

United Nations Joint Staff Pension Fund: Embracing opportunity in digital transformation

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Abstract

Business landscapes today are evolving at a faster pace than they were ever doing before. Such a fast rate of change requires an even faster speed of response to the demands. Today, digital solutions offer more value to customers and enhanced processes to organizations, which puts them in high demand and are considered crucial in a market whose needs are changing every day. Digitalization has become unavoidable, and it is one of the main causes of a shift into a never-ending digital transformation journey. If there was still skepticism and questions on whether to embark on digital transformation, all changed with the unexpected pandemic that hit the world and made the need to embrace technologies more important than ever. The abrupt arrival of Covid-19 not only forced a series of societal changes, but also fueled companies and organizations to invest and prioritize more on technology and in embracing more innovative solutions in an effort to address market needs.

The objective of this case is to present an interesting and successful example of a digital transformation process within an international organization. Through a step-by-step explanation of the development and implementation of the new digital-based solution that is transforming a 70-year-old manual operation, this case will also evidence the various challenges encountered, including the acceptance of the innovative concepts and specific technologies, such as the adoption of biometrics and blockchain. This case demonstrates how automating different processes through the introduction of digital solutions transforms day-to-day processes, but also enhances the experience of users through an improved execution of services. Additionally, the case offers the opportunity to dive deeper into the role of blockchain, which has become a buzzword in current digital initiatives. Despite the increasing number of applications employing this technology, examples in the context of international organizations remain limited. The study of this case offers the opportunity to highlight not just the benefits associated with digital innovation, but also some very common organizational constraints related to the acceptance of new technologies and the strategic decision-making process for addressing such barriers.

Background of the organization

The United Nations Joint Staff Pension Fund, also known by its acronym UNJSPF, was established in 1949 for the purpose of issuing retirement, death, disability, and associated benefits to the staff of the United Nations and other organizations admitted to membership in the Fund. The Fund has offices in New York, USA, and Geneva, Switzerland, in addition to liaison offices in Nairobi, Kenya and Bangkok, Thailand, and is governed and regulated by its own Regulations approved by the General Assembly and Administrative Rules, which are approved by the United Nations Joint Staff Pension Board. The first member organizations of the Fund were the World Health Organization and the United Nations. Today, the UNJSPF has 25 member organizations and pays periodic benefits to individuals in more than 190 countries and territories. Over the years, the number of participants has increased, and there are currently more than 140,000 participants¹. The Fund's value of assets as at 31 December 2021 was approximately USD 90 billion, making it an important organization of its kind in both function and magnitude.

Subject to individual contractual terms, participation in the UNJSPF is mandatory for staff members of the Fund's 25 member organizations under an employment contract of at least six months or longer. Once enrolled, a pension number is assigned to each participant, which acts as a personal identifier by the Fund. Each month, a percentage of the participant's pensionable remuneration is paid to the Fund in addition to double of that amount paid by the employing organization. Upon cessation of service, participants may qualify for a pension benefit that depends on a series of elements such as age, length of contributory service, and final average remuneration. Periodic UNJSPF benefits are adjusted for cost of living over time based on certain parameters in the CPI movements of the US Dollar. However, under the UNJSPF pension adjustment system, beneficiaries of a periodic UNJSPF benefit have the option to have their benefits adjusted under a system known as the "two track", which takes into account both CPI movements of the USD as well as CPI movements in their country of residence declared to the UNJSPF; in that case, beneficiaries are required to submit an application form and provide proof of residence to the Fund, so that the Fund can implement their benefit under the "two-track".

Participants with less than five years of contributory service are only entitled to a one-time withdrawal settlement, whereas participants with a minimum of five years of contributory service are eligible to receive periodic (i.e., monthly) benefits payable for life.

1. Unaudited figure, March 2022.

Certificate of Entitlement (CE)

For beneficiaries in receipt of a periodic benefit, in order to continue receiving their benefit from the Fund, they are required to return a completed (i.e., signed) certificate of entitlement to the UNJSPF once a year, every year, as proof of existence. While there is an obligation to report the death of a beneficiary, the certificate of entitlement assists the Fund in ensuring that benefits are not paid in respect of individuals who are deceased. Each certificate of entitlement contains the individual's pension number and type of benefit(s) in payment, and requires the signature of the retiree/beneficiary, or thumbprint if the retiree/beneficiary is unable to sign his or her name. Prior to the adoption of the digital certificate of entitlement described herein, this paper-based procedure, which has been operational for 70 years, was the only option for all retirees/beneficiaries (approximately 82,000²) to submit their certificate of entitlement. The signed certificate of entitlement received each year is then verified by the Fund to confirm the right to the continued disbursement of benefits to each retiree/beneficiary. For beneficiaries who are paid under the two-track, the certificate of entitlement process also serves as a verification that they continue to reside in the country that they declared to the Fund as their country of residence, based on which the Fund will calculate their periodic pension entitlement; the process of mailing the CE form to their mailing address in the declared country of residence, the beneficiaries receiving the form and then returning the duly signed form to the Fund serves to confirm their continued residence in the declared country.

The CE process starts with a barcoded certificate of entitlement that is mailed by the Fund to each of its retirees/beneficiaries at the end of May, which is known as the first CE mailing. For those who do not return their signed certificate of entitlement within three months from the first mailing, the Fund conducts, in early September, a second CE mailing. In order to ensure continuity in payment of benefits, a dated and signed certificate of entitlement must be received by the Fund by the end of the calendar year. A failure to return the certificate of entitlement within the allowed time frame results in the suspension of the benefit payments in the subsequent calendar year. The certificate of entitlement is mailed out as well as posted inside the Member Self-Service (MSS) accounts of those beneficiaries who are not paid under the two-track (beneficiaries paid under the two-track system cannot access their CE form inside their MSS account as the Fund also has to verify their declared place of residence). All beneficiaries are required to return their duly signed bar-coded CE forms either as originals by mail or in digital format by uploading a scanned version of the hand-signed form inside their MSS account. Normally, no other ways of returning the signed CE form are accepted.

Innovation Triggers

After more than 70 years, and with the significant increase in the total number of beneficiaries over time, the inefficiencies in the manual process of providing paper-based certificates of entitlement and risks related to the dependency on the mail services became evident. At the same time, UNJSPF launched a new strategy that included the objectives of simplifying the client experience and modernizing its processes, using innovative technologies and automation.

There were three main issues concerning the paper-based certificate of entitlement that would work as innovation triggers:

- Practical obstacles created by the postal service disruption linked to the COVID-19 pandemic.
- Operational Inefficiency.
- Exponential Growth of the Beneficiary Population.

Regarding the operational inefficiency, it should be highlighted that the paper-based certificate of entitlement process involves sending a paper-based certificate of entitlement to about 65,000³ beneficiaries each year, residing in more than 190 countries and territories. Doing this requires the involvement of over 190 postal services operating all over the world. Notwithstanding all the changes that have taken place in recent years in consolidating postal services, issues such as delays and errors in delivery remain persistent and are especially significant in cases such as this one. It is not surprising, therefore, that despite two mailings and other mechanisms of follow-up implemented by the Fund, an estimated average number of 1,400 payees are suspended per year, due for instance to the inability of the paper-based certificate to reach the retirees/beneficiaries, either because the latter changed address, or because inefficiencies of the postal services to ensure a successful delivery (i.e., to the retirees/beneficiaries or back to the Fund). It should be noted that although all beneficiaries who are not paid under the two-track system could download and print their CE form digitally inside their MSS account, many beneficiaries do not make use of this option for reasons of age, computer literacy or access to Wi-Fi/computer equipment/printer in their place of residence. Another issue that complicates the paper-based process is that there are cases where the signature of the beneficiary does not match the signature on file. In these cases, the signature needs to be authenticated by an official of one of the Fund's member organizations, a government official or a Notary Public. Similarly, in cases where the beneficiary is unable to sign the certificate of entitlement because of health issues, the certificate of entitlement requires a fingerprint authentication, which in turn needs to be duly authenticated by the attending physician, which increases the length of the process.

In terms of user anxiety, some retirees/beneficiaries have expressed concern that they would not receive the mailings on time, or that their signed copy might not be received by the Fund, due to postal delays. This issue is especially stressful for beneficiaries paid under the two-track system who rely entirely on the paper-based process, as they do not have the option to download their CE form inside their MSS account; these beneficiaries have to rely on postal services for the de-

3. Not all beneficiaries are payees. Only payees receive CE.

livery of their CE form so that they can fulfill the annual CE requirement and prevent the suspension of their benefit and issues for instance could arise if the beneficiary were away from home at the time of the delivery. The exception to this would only be the beneficiaries who would hand-deliver their certificate in person to the New York or Geneva offices of the Fund. The worldwide COVID pandemic constituted an objective challenge to the annual CE process as many beneficiaries, due to COVID related disruptions in the mailing services of many countries worldwide, did not receive the CE form or received it with extreme delays, and/or would not be able to return the CE form by mail for the same reason or, because of strict lock down measures in place in their country of residence were not able to leave their home to mail out the CE form and/or to obtain a valid signature authentication if required.

Finally, there was the Fund's concern regarding its ability to keep up with the increase in the target beneficiary population over the years, surpassing 65,000 in 2020. The UNJSPF mailed approximately 65,000 CEs in May/June 2020 and a further 20,000 in September/October 2020, meaning that more than 85,000 forms (considering the addition of the first mailing and the second mailing/reminder) were printed and mailed worldwide, and then received, scanned, and archived while processing signature verifications where needed. Considering the intensive manual labor involved, and the small group of staff dedicated to this work, there was a concern that a continued upward trend in the beneficiary population could present an issue with the same manual process.

Addressing the Needs

To summarize, the main issues concerned the need to transform a 70-year-old procedure that involved a very high number of beneficiaries residing all over the world, and a manual process prone to a series of delays and possible errors that could lead to a suspension of benefit despite the beneficiary being alive. In such circumstances, UNJSPF broke-down the problem into four main elements that would need to be addressed by a new system:

- Proof of Identity.
- Proof of Existence.
- Proof of Transaction.
- Proof of Location.

In this regard, firstly it would remain imperative to be able to offer a proof of identity that, as the name suggests, would prove a beneficiary's identity. Secondly, similar to the paper-based certificate of entitlement, it would have to validate the fact that the beneficiary remains alive. Thirdly, it would be important to provide a traceable and independently auditable process and data considering the importance of retaining secure transactions for every operation. Lastly, the new system would still need to incorporate a solution as to how to provide proof of location to ascertain the proof of residence for beneficiaries paid under the two-track system where the benefits paid by the Fund are tied to the beneficiary's place of residence.

When trying to develop the appropriate digital solution that would best address its needs and requirements, the Fund took inspiration from the UN Secretary General's Strategy on new technologies. Taking account of the Secretary General's guidelines, it was important to be able to promote global values, foster inclusion and transparency, and build on existing capabilities in an effort to provide benefits for a broader population, as highlighted in the current sustainable goals of the institution⁴. In the next sections a step-by-step guide of the whole process will be summarized emphasizing all the important events taking place.

4. For more on the Secretary General's Strategy on New Technologies: <https://www.un.org/en/newtechnologies/>.

Digital Transformation

The difference between innovation today, and what was considered as such in the past, is due to the fact that it does not revolve anymore on mechanical advances but rather on digital solutions, which are emphasized by the user needs that make design thinking a very human-centered set of strategic and practical processes (Przubilla et al., 2020). Digital transformation surfaces from the introduction of digital technologies, which in turn create disruption due to the need of organizations to balance, on the one side, the need of adopting new technologies and increase their value creation, and on the other, deal with the organizational and structural challenges that come alongside the digital transformation (Vial, 2019). Therefore, through digital transformation, organizations are not only changing value proposition but also creating a new organizational identity that would emerge as the result of the transformation (Riasanow, et al., 2019; Wessel et al., 2021).

The current market needs that the world is facing have turned digital transformation to be a “must” in every organization, no matter the size or industry. The priority vested upon digital transformation has accelerated the importance invested in incorporating digital solutions into every service and product. Digital innovation, as we know it, is not a new term, despite being revitalized lately due to the Covid-19 pandemic. The notion has been around the corner since the 1990s and started with the adoption of databases that would allow for new ways of storing and accessing information. Today, we mostly recognize it through the system of online collaboration or what we know of as Microsoft Teams, Zoom, Webex, and other similar platforms that have seen a boom of adoption in the last two years, due to the urgency to interact despite the difficult circumstances and societal changes imposed by the pandemic (Kaur et al., 2020). Similarly, today, a growing interest has been evidenced by the development of machine learning and artificial intelligence, which have brought new perspective on the number of possible uses and means of digital transformation. As the world has seen many faces of what can be considered part of a continued opt for digital transformation, there has also been a shift in what fuels the continuous quest for digital solutions. One of the highest scored reasons for engaging in any sort of digital transformation sees the user experience and engagement play an important role in adoption and delivery (Casula et al., 2020). Similarly, recent studies in the Information Systems domain highlight the need to make sure that new IT artifacts align with the dynamics of socio-technical systems (Spagnoletti and Tarantino, 2012) and how technology, information and social artifacts interaction enhance the performance of one another (Lee et al., 2015).

Investing in digital transformation despite being associated with a series of important benefits, does not guarantee the success rate of the solutions. Going digital and transforming one organization is a task best performed with the right set of strategic decision making, culture and skills that would allow for a clean return on investment (Matt et al., 2015; Soto-Acosta, 2020). Choosing the right approach should include the consideration all the possible alternatives in order to choose the one that best fits the needs and requirements of the organization. Similarly, the former can

only move forward under the right set of expertise and knowledge, which would be able to set the tone and carry-out the work of the digital transformation (Morakanyane et al., 2017).

With the spread of the pandemic and all the societal changes that came with it, it became evident – very early on – that technology would be one of the emerging themes that would address and ameliorate many of the new dilemmas. However, under such unprecedented circumstances, digital transformation did not change but rather was accelerated in terms of adoption in both private and public services (Agostino et al., 2020). The economy is becoming more digital, and digitalization has influenced all aspects of the economy that is in demand of digital transformation in order to avoid any collapses (Soto-Acosta, 2020). Such circumstances have offered the opportunity to observe businesses and organizations that have reacted to the “new normal” by means of digital transformation as providers of important lessons and guidelines for the future and long-term effects. After all, digital transformation is a continuous process that lingers in time (Wang et al., 2016), and as such it is important to be studied through specific examples that can offer the opportunity to look at the digital transformation process from inception to deployment, in order to gain a better picture of the unique shape it can take based on the circumstances.

The New Solution

1) Purpose and Scope

In order to better identify the purpose and scope of the project, the Fund started by first devising a “Proof of Concept”, which was used as a framework for defining the key objectives and principles that would play the role of a guideline for the steps to follow. Three main goals were set. The first was the need to adopt an innovative and secure technology that would be able to provide an automated digital identification and authentication process for the Certificate of Entitlement. The second was to prevent any potential risk that would present further complications, by offering an objective but yet reliable application of new technologies that would aid current limitations. The third objective was to confirm the technical feasibility of the service using new technologies. Similarly, three key principles were associated under the key elements of the proof of concept, in an effort to maintain the highest privacy and security possible and setting the goal of ensuring the confidentiality and integrity of any information.

2) Seeking the Right Technology

Biometrics

In order to verify the identity of beneficiaries, UNJSPF sought a solution that would adopt and adapt a biometric technology able to perform the identification of users directly through a smart-phone app. Biometric authentication consists of using means of computer science in offering a form of identification, which relies on special biometric identifiers that are distinctive for each individual, such as in the case of physiological characteristics (Bolle et al., 2013; Unar et al., 2014). For instance, facial recognition describes the technology system that is able to match a human face with a specific database (Woodward et al., 2003). Such systems today have benefitted from an expansion all over the world, not just by private companies, but by governments and public institutions as well (Lazarick and Cambier, 2008; Humborstad, 2015). Biometrics today is considered not only a very convenient technology from the user perspective, but a lot has been invested in the last decade in providing very reassuring and secure systems that are always strengthening their systems against data breaches (Yang et al., 2019). Nevertheless, biometric techniques despite being associated with a series of advantages, have their limitations, in terms of instability over time, complexity, cost, fear of manipulation, and level of acceptance (Kumar and Walia, 2011; Kaur, 2020).

At this stage, the issue though was not whether to deploy a biometric mechanism, but rather to decide about the appropriate one. At the time when biometrics was considered the best solution to move forward and marking the first step towards starting the journey of digital transformation, there were already a series of biometric readers and security systems available in the market. These included the ones from technology giants such as Microsoft, Google, and Amazon where,

once a photo of any individual is uploaded in the system, the provider automatically creates a biometric profile. Adopting one of the aforementioned solutions would have been an easy choice but considering that privacy was one of the key principles upon which the new system would be based, if private and sensitive data – including any biometric profile – were stored in a public cloud that would defeat the objectives. Another key consideration pertained to the decision of what would have been the best system for employing the Face ID and fingerprint scanners that are already part of most available mobile phones, as an easier means of offering identification. Despite their wide availability, however, their purpose was considered very limited in scope, especially when matching the project's concerns. In fact, biometric features that are part of such applications are not able to be linked to any individual. For instance, the device simply registers a biometric identity and is programmed to only accept the registered fingerprints. Despite such recognition when applied, the inherent limitation of the biometric recognition is that of being unable to recognize whose fingerprints they are into specifics, but simply that they are registered on the mobile device used.

After considering all the viable solutions, it was decided that the best option was to create from scratch a platform that would work on any mobile phone, ensuring that any biometric data would be chained to the phone, fully encrypted, and without leaving the device. The new custom-made facial recognition made use of machine learning and various artificial intelligence algorithms to supply an application that would secure the information in place and be bound to the device alone. Subsequently, despite the biometric solution being able to offer identification means, another issue remained: the fact that the system had to support the proof of life. The concern was that the current system was indeed able to register any physiological characteristics that would be shown in front of the camera, but that would imply that the platform would do so even if a picture of the individual – and not the person itself – would face the camera. In order to prevent any fraudulent action and to provide a more reliable solution, the technology team worked to adopt a new feature: Once the beneficiary faced the camera, within a 10 second-time frame, he or she would be asked to change facial features such as, for instance, smile or grin. This would ensure that the beneficiary was indeed alive and would work as a proof of existence as well.

Geolocation

Proof of residence is an additional feature that was required in the new solution because, in two-track cases, the benefit paid by the Fund is dependent on the CPI movements of the country of residence and exchange rates. Before the deployment of the new technology, the proof of residence was solely based on the address on file where the paper-based certificate of entitlement was delivered. Successful delivery was the proof that the residence remained unchanged alongside a declaration on the CE form attesting to the continued presence in the declared country of residence from the side of the beneficiaries concerned.

The solution made use of the geolocation capabilities of modern devices to also provide the proof of residence of the relevant users. Geolocation is defined as the identification of the geographic location by using, for instance, routing addresses or internal GPS linked to the mobile devices (Djuknic, 2001). The information is registered so that when a submission would be made through the app, the address of the beneficiary is automatically determined and registered without the need for any further attestations and procedures. This feature made it possible to also allow beneficiaries paid under the two-track system to use the DCE app to submit their annual proof of existence, thus offering an alternative to the formerly only paper-based solution.

Blockchain

Taking into consideration the auditing needs of the Fund and the requirement to provide a full trail of every transaction performed, from all the technologies available, blockchain was considered to be the only suitable technology to also offer full transparency and security of the records. Nevertheless, before further steps were taken, the Fund explored every aspect of the technology to determine to what extent it met the requisites. In doing so, the Fund considered various best practices, including the Blockchain Decision Tree developed by the World Economic Forum, depicting a list of 11 important questions to be asked before embarking any further (World Economic Forum, 2018). Such questionnaire supported the conduct of a sound assessment on whether blockchain was the right technology to address the challenges faced by the Fund. Despite the tool only being able to offer an initial assessment, it offered a good start in minimizing the risk of taking a blind decision. Considering the objectives and principles set forward at the beginning of the project, it was indeed decided that blockchain was a good technological fit for the Organization.

Blockchain technology has been attracting massive attention in the recent years due to its innovative distributing ledger mechanism that has proven to make it very useful and efficient in a wide spectrum of applications ranging from financial services, risk management but also public services (Alharby and Moorsel, 2017; Maesa and Mori, 2020; Pornauder et al., 2020). The praise for this technology is due to its revolutionizing means of establishing trust and allowing interaction of mistrusting entities of exchange (Becker and Bodo, 2021). Blockchain technology has gone a long way since its inception as an underlying mechanism of cryptocurrencies, since its novel way of governing, storing, and distributing information has been proven to be advantageous beyond the financial sphere. Despite the first wave of research and interest arising mainly from the cryptocurrency market, today, this technology has been pointed out in several studies including public administration, which is heavily based on providing services as a very promising mechanism in offering data certification, traceability and transparency (Rot et al., 2020; Cagiast et al., 2021).

Blockchain works fundamentally as a database where information is stored in the form of encrypted blocks that are chained together in chronological order, thus the name “blockchain”. Any

digital asset pertaining to the blockchain is neither copied nor transferred but rather distributed, which makes up the immutable property of this technology. The elevated immutability feature of this technology is what makes blockchain a secure and transparent alternative to existing solutions. The blockchain nodes are where blockchain basically exists and their main function is for the blockchain data to be stored and preserved. Their main purpose is to verify the network of transactions or, in other words, the blocks. For instance, a full node can be a computer server, and a running blockchain would be based on a series of such nodes that are connected together and have a full copy of the transaction history of that specific blockchain.

Today, due to the increasing attention being given to the technology, a wide number of applications across industries and countries hail the technology as the new future. In addition to private companies such as Starbucks or Coca Cola (Bloomberg, 2020; Cacioli, 2020), representing some of the most famous examples of entities that have embraced the technology, the public sector has also been an implementer and promoter of the technology for a variety of purposes. Governments of different countries such as Estonia have been pioneers in embracing the technology as a mean of achieving the desired digital transformation that would match this day and age in offering highly efficient public services (Ojo and Adebayo, 2017; Jalakas, 2018). Digital government, also known as e-government, has been one of the promising directions in the use of the technology, in an effort to increase efficiency between governments and citizens. What distinguishes blockchain is its successful delivery of the same public services through more secure and non-fraudulent means. Today, the implementation of blockchain in different countries in Europe, UAE, China, India, UK provide a tracked success story behind some of the most coherent blockchain implementations in providing superior services (Sobolewski and Allesie, 2021; Bhatia and De Hernandez, 2019; Al-Barguthi et al., 2019). In the various use cases where blockchain has been employed, it has shown not only to outperform in terms of performance, accountability and security but also offer public value in terms of trust, legitimacy, multilateralism, and anti-fraud (Spahiu et al., 2022). There are different types of blockchains that differ on the basis of a series of distinguishing features such as their consensus mechanisms. Public blockchains were the first to be introduced as a way of managing digital currencies and as such have been envisioned to be based on the notion of decentralization, where everyone could become a node of an existing blockchain network (Guegan, 2017; Lai and Chuen, 2018). However, despite being highly secure in nature, the downside of these types of blockchain is the fact that they have a long response time and very considerably high energy costs, which are also some of the reasons why they are always the best option in every setting (Khan et al., 2021). Permissioned blockchain on the other hand, in simple terms consists of an initial set of running nodes where the participation is not open to everyone and in order to be approved it should be done so by existing nodes in the network (Amid et al., 2021; Polge et al., 2021). The benefit of such a design is the fact that it comes with all the benefits of a decentralized infrastructure, but in addition also offers a quicker response time and comes as a more energy efficient alternative.

In the case of the digital certificate of entitlement, the Fund implemented a permissioned blockchain. For security reasons the nodes are hosted by a computing service provider of the UN system

in order to ensure that every transaction recorded on the blockchain remains within its computing environment, which is protected by the same privileges and immunities as the United Nations organization. In practice, once the beneficiary has successfully passed all the necessary steps to create his or her biometric profile, and a digital certificate of entitlement is issued, the transaction details related to the proof of identity, proof of existence and location are recorded on the blockchain. In this regard it should be duly noted that the information that is captured and being registered on the blockchain is not of a private nature. As mentioned in the biometrics section, any data considered private is only stored on the user's device, and the user is the only one who is in full and continuous control of the data through his/her mobile device. Once the user stops being part of the program, the information can be easily deleted at any time. The only data stored on the blockchain includes a representation of the transactions that pertain to public data. Data stored on the user's device are not transmitted to/nor is any private information shared on the server.

As mentioned at the beginning, despite blockchain being such an in-demand solution, as with every other technology, it first requires an adequate level of analysis and agreement before its full implementation. This is because it requires significant expertise to be implemented from scratch, as well as considerable financial and technological resources. Considering the demanding investment, it should be confirmed that blockchain is the right solution to the problem. In the case of the UNJSPF, the whole process supporting the digital certificate of entitlement application could have been implemented without the need of the blockchain. However, this technology was necessary for the Fund given the need to create and maintain an audit trail of the process. UNJSPF required a very detailed level of auditability, and considering the new revamp taking place, a more specialized audit trail had to be associated with the initiative. For this reason, blockchain was considered the perfect choice in offering an independent audit evidence to the digital certificate of entitlement process that would be both traceable and immutable.

In the development of the blockchain based solution, Hyperledger Indy and Aries were chosen as the most effective digital frameworks. Hyperledger is an online software that allows the development of customized blockchain solutions with the objective of meeting various business needs. The software started in 2016, as a small project with developers of various backgrounds and it has grown today as a unique provider of blockchain based solutions that are both personalized and accessible (Hyperledger, 2021). Different from Ethereum, which is based on a very generalized protocol, the elements that set Hyperledger apart focus mainly on providing privacy and confidentiality. Today, Hyperledger retains under its umbrella project a series of open source blockchains and related tools such as Hyperledger Indie and Aries. Hyperledger Indie was presented in 2017, as an innovative blockchain based alternative that would support decentralized identity and the validation of verifiable credentials. Aries was introduced in 2019 on top of the existing solutions such as Hyperledger Indie, as a tool kit that would enable the creation, transmission, and storage of verifiable digital credentials (Curren, 2021).

Another important element of any blockchain is the “wallet”, which stores the private key of the users. In Hyperledger, the wallets are entirely held by the organization:

“The wallets as they stand are stored in our systems. They are considered cloud wallets in commercial terms and have a whole wall of security put in place to secure that only authorized programs during verification process unlock these wallets and issue credentials. For the purpose of this project, we have two sets of issues, one from the Fund side and one from ICC. We do not store biometric information”⁵.

3) Cybersecurity and Privacy Assurance Assessment

Considering the sensitivity of the matter and the need to provide elevated security, UNJSPF engaged diverse subject matter experts to conduct security reviews. It should be underlined that reviewing and certifying the adequacy of the system in such a manner would ensure an objective review from an independent third party. To provide a heightened and reliable security system a series of ISO standards were referenced in order to provide assurance on the issues related to Cybersecurity. A security assessment was conducted in 11 different domains spanning from high level solution, network security, external system and business network to smart contracts and futureproofing. Additionally, a control assessment for privacy was successfully conducted with reassuring results in 4 domains: Policy, Data Collection, Data Processing and Organizational issues.

4) Pilot Project and Going Live

A pilot project was launched with a subset of beneficiaries as part of the initiative to test the digital certificate of entitlement in order to address potential weaknesses before confirming the suitability of the solution for full deployment. The pilot was made official with the launch of the first set of invitations to 265 beneficiaries, sent out in May 2020, followed by another set of 86 invitations sent out one month later in June 2020. The testing pool would later be reminded of their participation on the 9th and 17th of June 2020. 279 beneficiaries redeemed their invitation and later 232 of them were onboarded, which included residents in 43 different countries. Between the first and the second set of invitations, the system underwent a series of changes for fixing security onboarding errors, updating the biometric model, and improving biometric User Interface and home screen. After the successful completion of the pilot project, the results were presented to the governing board of the Fund, which following a comprehensive and detailed review of the proposal, endorsed and approved the new solution, which went live in January 2021.

5. Excerpt from presentation video on YouTube.

Challenges and Response

Despite the fact that the UNJSPF initiative in digitally transforming one of its main services concluded with the deployment of the new solution, it should not go without mentioning that the road to success was not easy. Both internal and external challenges were experienced alongside the process of formulating and testing the new app and its main technological features as incorporated in the digital certificate of entitlement. The most evident challenges are presented below in the form of dilemmas followed by their respective strategic responses.

Dilemma 1: Ownership and Accountability

Taking into consideration the objectives and principles defined for the transformation of a manual process and its implementation into a digitalized operation, the project required a lot of attention from the IT experts who designed and fool-proofed the solution for the new system. However, at first, the significant involvement of IT raised concerns on the ownership and accountability of the solution designed, as between the business units and the IT unit.

In addressing this initial challenge, open communication and information sharing proved to be an adequate solution to the problem. A working group was created with representatives of IT counterparts. The objective of this working group was to oversee and be involved in the decision-making process, as well as monitoring of the design and operation of the solution which provided for a better perspective of the roles and responsibilities of each of the parties involved, especially in terms of ownership and accountability.

Dilemma 2: Need for Expert Knowledge

The development of the solution and the level of the new technology to be adopted in the process, presented the opportunity to exploit complementary capabilities from external parties that would provide their valuable know-how in the deployment of the digital CE. Despite the fact that this was an unaccounted-for step in the pre-design phase, it quickly turned into an opportunity. The involvement of third-party experts would not just assist with and guide the technological design and operation but would also ensure that the Fund would be benefitting from utilization of the latest technology in the most efficient and effective way. This was especially evident in the introduction of blockchain technology, which in spite of its complexities that might have seemed challenging, with the right expertise showcased promising results.

Dilemma 3: Level of User-friendliness

Most beneficiaries are aged in their 60s when they commence receiving a benefit and might have limited experience using mobile apps. In addition, despite wishing for a more efficient solution as an alternative to the paper-based certificate of entitlement, the beneficiary might not be pre-

pared for such a jump in the form of an entire new process. With this in mind, the whole process of digitally transforming the solution needed to be designed with extra care, considering the audience making use of it. The main approach was to create a technology, every component of which would have been built with a very human centered design approach. This proved to be a learning curve and the many small issues that arose were addressed as they were encountered during the development of the solution. For instance, once the new design was implemented, it showed that there were still minor issues to be resolved, such as individuals who were not joining the video calls that were required to activate the digital certificate of entitlement for first-time users, despite having chosen the time and date to connect with the operators for the final authentication before the issuance of the certificate. Since the meetings were typically scheduled weeks ahead, a set of reminders was later included in the design that would help the individuals better keep track of their call with the operators.

Also considering the complexity of the solution, the Fund created a series of videos showcasing a step-by-step process of how the new digital certificate worked and how users would need to use the app. In addition, the Fund developed user manuals with detailed instructions, as well as frequently asked questions. Such manuals were translated into different languages displaying once again the need for an extra allocation of resources to various business functions to provide the necessary support to any beneficiary experiencing difficulty in registering.

Dilemma 4: Auditability

Prior to the launch of the blockchain-based initiative, as evidenced by the report of the United Nations Office of Internal Oversight Services (OIOS) published in 2018 on the certificate of entitlement process, a critical point was the need to implement “*effective measures that could address the low completion rate for signature verification of CEs*” (OIOS, 2018). The aforementioned point was deemed critical in the report, but another important point underlined was the need to improve the data integrity of beneficiaries in the Fund’s ERP system where errors can lead to data discrepancies. The Fund was also urged to address various risks associated with signature verification to avoid overpayments. As per usual protocol, the 2018 audit report was based on employee interviews, review of data and documentation, and a sample testing of the certificates of entitlement.

The aim of the Fund was to address these concerns as part of the digital CE project and initiative. Nevertheless, considering the high complexity of the project, the fact that the whole system would be created from scratch, and that the new automation would completely overturn the paper-based process that had been in place for over 70 years, there were concerns about security and auditability of the whole solution. This was especially evident due to the adoption of complex technological solutions implemented in the process, such as in the case of blockchain. Despite the increasing widespread application of blockchain around the world, it was still not a very well-

known option outside the IT-expert circle, which presented additional questions and the need for proper communication and assurance about its adoption in front of governing bodies with oversight functions and other stakeholders. Although blockchain has a successful track record in applications worldwide, the Fund was very aware of stakeholders' concerns, and expectations for a solution that would automate the certificate of entitlement process while, at the same time, being user-friendly, independently auditable, prevent fraud, and secure (i.e., in the handling of biometric information). These issues were addressed by carefully explaining the details of the specific blockchain solution implemented and how it protected any private and/or biometrics data. In addition, the specific architecture of the blockchain solution chosen and the security testing conducted provided reliable evidence for audit that, in fact, the solution was capable of addressing the audit observations and recommendations issued in the 2018 report. Indeed, the Fund designed and implemented a system where no changes could be made due to the immutable nature of the data recorded on blockchain records.

Dilemma 5: Legal and privacy concerns

As with the introduction of any technology handling private information, there is always concern about how private data would be transmitted and used. In this case, since there would not be any more paper-based evidence but rather a digital representation of every transaction made online through the app, there were further needs to explain in detail the scope of the blockchain and the protection of biometrics data. This was also one of the issues frequently addressed by the Fund when describing to the outside audience the new solution, considering the sensitivity of the topic and the fact that people today are more aware of such issues.

In order to address such concerns, it was imperative for the Fund to explain carefully and repeatedly what would be recorded – and what would not – on the blockchain, to provide a better depiction of the mechanics behind the technology. The adoption of blockchain was to capture only public information and leave all private information only on the device of the user, who remained always in control of his or her personal identifiable information. The Fund confirmed that at no time would there be any transfer of private information. Blockchain would be used only to record a representation of transactions that were public. That was also why the last step to successfully complete the application was made through an interaction with one of the Fund's operators in order to conclusively identify each beneficiary.

Dilemma 6: Adjusting to the “New Normal”

The initial plan was for the retirees/beneficiaries enrolled to visit one of the many local UN offices if present in their location. Such offices would not be limited to the UNJSPF ones, but they would require in person verification as a last step after having successfully downloaded the app and

gone through the first registration requirements. This represented the final stage of the authentication, where the representative confirmed that the ID uploaded on the app and the person in front of him/her matched. The biometric profile of the retiree/beneficiary would then be approved manually by the Fund's representative, completing the in-person verification. However, just before the solution could go live, the world was hit with the Covid-19 pandemic. The pandemic presented the Fund with a very difficult situation, which was ultimately addressed by reverting to virtual meetings and video-calls in lieu of the in-person authentication.

In addressing these unpredictable circumstances, the Fund and its partner institutions demonstrated to be agile in adapting to the new reality, by offering the services of a call center that would bridge the inability to travel during the pandemic, and in enhancing the app with new features to support both the digital CE process as well as the scheduling of virtual appointments. As a result, the new app also offers the possibility to schedule meetings, make in-app calls with call centre operators, upload scanned copies of identification documents and support video interactions. All these modifications were made in a short time and – as mentioned – all the transmission, processing, and storing of information would occur in systems protected by the same privileges and immunities as the United Nations organization.

The introduction of online call centre operators that would make up for the in-person meetings, despite being a success in addressing the urgency of the situation, proved a challenge of its own. In the beginning, there was a limited number of operators working from New York, USA, and Valencia, Spain, ready to finalize the digital certificate of entitlement process. As the number of beneficiaries making use of the app started to increase exponentially, along with the number of DCE related phone and written queries, it soon proved very challenging to manage the huge number of online meetings and DCE related queries amongst only a limited number of operators. This led to long wait times, resulting in appointments being scheduled as much as three months in advance as well as delays in response to written queries and phone calls. Since the issue was obviously due to the limited number of operators compared to the number of enrolments in the new program and DCE generated phone and written queries, additional operators were assigned to the call center. Nevertheless, considering that, as the year went by and more beneficiaries started making use of the new digital solution, the current number of operators is now double, in order to better address the of users.

Conclusions

Overall, from the users' perspective (i.e., the retirees and beneficiaries of the Fund), the introduction of the digital CE solution has been a positive initiative. Considering that the primary reason for the implementation of this technology was due to the concerns voiced by the users, it was very encouraging to note the level of appreciation reported back by the users. Despite the project having gone through a learning curve to better match the features of the app and the process with the needs of the users, today, the project can be considered a success story. UNJSPF proved to be able to respond quickly to the inevitable challenges encountered in the implementation of a global digital transformation, which used innovative technologies, deployed on a comprehensive set of devices manufactured by diverse entities. The Fund addressed the limitations in the number of call center agents, the need to make the application more user friendly and the request for simple and complete guidance with a series of documents and videos explaining in detail every single aspect of the project and the new system in place. Considering the operational changes, the retirees and beneficiaries of the Fund who have already used the new system, have underlined how the new system has finally been able to address their initial concerns, as well as mitigate the anxiety and stress often associated with the paper-based certificate of entitlement.

The success story of this initiative was also highlighted by a recent study undertaken by Gartner which emphasized the benefits of the new system from an operational perspective. While the paper-based system was manually intensive as compared to the digital transformation introduced by the Fund's new digital solution, would provide for great benefits in terms of cost, productivity, and reduction of manual processing work from the series of operational efficiencies it has delivered (Gartner, 2021). Apart from sending out the certificate of entitlement periodically, a lot of manual labor was also invested in the certificates returned to the Fund, which needed to be scanned and checked for proof of authenticity in a consistent manner. Being able to reduce the workload from the paper-based CE allowed staff previously assigned to dealing with the related paperwork, to dedicate more of their time to client services and value-added tasks. From a very basic and intuitive calculation this shows how going digital can have positive repercussions in terms of efficiency, time, and cost, as it is able to remove/reduce a significant part of manual-intensive work. Additionally, through digitalization, the risk of errors and mistakes is reduced, while also providing elevated security considering that the process has a reliable and immutable track record. While there is a recognition that the digital CE will co-exist with the paper-based CE for those beneficiaries who do not opt to use the digital process or are unable to do so, its implementation is already making a positive impact in regard to resources.

The successful implementation of the UNJSPF Digital CE has opened up the prospect for a UN System-wide Digital ID, that would allow UN staff members to be able to identify themselves across the entire System (i.e., when transferring between UN Entities/Organizations), and for various functions (i.e., Human Resources; Training; Health; Security; Finance; etc.), using the proven digital solution and biometrics used by the Fund.

All the benefits highlighted after the successful deployment of the digital certificate of entitlement perfectly match with the benefits that are routinely measured today as the main success factors behind a successful digital transformation in both scientific and business literature. From a user perspective, we see how – today – people are more and more eager to have the best service experience while also benefiting from fast delivery of such services. Indeed, a more user centric focus is usually considered as one of the main generators of digital transformation due to its direct effect in enhancing client experience. By giving voice to client needs, there is – by default – an increase in improved services. Meeting client expectations through digital transformation paves the way to improve the quality of services by mitigating delays and possible human errors.

The successful implementation of the UNJSPF digital certificate of entitlement through the use of technologies such as biometrics and blockchain, has facilitated the possibility of expanding the adoption of such technologies further into the entire UN-wide system. This would create a new digital culture within the organization whose main catalyst would come from embracing digital transformation. In the case of the UN, despite having advanced rapidly in keeping-up with digital technologies, it should be understood that the process of providing a digital culture is a continuous one, that stems from the constantly evolving nature of digital technologies and the introduction of new ones. As such, it is important to always be on top of such advances since digital culture has been proven to be a crucial element of all organizations and can only be maintained by being aligned with new technologies.

Completing the digital CE project despite all the challenges faced due to the pandemic, proved to be a concrete test in terms of agility. In the case of the UNJSPF, the Fund proved to have the right tools and the right capabilities to move forward despite the challenges. Agility refers to the ability to adapt and change both in terms of accuracy and speed in the face of adversity. Considering the outbreak of the pandemic, which was a good testing ground for all businesses and organizations that needed to find new ways to adapt to the new terms, the best take-away from this situation has been acquired mostly by the ones that knew how to transform themselves. In the case of the UNJSPF, this was achieved through the right skill set, quick thinking, and motivation.

Looking Ahead

The benefits of the implementation of the UNJSPF digital certificate of entitlement have already started to be revealed, although the official project has been live for less than one year. This positive outcome offers the Fund and all the partner institutions partaking in this project a bright future ahead. Both entities consider the solution deployed a living proof of the importance of undertaking digital transformation processes that bring potential improvements for organizations.

Through the embedment of various technologies and the revamping of an important process for the UNJSPF, it should be noted how such an investment in this area was able to not just intensify further various digital transformation initiatives, but also offer additional benefits that go beyond efficiency. The scalable technology proved useful in addressing multiple needs such as a sound ROI model and cost/benefit gain that has been shown to be important byproducts of this project.

Subsequently, following the development and the introduction of the digital CE, enabled a secure and reliable identification of the Fund's clients. This represents not just providing and securing reliable means when involving digital transactions, but also a catalyst for positive change. Such a change would furnish further the Fund's quest for stipulating to all clients a pain free process and most importantly a secure one.

Positive derivatives of this project, in addition to giving input to the "UN-wide Digital ID initiative", the Digital CE be used by the Fund to provide added-value services to its clients. Such services include:

- a) Targeted notifications, informing clients when their payment is issued; a statement is uploaded in the Member-Self-Service; or a document has been received by the Fund; etc.
- b) Using the Digital CE application as a Multi-Factor-Authentication app to ensure the security of online transactions performed by the Fund's clients.

In conclusion, considering such evidence-based implications that have been associated with the aftermath of the introduction and the engagement of the technologies discussed throughout, have opened a new door for future possibilities and potential of further expansion and wider adoption of technologies. Biometrics and blockchain, have been specific elements of interest worth analyzing further to a larger extent under the UN umbrella, which proves again the reach of this project in terms of success and accomplishment.

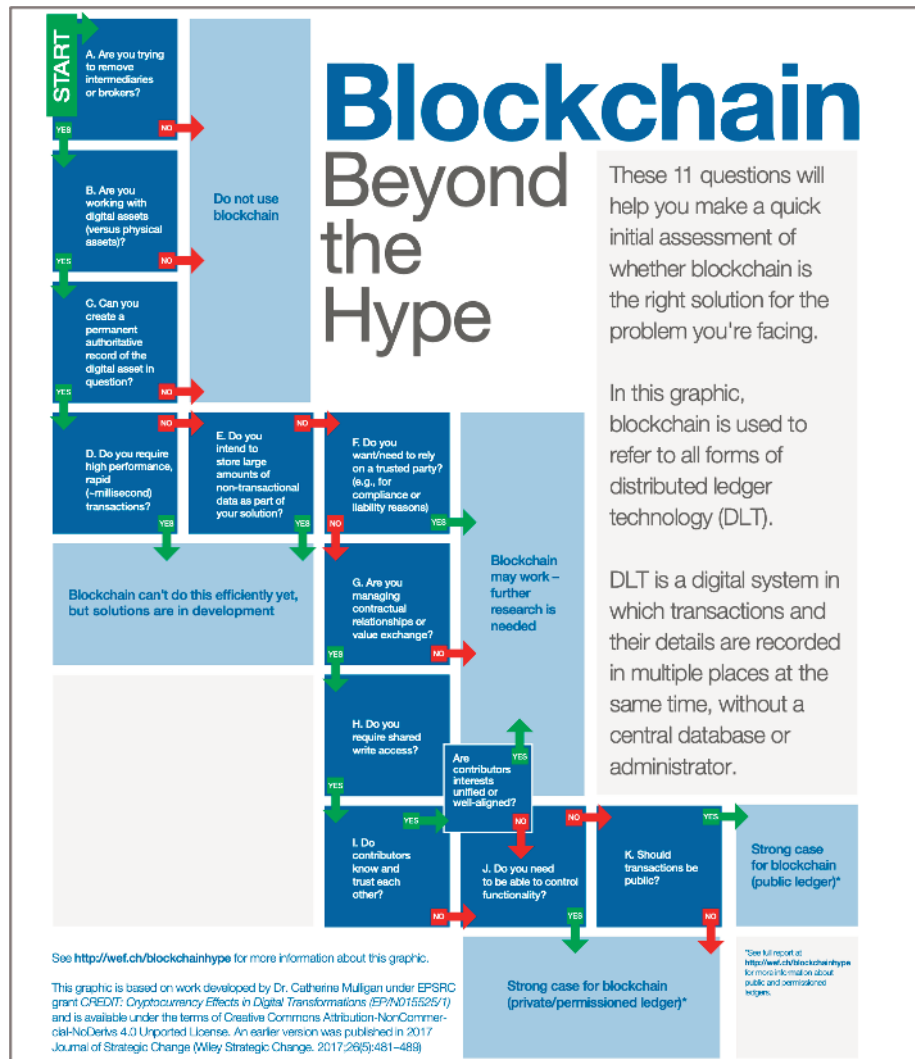
Exhibits

Exhibit 1: Sample of a paper-based certificate of entitlement

<small>PENG AN (2-0)</small> CERTIFICATE OF ENTITLEMENT / CERTIFICAT DE DROIT A PRESTATION / CERTIFICADO DE DERECHO A PRESTACIÓN		<small>PENG AN (2-0)</small> CERTIFICATE OF ENTITLEMENT / CERTIFICAT DE DROIT A PRESTATION / CERTIFICADO DE DERECHO A PRESTACIÓN	
RETIREMENT NUMBER NAME		RETIREMENT NUMBER NAME	
DATE DATE		DATE DATE	
<p>I certify that I receive a benefit(s) under the Regulations of the United Nations Joint Staff Pension Fund and that, on the date of my signature as indicated below, I continue to be entitled to this (these) benefit(s). I note that falsification of signature will be considered fraud.</p> <p>Je certifie que je perçois une (des) prestation(s) qui m'est (me sont) versée(s) en vertu des dispositions des statuts de la Caisse commune des pensions du personnel des Nations Unies et que je continue d'avoir droit à la date à laquelle j'appose ma signature. J'ai pris bonne note que falsifier une signature est considéré comme une tentative de fraude.</p> <p>Certifico que recibo una(s) prestación(es) en virtud de las disposiciones de los Estatutos de la Caja Común de Pensiones del Personal de las Naciones Unidas, a la(s) que continuo teniendo derecho en la fecha que firmo el presente certificado. Entiendo que la falsificación de la firma será considerado como fraude.</p>		<p>I certify that I receive a benefit(s) under the Regulations of the United Nations Joint Staff Pension Fund and that, on the date of my signature as indicated below, I continue to be entitled to this (these) benefit(s). I note that falsification of signature will be considered fraud.</p> <p>Je certifie que je perçois une (des) prestation(s) qui m'est (me sont) versée(s) en vertu des dispositions des statuts de la Caisse commune des pensions du personnel des Nations Unies et que je continue d'avoir droit à la date à laquelle j'appose ma signature. J'ai pris bonne note que falsifier une signature est considéré comme une tentative de fraude.</p> <p>Certifico que recibo una(s) prestación(es) en virtud de las disposiciones de los Estatutos de la Caja Común de Pensiones del Personal de las Naciones Unidas, a la(s) que continuo teniendo derecho en la fecha que firmo el presente certificado. Entiendo que la falsificación de la firma será considerado como fraude.</p>	
<div style="border: 1px solid black; padding: 5px; width: 150px; margin: 0 auto;"> <small>SIGNATURE / FIRMA</small> <div style="background-color: #e0f0ff; padding: 10px; text-align: center; font-weight: bold; font-size: 1.2em;">SIGN HERE</div> <p style="font-size: 0.8em;">(See below if you are unable to sign) (Si vous n'êtes pas en mesure de signer, voir ci-dessous) (Si no le es posible firmar, ver a continuación)</p> <div style="display: flex; justify-content: space-between;"> <div style="border-bottom: 1px solid black; width: 40%;"></div> <div style="border: 1px solid black; padding: 2px; font-weight: bold;">DATE HERE</div> </div> </div>		<div style="border: 1px solid black; padding: 5px; width: 150px; margin: 0 auto;"> <small>SIGNATURE / FIRMA</small> <div style="background-color: #e0f0ff; padding: 10px; text-align: center; font-weight: bold; font-size: 1.2em;">SIGN HERE</div> <p style="font-size: 0.8em;">(See below if you are unable to sign) (Si vous n'êtes pas en mesure de signer, voir ci-dessous) (Si no le es posible firmar, ver a continuación)</p> <div style="display: flex; justify-content: space-between;"> <div style="border-bottom: 1px solid black; width: 40%;"></div> <div style="border: 1px solid black; padding: 2px; font-weight: bold;">DATE HERE</div> </div> </div>	
TYPE OF BENEFIT AND COUNTRY OF RESIDENCE FOR TWO-TRACK		TYPE OF BENEFIT AND COUNTRY OF RESIDENCE FOR TWO-TRACK	
IF YOU ARE UNABLE TO SIGN YOUR NAME, AFFIX YOUR THUMBPRINT HERE SI VOUS N'ETIEZ PAS EN MESURE DE SIGNER CI-DESSUS, VEUILLEZ APPOSER VOTRE EMPREINTE DIGITALE ICI SI NO LE FUE POSIBLE FIRMAR, PONGA SU HUELLA DIGITAL AQUÍ		IF YOU ARE UNABLE TO SIGN YOUR NAME, AFFIX YOUR THUMBPRINT HERE SI VOUS N'ETIEZ PAS EN MESURE DE SIGNER CI-DESSUS, VEUILLEZ APPOSER VOTRE EMPREINTE DIGITALE ICI SI NO LE FUE POSIBLE FIRMAR, PONGA SU HUELLA DIGITAL AQUÍ	
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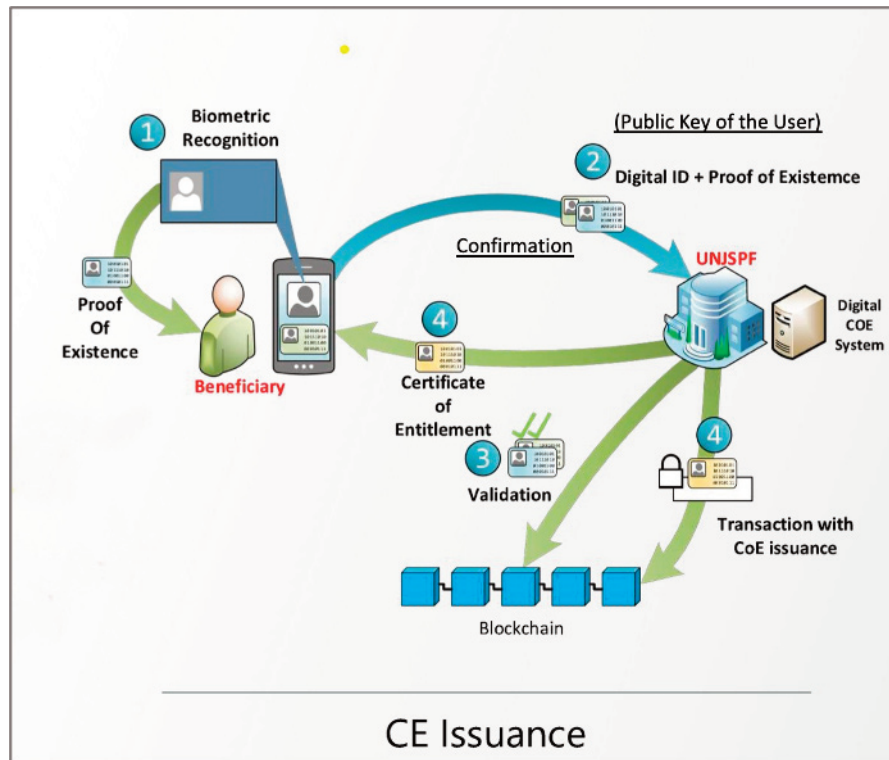
Source: UNJSPF Presentation, EURSA-Copenhagen (2016)

Exhibit 2: Blockchain Decision Tree



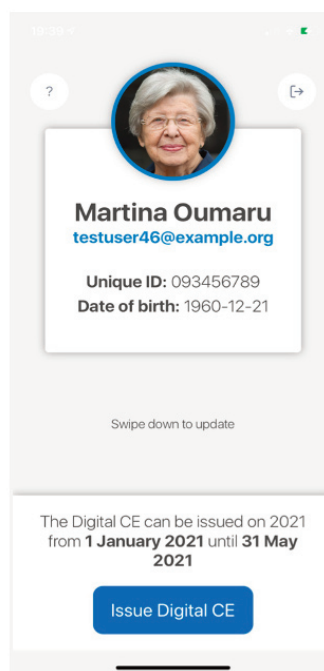
Source: World Economic Forum (2018)

Exhibit 3: Certificate of Entitlement Issuance Process



Source: UNJSPF Presentation (2021)

Exhibit 4: App view of new solution



Source: UNJSPF Digital CE Guide

More information on the step-by-step process:

<https://www.unjspf.org/wp-content/uploads/2021/01/Digital-CE-tutorial-English-Jan27-Updated.pdf>.

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