not all have smartphones, so the minimum viable product (MVP) solution should work based on some physical device, such as a smart card, for users to link to their account balance. Since smart cards may be too expensive, a somewhat less secure but manageable solution would be to use QR codes printed on some variety of plastic card. While the QR code alone can work as a basic MVP, it would be significantly more secure if a photo of the beneficiary is printed onto the card as well. Else, anyone who manages to photograph some beneficiary's card would be able to have access to their funds.

An alternative, used by the World Food Programme (WFP) in their Building Blocks programme, is to use biometrics such as an iris scan or fingerprint scan as a way for a beneficiary to authenticate their identity. This requires every merchant to support this method of payment which will be more costly than a smart card or QR code scanner. It is also possible to have multiple options of authenticating, where extra measures are placed on the more insecure methods, such as a maximum withdrawal of 50 USD per day for QR code initiated transactions.

The Building Blocks programme is a clear example of utilizing DLTs for unconditional direct cash transfers. In humanitarian organizations such as WFP, the bulk of cash transfer operations are done through the creation of virtual accounts with a financial service provider. The NGO in question holds possession of those accounts, as in many cases, refugees are not able to create accounts in their own names.

Instead, Building Blocks allows the WFP to function as a cash agent, by allocating a set amount of entitlements to accounts associated with the biometric identities of refugees. When refugees purchase goods, the system verifies that the account has sufficient funds, and the operation is authorized. All transactions are registered on the blockchain. Within these parameters, the funds refugees receive can be spent as they see fit, making it an unconditional direct cash transfer programme.

Compared to NGOs, who often need to gain access to hard-to-reach regions, Posts are already locally present. This makes Posts an excellent partner for NGOs and governments, as their close proximity can ensure that funds will reach beneficiaries.

In any DLT project where the objective is to realize a token-based economy, closing the economic loop is desirable. Participants that accrue value in the system are ideally able to trade this value for goods and services, thus not having to resort to extracting the value out of the DLT system and back into fiat money. The more participants are involved in the system and the more diverse they are in terms of their function and services they offer, the more closed the economic loop tends to become. As such, it may be worthwhile to consider how to attract not only merchants to the platform, but also those parties who supply the merchants. In addition, Posts could stimulate this themselves by allowing their own services to be paid for in the platform's native token(s). This would be particularly helpful if many parties within the system have use for postal services.

Furthermore, once a significant percentage of beneficiaries are observed to be technically capable enough, Posts could also expand upon the system by investigating the addition of digital wallet solutions. Individuals using a digital wallet would be able to become fully sovereign in handling their tokens, rather than relying on QR code or smart card-based systems. This will enable Posts to better serve beneficiaries, as they flourish into self-sustaining financially included individuals.

Besides working with unconditional direct cash transfers, such as Building Blocks, Posts could also expand at a later point in time by adding conditional direct cash transfers. For example, by limiting transfers to a certain area or by only allowing the spending on goods and services in certain regions or with selected merchants. In this manner, monitoring participant spending is simplified, as beneficiaries can only spend their funds in predetermined areas, while giving them freedom to purchase what they need. This way, Posts can provide a greater degree of assurance to third parties, such as NGOs and governments, that benefits are spent properly and are not being captured by middlemen.

Digital crypto assets would facilitate this process as they are a programmable form of money. This will make the use of conditional funds easier to monitor and audit as a type of a digital voucher.

To mitigate the interception or fraudulent exchange of benefits, cards containing biometric data (e.g., photo identification) combined with a scannable QR code, can ensure that only the intended beneficiary utilizes the card's assets. Other biometric data, such as iris-scans as utilized by WFP, can also be utilized but require significant investments.

Therefore, starting out with the inclusion of a photograph of the card holder is a cost-effective and easy to implement solution, that prevents exchanging passes between beneficiaries and non-beneficiaries. At a later stage, other biometric data can be added, to assure further security.

In the case of a custom solution, standards and regulations on the use of a DLT platform would need to be discussed and enforced for all users. This to avoid any challenges later on as it becomes increasingly difficult to define at a later stage as the number of participants grows.

Ecosystem management then becomes increasingly important, and it should be clear who will be responsible for this. The solution provider, in this case the UPU, would be in charge in connecting potential users and creating a standardised onboarding process. For a custom solution, continuous work with the technology partner is also necessary for the upkeeping of the product and ensuring that all users can access the necessary information and features.

When looking for a potential technological provider, it should first be decided which of the two options for a solution will be explored further (i.e., using existing cryptocurrencies or creating a custom and standardised solution and token).

For both of these, it is necessary to consider if the chosen technological provider can also provide support in the area of smart cards or biometric scanners if it is decided that personal information and identifiers will be used to identify beneficiaries. In this case, a higher investment will be required to make sure that the postal offices in the selected country and the participating stores are provided with reliable scanners.

It would be beneficial to obtain a provider who has previously worked with international organizations and has experience with international transactions. As organizations who partake in direct cash transfer programmes tend to be international entities, it is important that the selected partner can help with the onboarding and in their understanding of the solution. Although a DLT solution

would bring the most value in the auditing of conditional cash transfer programmes, the initial pilot could focus on an unconditional programme to test the use of a DLT platform for international transfer of funds between the programme managers and the beneficiaries. This will also require a lower initial investment as there will not be a need to add extra security layers to make sure that beneficiaries are spending their funds appropriately.

Another important factor to consider when selecting a technological partner is their ability to provide a high interoperability between the different users that will need access to the information and funds within the platform. The use of open APIs might be an option to be explored. Previous experience in this area would be beneficial.

In the second option, the Post would have a greater influence in the strategic direction of the pilot and the DLT solution. By becoming the solution provider, the Post would be able to make sure that the Posts and their postal offices facilitate the in-person services and a last-mile connection to the underbanked and unbanked populations.

In any case, Posts should attempt to maintain a strategic pillar in house. This is not only relevant for the co-creation processes with the selected technical provider but also as a stakeholder and expectation manager with the programme managers from the organizations taking part of direct cash transfer programmes.

Security and data protection issues

If it is decided that biometric data is to be used to identify beneficiaries, such as in the Building Blocks programme or using cards with a photograph as previously explained, Posts will need to consider national regulations and standards regarding identifying documents. As explained in [Facilitating digital identity management], unless international standard setting organizations come up with a common set of standards regarding the use of identifying information, domestic regulations should be taken into account.

Moreover, Posts need to identify any domestic regulation that would require them to obtain a license for the issuance of a card or database that obtains personal identifiers information (PII). In some countries, a license could be required for the issuance, transfer and owning of cryptocurrencies.

Any solution for this use case needs to make the protection of information from beneficiaries a priority. In a permissioned solution, different writing and reading rights can be given to the users that join the product's ecosystem. For example, the programme manager could be the only user group that is allowed to create an account for a beneficiary, while the merchants only get to check if the beneficiary has enough funds to purchase their goods or services.

A clear dispute management protocol needs to be set in place for all users which at least include the programme manager, the beneficiaries and the providers of goods and services (in the case that stores, or other types of merchants are to be included into the solution).

An area of concern for which appropriate cyber security measures have to be put in place is the risk of having the platform be targeted by cyber criminals due to the monetary value of the funds saved and distributed within it. The selected partner could offer a custody solution, or a separate custody partner could be onboarded to help mitigate this security risk.

Using biometric or photographic information to verify the identity of the beneficiaries would increase the programme's manager trust that the intended individuals are the ones that are receiving the funds directed for them. However, this method also relies somewhat on the trustworthiness of merchants and other parties accepting payments. If a person comes along with another person's (smart) card with a clearly incorrect photo, the merchant can still accept it simply because they wish to get paid.

This could be avoided by using biometric scanners such as with fingerprint scanners or iris scanners as seen in the Building Blocks programme. Posts would need to make sure that the solution complies with any domestic data protection regulations such as the European General Data Protection Regulation (GDPR).

Initial conversations around a possible pilot should be held together with the Postal stakeholders, the chosen technical provider, and a programme manager. It would be beneficial to also include any participating service providers that are to also participate during the pilot. This will enable everyone to discuss how the solution works, its benefits, interoperability and ask any questions they may have for better expectation management.

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