



ESSAYS

Technology in the Service of Development: The NADRA Story

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Foreword

Pakistan is a leader in the application of identification systems and technology to a range of development issues. The National Database and Registration Authority (NADRA) of Pakistan has become a central player in a number of program areas and has been internationally recognized for its expertise, including winning many awards for excellence. Pakistan has pioneered applications of biometric technology, successfully administering smart card programs for disaster relief programs and financial inclusion schemes for the underserved. In addition to its novel applications, NADRA's story is also one of effective programming to include traditionally underregistered communities, including tribal groups, transgender populations, and women. NADRA has experienced great success, but its example also shows some of the limitations to the effective deployment of technology when this confronts vested interests. Its experience offers many lessons for other developing countries.

This is the story of NADRA and its objectives, business model, and programs, as recounted by Tariq Malik, its former chairman and the architect behind its international recognition, to me and Sneha Raghavan at the Center for Global Development. In November 2009 Tariq Malik was awarded the ID Outstanding Achievement Award at the Global Summit on Automatic Identification in Milan. He received one of the highest awards in IT, Sitara-e-Imtiaz (Star of Excellence), from the president of Pakistan in 2013 for innovative citizen-centric ICT application and services rendered for the state of Pakistan.

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My Inspiration for NADRA

In early 2008 I was working in the United States in the area of ICT when I was invited to accompany Benazir Bhutto on her fateful journey to Pakistan as an election observer. After she was killed in a murderous attack, I returned to the United States, reviewed her e-mails, and thought deeply about my various talks with her. I noted 10 points on which she intended to take action if she came to power.

Benazir recognized that there was a trust deficit between citizens of Pakistan and the state and wanted to eliminate it. This involved, first, establishing a one-to-one relationship between citizen and the state. Second, she sought to empower women; third, to strengthen national security; and, fourth, to build a positive image of the country. Reflection on candid talks with her revealed a deep desire that she also wanted to strengthen democracy; improve government service delivery; reform governance; manage disasters effectively; combat corruption; and introduce transparency and combat crime.

It was said that Benazir might not have been killed had she not stood up in her car. This was a powerful metaphor for me – despite the risks, should she not have stood up for her objectives? Hers were objectives I believed in also. I realized that I wanted to find an avenue to implement them, so I started looking for jobs in Pakistan. One had become available in the National Database and Registration Authority (NADRA) as general manager of networks. In April 2008 I applied and was interviewed by the board of director generals and appointed, but when I joined they decided that I was overqualified. Within three months, they promoted me to the position of head of technology or deputy chairman. I presented these 10 objectives to the board and explained that NADRA could use its expertise in data and systems and could make a difference by setting our goals around these objectives. I argued that we should address each one by developing a technology product to address it. The board agreed, and I was given full authority to move forward.

The Origins of NADRA

To recap a little, Pakistan's first registration office was established by Zulfikar Ali Bhutto, Benazir's father, in 1973 under Article 30 of the Second Amendment of the constitution of Pakistan to perform identification and maintain the statistical database of the citizens of Pakistan. It was stipulated that every person should have a state-issued ID. When I reviewed old documents, I was amazed – he did not want only an ID document to simply record evidence of identity (EOI), but a system that provided an automatic census for informed decision making and to improve strategic planning for the country. In 1973, in a parliamentary session, Bhutto stated in parliament to the people of Pakistan, “Due to the absence of a full statistical database of the people of this country, this country is operating in utter darkness.” The government started issuing national identity card (NIC) numbers to its citizens in 1973. His vision was, in fact, not too different from the 10 points expressed by his daughter.

In 1998 the Nawaz Sharif government took the initiative to conduct the door-to-door census of Pakistan with the help of the Pakistan army. In 1999 the Pakistan army started contemplating merging two institutions, the Directorate General of Registration Pakistan (DGR) and the National Database Organization (NDO), to computerize census data collected and use it to issue computerized cards. A NADRA ordinance was promulgated with ID forms, ID cards rules, and regulations. Preparation began in 2000, but from 2000 to 2002 the program experienced difficulties. The “NADRA ordinance” came into being on March 10, 2000, by finally merging the DGR and NDO, and was introduced with the aim of reducing government interference in the process of registering people. The ordinance is comprehensive; it lays out a blueprint for how to register individuals. The government also provided some seed money on loan to enable NADRA to become financially self-reliant.

Registration was voluntary at the time and covered only adults 18 or above. They recorded manual thumbprints, but this proved to be inadequate for accurate identification. It was a paper-based personal identity system. Pakistan had many Afghan refugees, who started to pour in from 1979, and Bengalis dating from the 1971 separation of Bangladesh; there were also many Iranians living in the country. Many Afghans were able to obtain ID cards by deceiving the paper-based system, and there was no easy way to distinguish these false cards from the real ones. The years between 2001 and 2005 saw serious problems in the area of identification. Many genuine Pakistani citizens were without ID cards, many nonnationals possessed national ID cards, and there were many fake identities.

In response to these difficulties, my predecessor, Brigadier Saleem Moeen, had started researching the deployment of digital biometric technology, and by 2007 he had built a good foundation for a stronger system. The database was run in batch mode; if a person applied for an ID card, the batch to process the application ran during the night, comparing the captured thumbprints of the new applicant against the legacy data. The program imposed some basic business rules, for example, that the age of a person should be less than the duration of the marriage of his or her parents.

By 2008, we improved the data architecture to include the full set of 10 fingerprints and a digital photograph. This technology was powerful enough to enable full de-duplication of the national database and greatly reduced the prevalence of dual identities and identity theft. We asked the people to register and framed this in terms of a strategic partnership with the state, which in turn would recognize them as citizens. Registration was still technically voluntary, but people could not open a bank account without an ID card or obtain a passport or enter into any transaction with the state. An ID card was also needed to obtain a gas or electricity connection and to pay utility bills. These requirements made it very difficult to function without enrolling and caused people to register. By virtue of his post, the chairman of NADRA is also the registrar general of Pakistan, whose signature is on every ID. When I took over, NADRA was still based on an ordinance, but I requested parliament to approve it, and it became an act of parliament, under the 18th Amendment of the constitution. NADRA was lucky and blessed by very competent chairmen. I would give

credit to Major General (Retd.) Zahid Ehsan, Brigadier (Retd.) Saleem Moeen, and Ali Hakeem for laying out the solid foundations of NADRA.

NADRA's Financial Model

NADRA desperately needed a viable financial model. When I joined NADRA, it was left with only two months of salary. We decided that we would not ask for regular budget or for loans from the government as this would open the door to political interference. Instead, we would request a service fee rendered to the government and use our earnings to provide a cross-subsidy to the poor people of Pakistan to enable them to register free of cost. First-time applicants for an ID card would get the card free, but expedited service, within two weeks, would cost 1,100 rupees. We now earn money for a wide range of domestic services. For example, we charge banks around 35 rupees a head for authenticating an individual at the time of opening a bank account. Each individual fee is small, but when you have 55 million transactions, the amount generates significant income and in a sustainable way.

The business model has been very successful. In 2012–13 revenues were three times their level in 2007–8. NADRA now has 18,000 employees, 537 static registration centers, 15 registration centers for overseas Pakistanis, 236 mobile vans, and 74 semimobile units. We operate two data centers 150 miles apart, and a third one is planned to ensure that our data is secure. We run about 1,000 servers connected to 9,000 computers. We have issued 120 million identities and 97 million ID cards; the difference is the children, an area where we are still lagging. Our digital gallery includes 118 million facial images and 503 million fingerprints, making it one of the world's largest multi-biometric databases.

A public company was formed, NADRA Technologies Limited, registered with the Securities and Exchange Commission of Pakistan. It is wholly owned by NADRA and able to bid for contracts outside the country and earn revenues which could be plowed back to support our operations. We compete successfully for international contracts – income from foreign projects alone came to 17.6 million US dollars in 2013, which allowed us to further upgrade our infrastructure. In the last six years, we have been able to reinvest in our technology without accepting a regular budget from the government of Pakistan.

We also focus on employee incentives. I wanted people to be committed to working for NADRA, so we offered salary increases by creating a sliding scale salary structure that was better than that of the government. I introduced a reward and recognition system in which NADRA officers had incentives not to be involved in identity theft. One form of corruption in NADRA was that staff would often accept money in exchange for a token to jump ahead in a service line. To counter this, we created the system for fast-track service at a cost of 1,100 rupees and linked it to payments to staff, who received bonuses from money collected through this system, as an incentive. . Staff could also boost their pay by facilitating more transactions. Unlike government offices, they could keep NADRA offices open for as many hours as they wanted, subject to the manager's discretion. Between 2008

and 2013 the average salary at NADRA had increased by 131 percent. It is a perfect example how a just reward and recognition system can improve service delivery.

How We Increased NADRA Registration Rates – Especially for Women

In 2008 our rates of registration were not high enough to provide comprehensive identification. As soon as our resources allowed, I therefore made it a point to increase our representation to ensure that there would be an office in every district. We also made sure we would have the technical infrastructure to allow our mobile vans to go into far-flung areas to collect and transmit enrollment data on a daily basis, by making use of satellite communications. The static centers and van and semimobile units were organized into eight regions, each of which was headed by its own data infrastructure office, transmitting data back to the centralized database, which was located in Islamabad. This big data infrastructure through which the information could be exchanged with headquarters was named the Digital Video Broadcast System (DVBRCs).

Using this organization and technology, we rapidly increased registration from 54 million in 2008 to 98 million in 2014, including around 55 million men and 43 million women. While overall registration increased by 80 percent, the increase for women was 104 percent, relative to 65 percent for men. I made it a point in the registration campaign to stress that registration for women empowers them. If they wanted to be counted – as Benazir Bhutto had wanted – they had to let us count them. Overall we were very successful, but we faced some serious obstacles. In some regions we had to deal with the Taliban. We had to deal with terrorists. We had areas where a long-standing culture of male chauvinism would prevent people from letting us register women. Men would hold the hands of the women during registration, or not let us register them at all. I was persistent and sought to remove these objections. For example, we established 15 women-only registration centers, where all the staff were women, from the data entry operator to the manager. I would even send vans with women drivers to go into *hujiras* (area reserved for women only in a house) or areas ruled informally by warlords.

We incentivized women to register by making clear that if they were poor, they would be eligible to receive a subsistence grant from the Benazir Income Support Program (BISP) – a financial inclusion program geared towards the poorest of poor women. For a woman to register for BISP, they would need to register with NADRA for an ID card. They would also need this ID card if they wanted to go on their hajj pilgrimage, as it was a prerequisite to signing up for a passport. Similarly, we educated them on the need for ID to be able to exercise the vote, which involved running a campaign to assure them that they could vote how they wanted, even against the will of their husbands, and even when their husbands were not present. Many were thrilled to learn of these possibilities. When the first center was opened in Mardan, a region affected by the war, 3,000 women turned up on the first day.

To achieve universal coverage, we had to penetrate remote areas, beyond the reach of even mobile vans. We introduced motorcycle registration units and, where motorcycles could not go, man-pack units – I hired hikers, mountaineers, and skiers who could go into mountain areas and talk to the people there. Many living in rural mountainous communities did not see the need for an ID card because they had not interacted with the state in years. They were not interested in buying property or even going down the mountain to visit the towns. Through the hikers and mountaineers we explained that they could be eligible for social transfers and that, if needed, we would even open a BISP office on the mountain. We also explained that in the event of a disaster such as the 2005 earthquake, the government could use the ID system to provide a subsistence allowance. Once they understood the link between identification and social protection, they came in droves to register. We had to hire more mountaineers and hikers. It is pertinent to mention here that from June 2008 to December 2013, approximately 30 million Pakistanis got their ID cards free of cost.

In the process, we found some places where the state was totally absent. Azuchi, for example, was discovered by air force pilots in the foothills of the Kirthar Mountains. NADRA was activated and registered them quickly. They were thrilled as it was the first time the state actually bonded with them through the ID card. NADRA is often the first and only government office in certain districts, as we are present in areas that lack post offices, police stations, or any other representative offices of the government. To cite another example, Baluchistan experienced a tragic earthquake last year. We were the first responders because we had an office there, as well as mobile vans.

In addition to issuing general national ID cards in Pakistan, we issued special cards to citizens with special needs on the advice of the president, Asif Ali Zardari. We also wanted to document our diaspora. We registered 6.3 million identities of overseas Pakistanis through our embassies. This NICOP (National Identity Card for Overseas Pakistanis) card entitles them to transact with Pakistan and has some additional benefits. Similarly, the “Pakistan Origin Card” is issued to Pakistanis living abroad in states such as Germany and France that do not allow dual citizenship. They can transact with the government and enter visa-free despite relinquishing their Pakistani citizenship.

NADRA empowered minorities, as well, by easing registration for them. For example, Hindu marriages were recorded with the help of *Mukhis* (community leaders). Christian baptismal certificates were also accepted for registration. Similarly, Pakistan became the first Muslim country that allowed eunuchs to declare their identity as such (*Khawaja Sara*). All minorities are on voter lists, as well, and have equal voting rights. NADRA has empowered 1.3 million Hindus, 1.2 million Christians, and about 50,000 Sikhs, Buddhists, Parsis, Jews, and other minorities in the last four years. While registering minorities, my message was be counted, exercise your vote, and have your say in your Pakistan!

Towards More Sophisticated Smart Cards—and Universal Financial Inclusion

The Pakistani diaspora cards needed to be compliant with ICAO standards (9303 Volume 2) and with sufficient security features to be difficult to forge and hard to use for illegal purposes, such as human trafficking, illegal immigration, or other criminal acts through identity theft. I wanted to introduce the best identity document in the world. I researched and found that the German ID card was the best and at the time the most advanced card available. It became my passion to make Pakistan's ID card more secure than the German ID card, which has 28 security features; ours was designed to have 36 features. The contents on the face of the card are also in its chip; it has three ghost images, a machine-readable zone (MRZ), the flag includes microtext, and the colors change when the card is tilted.

The operating system on the chip was written by our own NADRA engineers indigenously. It is a passive chip, so it is not possible to track the owner. The chip includes a match-on applet that stores and matches the four best fingerprints and the digital photograph on the chip. The system is very secure; when you match information from the chip, it does not leave the chip itself. All you know is whether or not it matches, based on the applet. This gives confidence to card owners that their information is under their control, and they have the authority to allow access to this information for a service or product that they are entitled to. The card has other technical features and also provides a platform through which services can be delivered. These services can be enrolled through digital certificates, PIN, and token methodology. These include financial services – Pakistanis living abroad can send remittances by partnering with banks as an alternative to the “Hawala and Hundi System” (undocumented system), where all too often undocumented money is sent to terrorists. The card satisfies the Know-Your-Customer (KYC) requirements of the State Bank of Pakistan for secure money transfer.

With programs like social protection and health insurance in mind, we then moved to introduce a similar smart card for citizens inside Pakistan. I introduced the Smart National Identity Card (SNIC) in October 2012 to convert Benazir's dream of secure identification for biometrics-based voting, pension disbursement, social and financial inclusion programs, and other services like health insurance and keeping track of whether children are vaccinated or are not. This can be an effective vehicle to strike a strategic partnership between the state and citizens in a meaningful way. It can revolutionize governance by cutting intermediary channels and bureaucracy. As an incentive, we partnered with a national insurance company, the State Life Corporation of Pakistan, to offer insurance against accidental death for a nominal charge built into the ID card fee. I ran a campaign, offering citizens the choice of a simple plastic Teslin-based card or the new card with the built-in insurance policy. It was a huge success. One million people applied for smart cards in just eight weeks. Another selling point was that this card would be accepted as an identity credential in more than 100 international airports because it adhered to the ICAO rules for machine-readable travel documents.

Another feature is the QR code on the back of the card. It serves as another security feature: taking a picture of it and running a program decodes it to provide the same information as on the front and back of the card. The QR code also enables the card to be used for other applications such as e-commerce; platforms for iPhone applications were being developed when I was chairman. It does not require a lot of infrastructure to use; all that is needed is a machine that is capable of reading the card or a mobile phone that has the same capacity. I hope the current chairman will take it to the next level.

I strongly believe that by experimenting with information and biometric technologies and using NADRA's citizen database to Pakistan's competitive advantage, Pakistan has a unique opportunity to become the world's largest and most inclusive digital financial services market, with every household in the country connected to the integrated digital financial platform. It is my passion to see this happen, as it would convert Benazir's dream into reality. Benazir Bhutto was a strong believer that financial inclusion matters for the welfare of the poorest of the poor and for national economic development, and I believe this, too. Without formal financial services, the poor have to rely on informal mechanisms that are expensive, unreliable, and often exploitative. NADRA's smart card solution triggered a branchless banking revolution in Pakistan. Digital financial inclusion must be a priority for the current government, as leveraging NADRA's database can enhance its ability to optimize service delivery. The State Bank of Pakistan will be better able to monitor suspicious financial transactions when they are under the net of digital transactions, rather than outside in the untraceable cash economy. With citizen registration soaring to 98 percent, Pakistan has the necessary ingredients to achieve universal financial inclusion.

Identification for Social Protection

We soon began to use our ID technology to implement a variety of social protection programs. Since most of our beneficiaries were now uniquely identifiable, it seemed like a logical transition to use it in this way. Pakistan had not had a census since 1998, and although international organizations often conducted surveys to roll out their programs, there was no mechanism to preserve the data that they collected.

Internally Displaced People

The first opportunity came in 2009 when the government launched the military operation "Rah-e-Rast" to take action against terrorists in Swat and Malakand. In the wake of this operation, many people had to leave their homes, to be lodged in camps set up by government and welfare agencies and with host families. Many of their houses were destroyed, and many lost their livelihood. The government estimated the displacement cost at around 25,000 rupees per household. The problem was how to deliver assistance without pilferage and to offer an assurance to international donors that the money would go to intended beneficiaries. As stressed by the president, the recipients also needed to be able to

preserve their dignity. This would not be possible if they were expected to wait in long lines for handouts of rations or clothing.

In response, we used the NADRA database, sorting by the address field to identify potential beneficiaries in the Swat and Malakand regions. The government had come up with a 3R strategy: **R**elief (immediate), **R**ehabilitation, and **R**econstruction. We calculated that the total number of beneficiaries should be 396,653 and arranged to disburse 25,000 rupees to each internally displaced family using debit cards in tandem with biometric verification. We recorded the thumbprints of all who came to receive the first phase of immediate relief in the form of in-kind aid. The database had an architecture whereby it was easy to see who constituted the direct members of each family, so that we were also able to prevent two members of the same family from receiving the entitlement. The system would reject a member of the family who intended to claim assistance if another member of this family had already done so.

Not surprisingly, many people wanted to change their addresses to Swat in order to qualify for aid, so that we received a lot of applications for change of address. To resolve these cases, we reregistered people living in camps created by the army to ensure that they qualified. When people were reregistered, their fingerprints were taken again to check if there was a match with the citizen database. I also established a rule to the effect that for those critical three months nobody moving into the Swat-Malakand region would qualify to change their address – we did not believe that people would have valid reasons for moving into a war-torn area.

Eligible families were given ATM cards loaded with 25,000 rupees that were activated upon registration. Their purchases encouraged the private sector and helped boost the economy of neighboring districts that were not directly hit by the war. The program was viewed favorably by the United Nations and the World Food Program because it encouraged local distribution and saved them the cost of bringing in food and other in-kind relief by air. They calculated their contribution per family and went through us to allocate an additional 5,000 rupees on each card.

NADRA's system allows for two addresses – permanent and current. When people move they can change their permanent address once they decide to stay in their new location. This prevents people from claiming benefits from places they used to live in, even if they do not live there anymore. An unexpected and welcome consequence of the relief program was that people in war-torn areas who received money no longer wanted to move despite the difficulties. The social disbursements encouraged them to start new businesses in that area and stimulated the local economy rather than having the money leave to other provinces.

Another lesson that I learned was the necessity of having an effective grievance redress system. The process was not perfect, because there can be a variety of family structures. There can also be children without parents. In these cases we had to reorganize the children

as separate family units and to mark the eldest as the main beneficiary. We created similar special mechanisms for widows. I went on national television and asked for people to come to us with their grievances. Some complaints did not reflect deficiencies of the system. Because of the database, we were able to tell if members of the family had claimed the money without telling other members or if people were attempting to cheat the system by trying to claim it twice. The biometric system helped to deny access to relief funds to imposters. In one case, a person attempted to access relief 132 times but was denied and given authorized relief only one time, as was his right. The internally displaced people project was covered in the *Economist* of August 2009 in a story entitled “A Plastic Prop.”

Flood Relief

A second humanitarian crisis came in 2010. Pakistan experienced flash floods with over 20 million people affected. The prime minister called a Council of Common Interests – CCI – meeting with provincial chief ministers to discuss the potential use for NADRA and create buy-in among all provinces. We presented the possibilities and the limitations of the database usage. We wanted to use this database in a way that the personal information of the citizens would not be compromised. I compared cash disbursements in disasters all across the world, such as after Hurricane Katrina and the 2010 Haiti earthquake. None of these systems was perfect, and the most persistent problem appeared to be difficulty reaching the correct beneficiaries. My advice was for the affected regions to declare themselves as calamity-hit areas in accordance with Pakistan’s 1951 Calamity Act. Once again, we used the address field to sort by all the provinces that declared a calamity and created a consolidated fund with contributions from all of these provinces. The fund grew when international donors also chipped in, realizing that the program was transparent. The federal government offered to match an additional amount of money to each province that contributed to the consolidated fund.

NADRA set up 131 registration sites near the disaster-hit areas. In the event that people had lost their ID cards, as is likely to happen in the case of a disaster, we used our mobile vans to retake their fingerprints. The system would confirm who they were, so that we could issue them a new card. About 700,000 ID cards were reissued free of cost; 300,000 of the new cards were issued to women. Ironically, the disaster served as an opportunity to increase our registration numbers, as we registered many people whom we had previously struggled to reach. Under the Citizens Damage Compensation Program (CDCP), a partnership between Pakistan, the World Bank, and others, a total of 77 billion rupees was distributed to 2.84 million families, an average of over 27,000 rupees per family. We later repeated the process after another flood (2011), with similarly successful results.

In order to ensure that this system was sustainable, we wanted to create a structure to address future disasters. NADRA helped the government to create a division in the cabinet to use the best practices from NADRA’s own experiences and developed manuals of disaster management for future use. My intent was to leave a legacy of sustainable processes

which any government can invoke for emergency relief or disaster management. This structure was activated under the National Disaster Management Authority (NDMA), an existing organization. Under the NDMA, we have Provincial Disaster Management Authorities (PDMAs), creating a link from the federal government to the provincial governments to respond in such situations. These PDMA's have the authority to work independently and to invoke NADRA in the event of a disaster.

NADRA's model of cash disbursement using a biometric system was a big hit. Last year, the United Nations approached me to see if the same cash disbursement system could be deployed in post-conflict situations in Africa.

The Benazir Income Support Program (BISP)

Per Benazir Bhutto's vision, the elected government wanted to establish a financial inclusion program geared towards women living below the poverty line. But who were these women? Even though it could establish unique identity, NADRA did not have a mechanism to find out who was living below the poverty line. In the first phase of the program, all elected members of the National Assembly (regardless of their party affiliations) agreed to go back to their constituencies with a form to collect data on poor women on which we would run some business rules to try to gauge the legitimacy of the claims. The World Bank opposed this approach because it thought it would introduce political patronage into the program. The World Bank was right, but the government was right, as well. It did not want to wait until the World Bank completed its poverty scorecard survey but rather some immediate relief to a vulnerable part of the community that was suffering under immense inflation shock. Previous governments have rolled out similar programs/surveys (Tameer-e-Watan Program and Peoples Social Program) but failed because the survey results were not digitized, and, as such, their findings were not applied by local offices after the government's departure. I made it a point that this time the surveys must be digitized and preserved in the form of a relational database for use by future governments. NADRA stepped in. We agreed that the data could be collected by elected members of the National Assembly in their constituencies (as an interim measure), and then we would use advanced data analytics to determine how political, how true, and how accurate it was! The World Bank started its poverty survey in parallel but this time with a difference – NADRA partnered with World Bank to digitize the household survey.

Initially, some 4.3 million beneficiary forms were received from the politicians, but after running data analytics and screening, only 2.3 million were determined to be eligible for assistance. I came under heavy criticism from all politicians because we were able to identify some people who were not eligible due to NADRA's advanced data analytics. But when I explained why some out of the 4.3 million excluded (e.g., government employees, overseas Pakistanis, etc.) were not qualified, they agreed. I could feel the power of "big data" and data analytics. Real data was so convincing that it was even able to convince these politicians! When the World Bank completed its household survey, Pakistan's first ever poverty database

was born, and hence BISP switched to the World Bank's authentic, nonpolitical and real data. With increased survey data coverage, the number is increasing; new surveys using the World Bank's poverty scorecard have placed the number of eligible women at about six million. I suspect that this year this number could hit seven million.

Developing Payments Mechanisms for Social Transfers

The first tranches of BISP transfers were delivered with checks through the Pakistani post office system. However, bribes were frequently reported, and we sought a more efficient system of delivery; smart cards that would be loaded with money when a beneficiary was eligible for a transfer. At the same time, because we had 120 million mobile phones, we tested mobile-to-mobile transfers from the BISP office to the beneficiary. When the beneficiaries receive a code, they can go to an eligible store, which will provide them with the money. About 130 billion rupees were disbursed via money order, 16.7 billion via the BISP debit card, 5.25 billion using smart cards, and an additional 1.8 billion using mobile services.

But these new approaches had their problems, too. PIN numbers were involved, and people often shared them with others who would steal their transfers by pretending that the government had not loaded the card, under the guise of helping them get their money. Some people sold their cards to others, not understanding how to use them. I went on television and tried to educate people not to share their PINs and, if they had done so, to explain how they could deactivate their accounts. Some then started selling the cards and fraudulently deactivating them at the same time – the potential for deactivation created its own problems.

These services proved to be a catalyst for branchless banking in Pakistan. After 60 years of banking development, there was only one rural bank branch for every 20,000 rural people. Under BISP, some six million families will have been taken towards financial inclusion by way of Visa or debit cards or mobiles backed by bank accounts; BISP also provided a financial stimulus to the poor of some 108 billion rupees. Banks became increasingly interested in the possibility of educating a largely illiterate population on how to use smart cards, debit cards, and credit cards and incentivize savings for future needs.

Increasing Birth Registration

While Pakistan's national ID system has moved towards comprehensive coverage of up to 98 percent of the adult population above the age of 18, the rate of birth registration is much lower. I believed that a centralized ID system with very good technology like that of NADRA might help to accelerate these low birth registration rates.

The roadblock to increasing the birth registration rate was that this is the responsibility of the union council, the smallest jurisdiction under provincial government. I therefore developed a program with NGOs and the telecom sector in Pakistan to develop a mobile

application to facilitate preregistration. Pakistan has a high density of mobile phone users, so that any midwife or parent can use that application to create a preregistration in our database. NADRA's infrastructure, such as mobile vans, can then be alerted to go and register the child and take this record to the union council. This is one way that children can be registered through the collaboration of NADRA and these union councils.

Another approach is to set up a standard that all union councils can follow in accordance with NADRA's methodology. We created a program and provided union councils with both computers and software to register children. While our software is used, the certificate-issuing authority would still be the union council. All certificates would have the same standards. In Punjab, about 98 or 99 percent of union councils are issuing these standardized certificates; in Sindh, about 86 percent; in Baluchistan, 74 percent. In Khyber Pakhtunkhwa, around 98 percent are using the approach.

A birth certificate is also a social document that registers the child as a member of a family. We have relaxed our rules on the necessity of prior marriage or divorce registration to register a birth, and we also accept certificates from religious authorities in lieu of civil registration. There still needs to be a public awareness campaign around this, but we hope it is successful in increasing rates of birth registration in Pakistan.

In the case of children who have been displaced, lost their parents, or other similar circumstances, we have relaxed the definition of the parent. In these cases and similar ones, such as children born out of wedlock, philanthropic organizations may take care of the children. The institution taking care of the child can assign an alias name of a father that appears on the front end of the database, so that the child will not face any stigma from being parentless. On the back end of the database, however, we would know that this child is registered under a certain orphanage. In June 2013 we also started registering the orphanages and the children therein. I pushed back to register children at whatever age they are, so that we can have a snapshot of the demographic situation at any given time. If there is a child that we registered at age 5, when he comes back at age 18 for an adult registration, we would know that we registered him 13 years ago and would be able to compare data. Since biometric data do not become stable until the age of 14 or 15, we start taking biometrics at this age.

Elections with Integrity

Benazir Bhutto wanted to strengthen Pakistani democracy and encourage transparency in elections. In order to truly strengthen democracy, you have to engage citizens in a meaningful manner that makes them want to exercise their vote. In addition, electoral rolls should be free of errors. Looking at previous elections, I found it very ironic that the sanctity of the vote was not preserved, considering that Pakistan itself was not created by an act of war, but rather through the democratic act of a plebiscite. I was interested in using our database to find out more about the forces who wanted to manufacture consent in the

election system by engineering votes and rigging elections. The voter list was the main mechanism for such abuses. Cleaning the list of identity-less voters, duplicate voters, invalid entries, and the deceased would drastically improve the sanctity of the vote in Pakistan. At the same time one had to be realistic. No country has a perfect voter list.

If the NADRA database could be used as the foundation for the voter roll, there would no longer be duplicates as the system would only allow for one entry per person, as each voter would have a unique identity number, based on his or her ID card. I articulated this vision to each political party and brought them to a consensus that we needed legislation to allow the NADRA database to be used to clean the voter roll. There was then landmark legislation in parliament, agreed upon by all parties, that an ID card was needed to register to vote and also to cast a vote on Election Day itself. Unlike previous elections where voter registration would involve a massive door-to-door enumeration requiring people to fill out forms, we would print forms for each person in advance, and enumerators would then simply ask them to verify the information. This time the old voter list of 2007 was reconciled with the NADRA database, and the Election Commission of Pakistan reverified voter entries by a door-to-door reverification exercise. Hence, door-to-door enumeration replaced door-to-door verification.

The election was also a way for us to update our database and reconcile our existing voter list of 81 million people with the existing NADRA database that at the time included 85 million people. There were three phases in creating this database: door-to-door verification, a preliminary electoral draft roll, and then the final electoral draft roll. All documents in each phase were scanned and verified with each voter. For instance, if the door-to-door enumerator stopped by and showed you a family record, you could tell them that you have an additional voting-age sister since the last round of verification. This information would be transmitted to us, and we would send a mobile van to register this additional person. If an adult who used to live in that household no longer lived there, we would have to de-list that adult. This mechanism allows us to update the family connections and address fields in our database. The methodology behind the voter list to ensure that it was a fully transparent process was made available on the Election Commission of Pakistan and NADRA websites.

We found that the voter roll included 15 million voters without identities; 9 million duplicates (some individuals had registered more than 23 times!); and 13 million invalid identities. These 37 million voters – fully 45 percent of the voter roll – were expunged from the system, with the aid of the Supreme Court to ensure that this was done in accord with legal procedures. The voter lists were augmented with 36 million missing ID cardholders who became new eligible voters. These voters had received their ID cards in the last three years or had possessed ID cards earlier but were missing from the previous electoral rolls. We ended up with a total voter roll of 81 million citizens; a single voter list, with no inclusion or exclusion errors; one computerized national ID card; and, most importantly, one vote per person.

All scanned documents were digitized using double-blind data entry; the data is entered from two different locations, by two different data entry operators, and it is only added to the database if both these entries match. Each voter entry is linked with a document and business rule in the database. Voter migration history is maintained, and there is a complete audit trail.

Once the final voter list was completed, I liberated the list to make the electoral rolls available to the general public through SMS – mobile app; some 55 million voters checked their registration through this service. The total is now almost 60 million, because of further checking in the course of by-elections.

Pakistan was also the first country to register transgender individuals as transgender/eunuchs on the voter roll rather than male or female. I hired eunuchs as staff, to serve and register people like them, which helped to create an environment where they would feel comfortable. I ran a campaign to encourage minorities to have a stake in this election – minority groups had more than 10,000 votes in some 96 constituencies. NADRA was successful in registering 1.3 million Hindus, 1.2 million Christians, and other minorities (Sikhs, Buddhists, Parsis, and Jews). My goal and Benazir’s vision was to count them and empower them so that they could also be counted. I felt so satisfied when they were also registered to vote. This is the Pakistan our forefather, Quaid-e-Azam Muhammad Ali Jinnah, envisioned. These initiatives upset a lot of people and some groups, but voters came out in droves, and the election had a historic turnout.

The robust participation of voters in recent elections (56 percent turnout) has set a new precedent in Pakistan’s electoral history. Voter lists prepared using NADRA’s database and technology played a leading role in restoring faith in the democratic process. A series of technological interventions, spurred by the principle of “one CNIC, one vote,” facilitated the electoral process. It is important to document these reforms so that they are understood, preserved, and improved for future generations. The elections on 11 May 2013 were perhaps the most technologically intensive elections in the country’s history. Consider that the main technology interventions resulted in a more transparent electoral database recording each electoral transaction with details: weeding out unverified entries, multiple registrations, exclusion errors, inclusion errors, fake identities, and dead voters, on the one hand, and registering voters based on biometrics (10 digital fingerprints and photograph), together with recording who came to register them and who verified them, on the other. Designing, developing, and implementing an integrated scrutiny system – a tool to empower returning officers to scrutinize candidates for criminal convictions or loan or tax default – was also a first-time experiment. The jury is out on how well the scrutiny of candidates worked, but I can say that NADRA did try! But the most popular service developed by NADRA was its 8300 SMS service, which liberated the voter list. Some 55 million voters checked their vote registration details and polling station, which is simply unprecedented. This mobile example is considered to be one of the best examples of citizen engagement! All of these technology interventions were aimed at offering an error-free, clean, and digitized voter register with

voters' photographs, promoting access and the empowerment of voters, eliminating the trust deficit and thus increasing turnout.

At the same time we developed a system to scrutinize candidates contesting the election that would connect the databases of NADRA, the Federal Bureau of Revenue (FBR), the National Accountability Bureau (NAB), and the State Bank of Pakistan. This system was to enable the Election Commission of Pakistan to decide whether an individual was eligible to run for office according to Articles 62 and 63 of the constitution. These outline the necessary characteristics for anyone wishing to stand as a candidate for public office. The terms of the articles were often vague and difficult to pinpoint, so that I could not develop a business rule based on them. For instance, the articles specify that whoever runs for office should be a pious or good person. I consulted with legal experts and translated the requirements into a legally verifiable checklist. For instance, we interpreted the requirements as meaning that the candidate for office should not be a tax defaulter, a convict, or loan defaulter, and hence integrated the departments which contain the relevant information. Unfortunately, although the integrated database to verify the results of such tests exists, the system faced severe criticism, due to vested interests. As a result, the system had to be abandoned.

We also developed software that links the voter list with voter thumbprints to enable overseas Pakistanis to cast a vote. The advantages and disadvantages of this system are still being debated, since some believe that it gives certain political parties an unfair advantage over others. A consensus on this issue is yet to be developed.

All political parties agreed that NADRA was able to produce the most error-free voter list in Pakistan's history. But they raised some serious concerns regarding the conduct of the election (on Election Day), which was beyond NADRA's control. NADRA had empowered the voters to register, liberated the voter list so that voters could check their credentials and polling station, and had equipped returning officers and presiding officers to verify evidence of identity (EOI) on the voter lists produced by NADRA. But various political parties alleged that in some parts of the country the process of electoral management was compromised by the returning/presiding officers on the day of election.

Anticipating this possibility, I also wanted to introduce electronic biometric thumbprint verification at the point of voting. This would make it far more difficult to rig the election. This proposal was met with severe resistance. The Election Commission of Pakistan (ECP) is the ultimate arbiter of the voting process, and I did not have the authority to make this decision. The ECP has been taking thumbprints on counterfoils while issuing ballot paper for the last 30 years. They suggested that we take thumbprints of each voter on the voter lists before s/he casts a vote and then manually match them in case of post-election rigging complaints. We explained that it would be time-consuming and cumbersome, but elections were close and we had to rely on this methodology as a last resort. We suggested the use of magnetic ink and ink pads, so that if NADRA had to read thumbprints, it could.

Amidst allegations by some quarters of the ruling party that the process is being compromised, the NADRA database is again being used to assist election tribunals to investigate complaints. If allowed to continue, biometric verification of constituency results may expose the elements, circumstances, and people who have tried to rig elections in various constituencies, if indeed they did. Take the example of constituency NA 202. The election petition was filed by a challenger. After exhausting the litigation arguments of the parties, the election tribunal sent the voter list and counterfoils to NADRA for detailed technical examination. NADRA's analysis was a very detailed one. Advanced data analytics revealed stunning results of vote rigging. For example, one man voted 310 times – and from a women-only designated polling station! The election tribunal recalled the election and ordered a repoll. The challenger won the election.

These kinds of analyses empower election tribunals to make informed decisions. But the ruling party, the ECP, returning officers, and presiding officers came under heavy criticism from the public, the media, and other political parties. My family and I received threatening messages and letters. The Senate of Pakistan demanded that the government protect me and provide additional security due to the threats, but I never received any security or protection from the government. Unfortunately, the use of NADRA's database and technology for helping election tribunals to investigate the vote-rigging complaints coupled with the pressure tactics of the ruling party and threats to my life led to my ultimate resignation from NADRA.

Regardless of my personal decision and the remaining problems with the election, the experience shows that the use of identification technology in elections has value. It exposes people who commit electoral fraud, and the greater integrity of the voter roll has reduced the power of those seeking to manufacture consent. We have strengthened Pakistani democracy by restoring the confidence of the people that their votes would count and that anyone hijacking their vote could be held accountable since they could be identified. There is now demand by all political parties that thumbprints will be matched electronically in the next election. Before my resignation, I completed the last deliverable that I had set for myself: biometric systems for voting. NADRA has developed an integrated biometric system to verify a voter's identity before s/he votes. The system was tested on 5,000 voters in the province of Khyber Pakhtunkhwa with good results. This will be a significant improvement on the current electoral manual system.

National Security Applications

The importance of border control to national security is undeniable for Pakistan. If Pakistan cannot secure its borders, it cannot secure itself from terrorist attacks. The country should be able to identify those entering and exiting the country. Any national security policy that does not address entry and exit points is flawed.

We developed a homegrown system to computerize passenger data and link this to the passport database, similar to the US PISCES (Personal Identification Secure Comparison and Evaluation System). Pakistan had PISCES, but we wanted a better system, based on Pakistani laws and complying with international laws, as well. This should also connect to Interpol's stolen passport database, so that people who travel with passports reported as missing can be easily apprehended at entry/exit points. We came up with the Integrated Border Management System, which is currently deployed in all of Pakistan's airports. We are currently moving to the land border crossings, including the Khokhara Par train route to India, the Torkham border crossing, and the coastal highway to Ghat. This system will disrupt drug and human trafficking and other kinds of smuggling and is appreciated by the Pakistani national security forces and the international community.

NADRA has also assisted with forensic identification of terrorists and victims. To take one example, in June 2009 a suicide bomber destroyed an army vehicle near Muzaffarabad, killing two soldiers and injuring three others. NADRA was able to identify the bomber through his remains within three hours of the incident. Similarly, 67 victims of the Bhoja Air crash were identified through their fingerprints, as were 83 people killed in the Gayari relief operation.

Strengthening Tax Collection

Pakistan's tax system is notoriously weak. There are less than 800,000 registered taxpayers in a population of approximately 190 million. Since many transactions, including setting up a bank account, require an ID card, advanced data analytics using the predictive analysis of "big data" (transactions-based data) enables us to derive a picture of the economic activities of much of the population. Under an understanding with the Federal Bureau of Revenue, we were able to question disparate databases to identify frequent travelers, individuals having multiple bank accounts, residents of posh localities, owners of expensive vehicles, heavy consumers of utility services, individuals with arms licenses, and top professionals. Through such data mining, almost 2.4 million potential taxpayers without a National Tax Number (NTN) were identified, as well as an additional 1.2 million potential taxpayers with a NTN but not filing. We therefore estimated that the taxpayer base should be at least five times the number that were actually filing tax returns. If a fair number of those not paying were to pay legitimate taxes, we estimated that in just three months we could increase revenues by at least 100 billion rupees – US\$1 billion (about 0.5 percent of GDP), a sizable sum compared with funding that was being requested from outside the country.

Pensions, Payrolls, and Prisons

We similarly identified serious problems of double-dipping in the pension system and ghost employees in public service. In one province alone, we found more than 20,000 people as ghost employees. Some were getting paid twice over; others were in the system but did not have ID cards to confirm that they existed. Similarly, while running advanced analytics on

pension data, we found cases where persons were getting pension three times, as well as cases of ineligible pensioners getting pension. On the other hand, we also found some who had been falsely excluded from the pension system. The project is stalled due to the vested interests of some groups involved in this.

We tried to reform the judicial system, as well, by making use of our biometrics system. A very young man had been charged with murder, and biometric verification of a witness deployed at the Sindh High Court was used to provide evidence of the identity of the witness. I happened to be present at the court on the same day, for an unrelated project relating to the witness protection program. Despite media comments that the accused would get off because he was from a well-connected family, he got handed a life sentence – this in a country where every stage, from identification to arrest to conviction, presents numerous challenges to the prosecution. When he was eventually convicted, he showed no emotion or remorse. I was curious as to why this was the case and asked the judge if there was a possibility that he could expunge his conviction. The judge told me that although he could appeal for a review of his case, it was rare that judges made rulings against those of other judges.

The behavior of the recently convicted felon puzzled me, and I decided to investigate further. I deployed a team which took the fingerprints of other prisoners who were present. We matched them with the citizen database and found out that 41 of those prisoners were actually proxy prisoners rather than the individuals convicted of the crimes. After their convictions, with suitable payments the well-connected could substitute someone else to do time on their behalf! I was shocked! When I uncovered this information, it brought a lot of media attention on that day, but then the news was buried. I received threats from jail authorities and politicians. In December 2013, encouraged by the results, I started an ambitious journey to expand this exercise to all jails of Pakistan. I ordered all mobile vans to visit the jails and collect prisoner data to reconcile these cases, but I could not see this project through before my resignation. I share this story to show that biometric data has very valuable applications where the state can take corrective action. Pakistan does not have a monopoly over corruption. There are countries with far more corrupt judicial systems, and this experience can be replicated in other cases, as well.

The Approach to Privacy

Security versus privacy is a very hotly debated issue these days. In Pakistan's perspective, extraordinary security circumstances demand extraordinary steps to revamp governance. The state is eroding very fast, and it has to restore its writ to avoid collapse at the hand of outlawed and terrorist groups. At the same time, it is my strong belief that privacy of citizen data must be guaranteed in a fragile state like Pakistan. It is sad that Pakistan does not yet have an official data privacy law. In this situation I had to be especially careful to implement systems within NADRA in a way that protected the privacy of the citizens. I started to craft Pakistan's first citizen's privacy law with select lawyers and parliamentarians, but then I had

to leave. I made it a practice to obtain permission from NADRA's independent board for any developments or applications that would require data sharing. There is also a mechanism in place to obtain official approval for sharing NADRA data with other organizations, including government departments, on a case-by-case basis.

To take one example, when we were asked to help the Election Commission of Pakistan, we had to seek approval from the NADRA board on what fields we were allowed to share and what fields had to be kept private. Similarly, when the tax study was done for the Federal Bank of Pakistan, they already had a lot of data on who was paying their taxes and how much they paid but wanted us to help them identify trends on how many people were missing from this list and how much potential revenue. We have not shared the identities of these individuals with them, but rather provided aggregated data that can help them with policy making. In addition, data sharing needs to adhere to strict parliamentary processes. For instance, if there is a national security issue, NADRA does not itself evaluate the need for personal data to be shared with the law enforcement agency. In this case, the crisis management cell within the Ministry of the Interior makes this determination and submits a formal request for certain data fields. Such standard operating procedures (SOPs) allow for data sharing to be considered on a case-by-case basis and create a paper trail for the data that is shared. NADRA's administration is answerable to its board. I was also responsible to the Standing Committee on the Interior in the National Assembly, as well as the corresponding Standing Committee in the Senate. All of these bodies have to be kept abreast of any information-sharing needs.

As far as we know, there has not been heavy censure from civil society groups about NADRA's processes on privacy. We get a lot of positive feedback on the way we use this data and the positive implications these services have for minorities and marginalized populations. However, the case-by-case approach is not enough. More needs to be done on the legislative side, and it needs to take place quickly. I was working extensively on a law that protects the identity of the people. Had I stayed a little longer, I might have managed to see it through. My goal was to get the legislation completed in June 2014.

Towards this end, I also implemented software whereby every transaction is noted in the database. I was working towards my goal that each citizen would be empowered to check the database to see who has accessed his or her data. This is possible if all such transactions are recorded with the audit trail. For example, as an individual citizen, I should be able to put in a request to NADRA to see if the tax authorities have checked my data. This can help citizens to assert that they have paid their taxes or are eligible for a certain benefit. In addition, it also gives the right to citizens to know who has checked their personal information and for what reason. This also empowers NADRA management to oversee its employees to see whether they are involved in identity theft or not. I had a zero tolerance policy on identity theft and was criticized for firing 254 employees involved in violation of NADRA's policies and procedures.

Current and Potential Future Projects

We have also used our infrastructure for other applications. They include electronic highway toll collection, integrated border management, and a bill payment program called e-Sahulat (e-Convenience). This created a franchisee network of small-shop owners or students whom we provide with computers and software to set up a transactions point for people to set up their utility connections, such as gas or electricity, and pay the bill through this software to the utility companies. This program has helped utility companies to reduce delinquencies and also enabled the franchisees to earn some money for providing the service. This has helped a lot of out-of-college students to earn their tuition fee for continuing their education. It is a win-win innovation.

I was deliberately working to build this network of centers for services, a trend that is picking up momentum now in Pakistan. I wanted to use the same network for pension disbursements, so that pensioners do not have to travel to government offices to receive their pensions. Elderly people can now go to a nearby shop. We are working with banks and those shops to have a revolving credit where they can disburse their pensions and then claim it from the State Bank of Pakistan the same or next day using the software provided to them by NADRA. Now that the network exists, it can be used for a wide range of government services, such as health insurance, subsistence allowances, public health such as vaccination reminders, and so on. These programs are still ideas but can be implemented by subsequent generations of NADRA leadership now that the architecture and network are in place.

We have also teamed up with mobile companies to ensure that when you activate your SIM, you need to provide your unique identity and to link a biometric identifier with every SIM card. This would go a long way to combat terrorism, as mobile phones were used by terrorists and suicide bombers to detonate bombs and create mayhem. I wanted to restrict their space to operate. This way each mobile would be backed up with a unique but real identity. We are able to transmit information regarding SIM activation quickly and easily, which has disrupted the use of mobile phones for terrorist purposes.

Another application is to track student and teacher attendance. I strongly believe Pakistan needs dramatic changes to its education industry. For that, it is not just enough to ensure every child goes to school, but a check on teacher attendance is also required. Before leaving NADRA I was conducting a small experiment in Sindh on 26,000 students. We created smart cards for both students and teachers that they had to swipe upon entering the school building. This experiment was started in December 2013 and is still ongoing. In another application, I wanted to keep track of arms purchases. We ensured that people must have an arms license in order to own and carry arms. In all provinces, these kiosks and our offices were used to register individuals wishing to purchase arms, and then to register them again with their fingerprints once they get an arms license. I was starting to put together this database in November 2013, and wished to move to biometric registration, giving them a

smart card when they were registered and accounting for all new arms or cartridge purchases. This is another area worth implementing.

Exporting the NADRA Model: Bidding for Foreign Projects

Following on from NADRA's successful implementation in Pakistan, we decided that we would compete for projects to help set up similar systems for other countries. Private companies could only sell their products, but we aimed to sell an entire system as well as the strategy and governance model behind it. This strategy of creating a proven architecture for the governance of ID systems was a particular strength; it could not be offered by other companies competing for these bids.

NADRA has by now implemented many foreign contracts. Success requires a detailed understanding of the culture of a country and its level of capacity. We won the project to scan and digitize the citizen registration system in Sri Lanka. We have implemented a comprehensive civil registration system for Sudan, in Arabic. For this, we sat down with 73 people who had a good understanding of Sudanese customs and traditions to understand their societal institutions, such as marriage, divorce, and baptism, to learn their customs and how to construct business tools and document forms without disturbing these institutions. The key was that their certificates should more or less resemble the ones that they were using but be backed by modern digital technology. The adult ID card is managed by the federal government and is intended to be a system that encompasses multiple uses, including civil registration, births, deaths, and marriage, as well as passports and other aspects of identification. We created the system using object-oriented programming and by experimenting with technology to simplify the process. For example, we introduced the concept of mobile registrars with a kit and a briefcase – people go to a village, open the briefcase, complete with camera, register people, return, and plug the briefcase into the main server.

For Kenya, we developed a machine-readable passport system. In Bangladesh, we helped develop a national driver's license, and in Nigeria, an identity management system will be used to produce national ID cards. We also helped UNHCR come up with their first biometric ID card system, which they were interested in using in conflict areas. For this project we were able to draw on our own experience with refugees. As many as 1.7 million Afghan refugees have been registered in Pakistan. We provided them with ID cards in order to help them transact with the Pakistani state and empower them with identity so they can be protected under the Geneva Convention. We experimented with fingerprint, facial, and iris technologies in this project.

While NADRA's status as Pakistan's ID authority gave us valuable expertise to help us compete for contracts, our status as a public entity also constrained our flexibility. For instance, there was criticism that I was spending too much money on travel – however, we had to travel to help set up international projects, participate in conferences, and to win bids

in new parts of the world to finance NADRA. We ended up creating a completed address library for Sudan during the process. Similarly, NADRA won the passport-issuing system for Kenya. More than 70,000 machine-readable passports powered by NADRA technology had been produced by Kenya. NADRA also helped Bangladesh to come up with its first modern driving license. We won the Nigerian identity management system project, after companies belonging to developed countries failed to produce over 50,000 Nigerian ID cards. The Nigerian president last year inaugurated a system by processing his own ID card through a NADRA-assisted system. NADRA helped UNHCR to come up its first biometric refugee management system; 1.7 million Afghan refugees in Pakistan were registered with biometrics. They were empowered by their identity as refugees to avoid problems in the host country. I saw this as a way of ensuring Pakistan's compliance with the Geneva Convention. As I was moving very fast, winning international projects through international competition, the current government couldn't keep up with this pace and tried to enforce bureaucratic controls on an independent organization. Constraints on travel meant I missed opportunities to go to ICAO events and to win ID projects from new governments, such as those of Iraq and Libya. No matter how independent NADRA was financially, the government still had control over us to some degree. Government has also not always lived up to its promises to pay NADRA for services rendered, with some arguing that we were profitable enough to fund them. The government still owes NADRA billions of rupees for the services we rendered.

Conclusion: Optimizing Governance with Biometrics and Information Technologies

NADRA's success story reflects how organizations can be turned around. NADRA has become the backbone of governance in Pakistan. The systems it has enabled enforce transparency in almost every facet of life where the state touches the lives of its citizens. From birth certificates, to ID cards, to marriage, divorce, passports, and death certificates, and electoral rolls – it maintains the identity, recording its unique evidences and helping the state to enforce transparency. It empowers citizens, minorities, vulnerable communities, and, above all, the state to enforce rights and to roll out targeted subsidies to vulnerable communities. I was able to do what I have done because of the passion ignited by Benazir Bhutto's dream. Her dream resonates with that of Dr. Martin Luther King Jr. Though I took inspiration from her, I never let political influence guide my job. I ensured that NADRA allowed the government of Pakistan to treat all citizens equally, no matter what their political or religious orientation was. Governments are about people, who have unique identities, and NADRA helps the state of Pakistan to build its capacity to improve service delivery. My overall vision for NADRA has been for it to provide an effective identity management strategy for Pakistan. With unique identity as the foundation, we can roll out reforms more easily and transparently, eliminating any political expediency.

NADRA's identity management system with its associated identity card is the single version of the truth, recording all evidence of personal identity. Systems for passports, civil

registration, and other documents should all originate from a single version of the truth. This was very far from the reality we faced at the start, a reality that often originated from people's attempts to cheat the authorities. A single identity truth could provide a mechanism to save a lot of money on social support and cash transfers – the ability to engage citizens and dispense these services directly to individuals is a huge benefit. We estimated potential savings of more than 50 billion rupees from eliminating cheating and false positive and false negative identification errors from such programs.

My vision is for NADRA offices to become citizen service centers, rather than just registration centers. They would activate health insurance, register vaccinations, help facilitate scholarships, and offer access to a range of other government services, cutting the intermediaries like bureaucracy and hence striking a direct partnership between citizens and state. Only the innovative use of a mixture of biometrics and information technology can achieve this result. This is the true manifestation of e-government. I wanted to use the same offices for computer literacy programs in the evening, to impart training and engage the citizens to make use of the Internet to better their own lives and careers. I wanted to make it easy for citizens to transact with the state and easy for the state to enforce the law, rather than to be an absent state.

Standard identity cards have limits but cannot be replaced overnight. We have to incentivize smart cards to make them more popular and encourage their adoption. For instance, creating a smart card for children allows international recognition and may facilitate government services specifically geared towards children, including vaccination and healthcare records as well as education, immigration, and building experience with financial transactions. “Big data” in general is an area where Pakistan has an opportunity to strengthen governance. Teaming up with the World Bank allowed us to develop the poverty scorecard, which can identify not only people living below the poverty line but also the lower middle class. This allows us to roll out tiered subsidies for different income groups, based on their own specific needs. Having a biometric database alone is a start but is not enough to create an effective state.