# Tackling identity management, service delivery, and social security challenges: technology trends and partnership models

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## ABSTRACT

Today, 1.1 billion people have no formal identity. A full 50% of the world population does not have access to social security. At the same time, the number of 60+ year-olds will double to 2 billion by 2050, and the high levels of youth unemployment will limit the funds available for public services. Technology-driven efficiency and effectiveness in service production and delivery is part of the solution to these challenges and the Sustainable Development Goals. Secure and reliable identity management is a key enabler in the digital transformation of public service delivery, but many countries still battle. This paper highlights a number of technology trends in electronic identity management and partnership models for efficient and effective service delivery. The paper finds that digital identity and signature can provide cost-efficient, easy, secure, and personal service access. While there are strengths and weaknesses to all technical solution, technology is secondary when compared to the completeness, reliability, and quality of data. The cooperation between authorities facilitates efficient and effective identity management, and partnerships with the banking and telecom sectors for development, maintenance, and rollout can be especially beneficial.

## CCS CONCEPTS

• **Applied computing** → **Computers in other domains** → Computing in government → *E-government*

## KEYWORDS

Identity management, digital identity, digital signature, social security, service delivery, partnership models, technology, trend



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## 1. INTRODUCTION

While the rapidly evolving digital culture is characterized by greater inclusion and participation of the public in social and political processes, ten global challenges are identified by the International Social Security Association (ISSA) in relation to public service delivery [1]. Key amongst them is the 50% of the global population who does not have access to social security and the mere 20% of migrant workers who have full social protection [1].

Digital transformation focuses on the use of technologies to improve access to government information and services previously only available in physical formats. To modernize and provide digital access to public services provided to citizens, the use of technology focus on the automation of internal operations of government organizations to improve. To this effect, the identification of users and matching data to these identities is essential [2]–[5]. This includes the authentication of the claim and proof of identity to ensure the validity of the identity claim and the entitlement to a given service. While people are increasingly online, 1.10 billion people are without a formal identity, 0.45 billion of which are located in Asia alone. Only 4 of 31 low-income countries have electronic forms of identity (eID). The 20 countries with the highest proportion of inhabitants and migrant labours without ID all are in Africa and the Middle East: with a massive 77.77%, of people in Nigeria not having formal forms of identification and 45.52% of people in war-torn Libya in a similar situation. The lack of formal identification constitutes a key

challenge for the planning public of service delivery, their financing, and actual delivery [1].

Inequalities in relation to service access weaken social cohesion, but they are also a challenge in relation to the Sustainable Development Goals (SDGs). For instance, ICT-enabled cost and burden reduction in public service delivery can support the Agenda in a number of ways. Productivity growth within the public sector may release resources to promote other development goals (SDG 8). Efficient and effective back-office use of ICT, combined with administrative burden reduction, helps promote just, inclusive, and sustainable economic growth, and employment and decent work for all (SDG 8 and SDG 16). As an essential part of a resilient public sector infrastructure, technology can promote sustainable industrialization and foster innovation in the private sector and civil society (SDG 9). Similarly, the inability to effectively plan, address communicable diseases, environmental and economic disruptions are problematic, as these happen with increasing frequency [1], [6], [7].

Demographic changes, which are due to the number of 60+ year-olds doubling to 2 billion by 2050 and 40% unemployment rate of current youth, hinder the funding of social security or assistance due to lack of tax generation [1]. This is compounded by the fact that up to 45% of work activities are potentially being automated in the future [8]. Resource-constrained and low-income countries, and micro- and small-states are particularly vulnerable and face challenges in relation to market forces and environmental disruptions, internal capacities, human and financial resources [1], [8].

The question is how to take advantage of technology for a positive disruption of the way we identity management and public service production and delivery is approached? How to increase productivity, cost efficiency, and service quality? How to reach everyone in the society and, particularly, the weakest?

## 2. METHODOLOGY

As an exploratory paper, keyword searches were used to explore the topic in key academic databases [9], [10]. Databases included Web of Science [11] and Google Scholar [12]. As the paper focus on current trends and themes, additional key word searches were carried out on the Internet in order to identify any focal areas in non-academic writings. While the paper draws on publications from the 1990s onwards, the focus on current thematical trends mean that newer publications were of particular interest. This also means that this paper is not a classical review of academic literature.

Keywords used include “electronic identity”, “eID”, “electronic identity management”, and “digital signatures”. Keywords are combined with terms such as “sim card”, “ID card”, “mobile”, “cost”, and “price”.

## 3. EQUITABLE, EFFICIENT AND EFFECTIVE SOCIAL SECURITY AND PUBLIC SERVICE DELIVERY

As the world stands at the threshold of a new industrial revolution [13], the fusion of technologies, the blurring of lines between the digital, physical, and biological spheres is seemingly increasing. This amplifies the demographic, economic, and environmental challenges seen in the last decades. Doing nothing will put the public sector and service delivery under increasing pressure, but if handled correctly it is a unique opportunity to improve productivity and re-invent service delivery.

The velocity, scope, and systems impact are vastly different than in past industrial revolutions. Digital technologies are impacting almost all industries in every country at a depth and breadth such that are transforming entire systems of production, management, governance, and professional and personal lives [13]–[15]. A new logic is potentially emerging, and capacities to increase efficiency and effectiveness are shaping society, the private sector, and also the public sector in the way they are organized, citizens expectations and behaviour.

The successful management of ICT is essential to the implementation of innovative solutions to address rapidly evolving social security needs and expectations. Emerging technologies open new service delivery possibilities that seemed futuristic only a few years ago. Failure in keeping up with the latest developments or in implementation can have serious enterprise-wide consequences, reaching the political level when impacting on the capacity to meet public expectations. ICT is not only a matter of interest for the involved professionals and specialists, but has also become of strategic importance for CIOs and decision makers in social security institutions [16].

For public sector service production and delivery, efficiency and effectiveness are limited by the lack of proper means of identification and identity management. Reliable and unique identification of individuals is the basis for a multitude of public services: this includes planning of infrastructures, service delivery and rights to vote, travel, and to access a given service. Efficient identification for service delivery can help improve reach and service quality. Sharing of account information or even the use of single accounts, such as India “Zero Rupie” account, or Denmark single-account (or NemKonto), are examples of such initiatives [3], [5], [17], [18].

Similarly, front-office location, staffing, channel mix (physical, written, telephone or online self-service) are largely dependent on identity management and the people physical location. Back-office automation and cost-efficiency are facilitated by the ease and reliability of identity management. Administrative burden reduction facilitated by once-only-principle is linked to the ability to check identities and data across systems without making the individual or business the proverbial “carrier pigeon” of information between authorities [5], [7], [19]–[21] In fact, back-office efficiency can be combined with proactive and personalised service delivery, such as the one seen in Stockholm comparative services offers on jamfor.se (hotel booking inspired). This, in turn, has socio-economic benefits, can improve private sector competitiveness and job creation, and equitable, efficient and effective social security and service delivery [7], [22].

## 4. TECHNOLOGY TRENDS

In this light, the latest technology and partnership trends are highlighted with a particular focus on successful identity

management and the provision of social services, in both developed and emerging economies.

The academic literature identified can be clustered into two general groups. Both focus on the importance of eIDs as a facilitator of more efficient and effective public sector production and service delivery through various technical means.

The first cluster is technically focused. Key have been security [23], [24], interoperability [25]–[27] and architecture [28], [29]. While technology developments are rapid, the academic literature seem to have had a particular focus on electronic identification enabled by ID cards (i.e. chip cards) in the 1990 [28], [30], [31], whereas blockchain and smart ID has emerged in the last few years. These are often conceptual in nature and do not necessarily include the technical detail seen in the earlier literature mainly [32]. The second cluster constitute a number of sub-groups including single case studies, particularly European countries, such as Austria [28], Denmark [33], Poland [24], India [34] and Iraq [35], the lack of eID as a barrier to the digitization of service delivery [27], [28] and personalization [4]. Other focus areas includes the importance of trust in national contexts [2], [17], [24] and perceptions [31]. Others have focused take-up [37] as well as different theoretical acceptance and trust models [38], but also the conceptual cases made for e.g. smart and blockchain enabled identification and signatures online.

While many have argued in favour of personalised and proactive service delivery, UNU-EGOV research highlights that most public service delivery is still fragmented and organised in administrative silos [7], [19], [39]–[43]. While the last three decades have seen countries and authorities increasingly move towards single points of entry – such as one-stop-shops and shared service centres – and providing services on multiple channels and devises, there is only limited evidence of actual personalisation. That said, the public sector still has some way to go to provide really user-centric and personalised services: Services which are accessible, easy to use, and use everyday language [4], [7], [20]

In this connection, digital identities and signatures are early enablers emerging in the the 1990s and early 2000s. Initially, secure login was based on a simple login and password, but not requiring three-factor authentication. To date, most eID solutions have been based on chips in physical ID-cards or various code generators [3], [5]. With the popularity of smartphones and tablets, ID-cards requiring card readers have been problematic and sim-card based mobile versions have gained popularity. Essentially, ID-card based solutions have been inoperable with service access on mobile devices [5], [27]. That said, an ID-card based solution is relatively easy to use but does require card readers and for the user to install various drivers. Therefore, the usability is lower than a simple key-card solution like the one currently in use in Denmark, for example. In economic terms, the sim-card based solutions cost about €3.50 to issue, which is substantially lower than the roughly €24 chip-enabled ID-card. [30], [44]. Recent technology solutions, whether Blockchain-enabled or not, have focused on biometrics and apps [5], [18]. Voice recognition and fingerprint scanners have improved in quality and came down in price. That said, fingerprint scanners are generally only available as separate devices or on high-end smartphones and tablets, being a real barrier to home use. The usability barrier is thus similar to that of ID-card solutions and the required card readers or special code generators as often seen used by banks. App-based solutions are gaining in popularity. They are based on the electronic boarding card concept and generally include key personal details, a picture, and a QR code. Certificates are released and exchanged as with most other technical solutions [3], [5].

The key difference here is the price point. Once the backend system and databases are in place, solutions using stock app "wallets" can be as cheap as €0.30. The challenge for emerging economies is that smartphones are not yet the standard mobile device. In Sub-Saharan Africa, for instance, only 20% of mobile phones are currently smart. However, here SMS-issued codes can be utilised for sim-card based solutions [5], [45], [46].

While the technology, usability and price-points of eID and digital signature solutions vary, all are depending on a key precondition: that is, completeness, quality, and reliability of the population data. Without a reliable population register, no technical solution will be able to provide unique and secure physical or digital identification. Also, all technical solutions require internet connectivity by at least one of the involved parties to attest the validity of a digital identity. Digital identity and signature can provide easy, secure, and personal service access while being cheaper. However, there are strengths and weaknesses in all technical solutions. The technology is secondary and should not be chased. The completeness, reliability and quality of data are essential parameters. Cooperation between authorities can facilitate this. Essentially, the technical solution is unimportant REF.

## 5. PARTNERSHIP MODELS TACKLING CURRENT CHALLENGES

Multiple partnership and financial models for sustainable deployment and use of both electronic identities and signatures exist. Looking at different national experiences shows that someone must be mandated to ensure the development of key registers and enables like eIDs and digital signatures on behalf of the entire public sector. Similarly, the use of key enablers must across government must be ensured e.g. by mandated compliance of national identity management solutions, to optimize data quality and reuse said data [47]–[50].

National also experiences highlight that public-private partnerships for joint development, use and roll-out of eID is fruitful. As seen in countries like Estonia [27], [51]–[53], Denmark [33], [49], [54] or a micro-dependency like the Faroe Islands [50], cooperation with the financial sector is particularly fruitful when it comes to joint development, maintenance, funding, and roll-out. What such partnerships provide is a critical mass of users and volume of use. This benefit both the public and private sector partners. It is also advantageous for users as they only have to deal with one form of eID for secure and private access to key public and private services online. Depending on the technical

solution, cooperation with the telecom sector is also of interest, particularly in relation to sim-card based options. The lack of such partnerships to create critical mass and take-up is illustrated in the limited take-up of eID solutions in countries such as Japan [49], [55], [56], Georgia [48], [57], [58], and others [5].

Cooperation with the private sector and civil society organisations are also beneficial to capture and digitise unregistered individuals and entities when identified, in a collaborative cross-governmental effort. Essentially, different partners can cross-check a centralized and shared population register when engaging with end-users: if already included, a service request can be processed immediately; if not, registration can be made and the service requested can subsequently be processed. The benefit of this type of collaboration is the joint-reach of multiple partners, the speed with which unregistered individuals can be captured in the population register, and a sharing of the burden of doing so. In fact, this type of approach may not even require the allocation of additional funding or staff.

## 6. CONCLUSION

The research supports the importance of a strong, clear mandate to ensure the digital transformation. Multiple cases have confirmed the benefits of a politically-driven and motivated public sector modernization process. What research and national experiences also show is the need for high level of inter-governmental cooperation and decision-making. In short, a strong governance model, a collaborative and coordinated approach is required for the successful digital transformation; including with the private sector. A strong mandate of the mandated body in case of conflict or indecision is essential. This is particularly important to efficient and effective identity management in relation to ensuring the completeness and maintenance of population data, the quality of said data, data protection and privacy, access and reuse of population, and associated data across government on a once-only basis. The technology choices in relation to the actual eID and digital signature are shown as being secondary to data quality.

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