Groundbreaking Smart Contracts in Land Registration: The NAPR Experience

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SUMMARY

The digital transformation of public administration has accelerated the modernization of land administration and property registration systems worldwide. Georgia represents a notable case in this transition through the introduction of the Smart Contract by NAPR platform.

The first successful property transaction through a Smart Contract by NAPR was conducted on November 6, 2024, in which a Georgian citizen residing in Sweden and a Georgian citizen located in Georgia concluded a fully remote sale and purchase agreement for real estate located in Tbilisi. The transaction, valued at 440,000 GEL (160,000 USD at the time of transaction), was completed through simultaneous digital contract execution, electronic property registration, and integrated financial settlement. The case demonstrates how artificial intelligence-based identity verification, and automated business process integration can eliminate the requirement for physical presence while maintaining legal validity, transactional security, and operational efficiency.

The paper further explores the institutional role of NAPR as a leading digital governance agency providing more than 300 public services through both physical and remote channels. Particular emphasis is placed on public–private cooperation, including the integration of AI-driven biometric identity verification and liveness detection technologies. A case study is presented highlighting challenges related to biometric verification following significant physical changes in user appearance, illustrating the importance of balancing system tolerance with high-precision identity authentication standards. The findings demonstrate that Smart Contracts address key inefficiencies in traditional real estate transactions by reducing administrative costs, increasing accessibility for citizens abroad, strengthening transaction security, and enhancing transparency. Additionally, the platform illustrates the potential for broader digital ecosystem development extending beyond property registration to financial and commercial transactions. The Georgian experience provides valuable insights into the implementation of AI-supported digital identity verification and fully remote legal transaction frameworks, offering a scalable model for digital land administration and e-governance.

Groundbreaking Smart Contracts in Land Registration: The NAPR Experience

Nika JASHIASHVILI and Elene GRIGOLIA, Georgia

1. INTRODUCTION

The administration of immovable property has historically depended on the physical presence of the parties: the buyer, the seller, sometimes their representatives, the registrar and in many jurisdictions, a notary or a lawyer, all gathered in one place to sign, certify and submit documents. For most of the last century this was the only practical way to provide the guarantees of authenticity, capacity and free will that registration requires. The combination of secure remote identification, qualified electronic signatures and direct integration with banking systems has, for the first time, made it possible to disrupt the process without compromising the legal protections that come with it.

Georgia, through the National Agency of Public Registry (NAPR), has built a service that does exactly this. The Smart Contract by NAPR is a fully remote, single session product that combines reservation, AI supported identification, contract preparation, electronic signing, secure payment and registration into one continuous workflow. The service was launched on 24 October 2024. The first transaction, the sale of a property in Tbilisi by a Georgian citizen residing in Sweden to a buyer located in Georgia, was concluded on 6 November 2024 for a price of 440,000 GEL (approximately 160,000 USD at the time). Eighteen months later, the service has handled hundreds of sessions, supports three transaction types, with many more in the pipeline and reaches Georgian citizens in more than twenty countries.

This paper describes how the service works, the architecture and partnerships behind it, what the operational data so far indicate and one of the more instructive cases the project has encountered. The intention is to share lessons relevant to other land administration and e-governance agencies considering similar services, rather than to present a finished blueprint.

2. THE NAPR SOLUTION

NAPR is a legal entity of public law operating under the Ministry of Justice of Georgia. It registers rights to immovable property, mortgages and other encumbrances, business entities, political associations and a broader activities that includes more than three hundred services in total, delivered through public service halls, community centers, territorial offices, authorized users and online channels.

Georgians who live or work abroad and who account for significant share of property buyers and sellers, could only complete a transaction by issuing a power of attorney, travelling home for the signing, or hiring a representative. Each of these options carries cost, delay and risk. Cases of fraudulent powers of attorney, disputed sales and intermediaries acting outside their

authority do reach the courts and even when they do not, the perceived risk discourages legitimate transactions.
Two further problems were less visible but equally important. First, the parties typically settled the purchase price without any direct connection to the registration outcome, which meant that a buyer could pay and then find that the registrar had refused or suspended the application. Second, the conventional process required several interactions with notaries, banks, real estate agents and lawyers, each of which charged its own fee and added its own burden. The Smart Contract project was designed from the outset to address all three issues at once: the requirement for physical presence, the gap between contract and settlement and the abolition of intermediaries.

3. CONCEPT AND DESIGN PRINCIPLES

The project adopted four working principles. Each shaped concrete decisions later on.
The first was autonomy of the parties. The buyer and seller or the owner and the bank, should be able to complete the transaction without any intermediary other than NAPR itself. This excluded notaries, brokers and lawyers from the critical path. Identification had to be at least as reliable as a notary's. The contract template had to be sound enough to use without legal review. The registrar's questions, normally posed in writing, had to be presented to the parties in plain language during the session.
The second principle was end to end financial integration. The price had to move through the same workflow as the registration, not in parallel to it. This was achieved by integrating with JSC Bank of Georgia, using an escrow account that holds the purchase price during the registrar's review and releases it only after the registration outcome is known. If the registrar approves, the seller is paid automatically. If the registrar refuses or terminates the case, the funds are returned to the buyer. The same logic, with adjustments, applies to mortgage and combined purchase-and-mortgage transactions.
The third was the use of microservice architecture. Smart Contract was one of the first NAPR projects designed from the start for a microservice environment, partly as a deliberate exercise in moving away from monolithic legacy systems. Document generation, electronic signatures, file storage, video recording, SMS and email and identity verification are each provided by separate services that communicate over REST APIs.
The fourth was AI-supported but human led identification. The session is not an unattended workflow. A trained NAPR operator joins the video call, walks the parties through document capture and the dynamic selfie step, can re-initiate verification when needed and can stop the session if anything looks wrong. The AI does the matching, the operator does the supervision, as the case study in section 6 will show.

4. ARCHITECTURE AND TECHNOLOGY

The Smart Contract platform consists of two front-ends and a number of back-end services. Citizens reserve sessions on napr.gov.ge through the public facing booking module. Operators

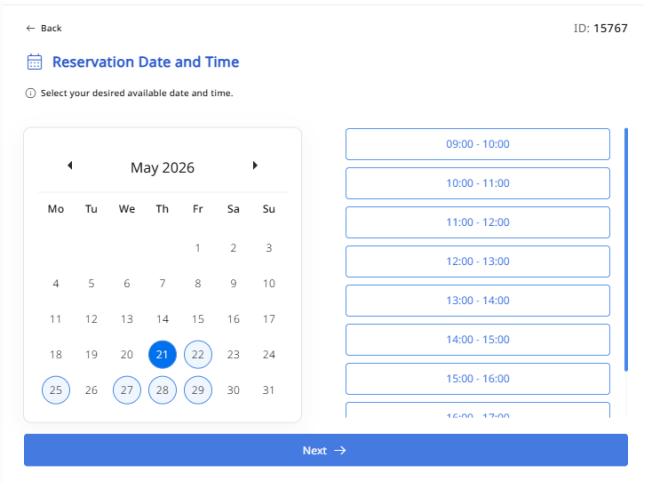
conduct sessions on office.napr.gov.ge, an internal platform that handles session management, contract editing and request submission.
External integrations are central to the architecture. Identomat, a private vendor specializing in AI driven identity verification, supplies the document and biometric checks. The Public Service Development Agency (PSDA) provides authoritative civil registry data, including photographs, document validity, MRZ and the personal identifiers used to corroborate Identomat's match. JSC Bank of Georgia provides escrow services, transaction processing and account verification. In the future more commercial banks will join the ecosystem. Reservations made by bank representatives, which apply to mortgage and combined transactions, flow through a separate API rather than the public booking page, with bank-specific rules on reservation windows and same-day execution.
The session itself is recorded end to end. The audio-video recording is stored in object storage and attached to the registration application alongside the signed contract. The registrar reviewing the case therefore has the complete record of the session, including the identification steps and the verbal consent of the parties. The contract is certified with a qualified electronic stamp through PSDA's signing microservice before being attached to the application.
The service is designed to operate twenty four hours a day, seven days a week, although sessions are scheduled within working hours.

5. THE BUSINESS PROCESS

The business process unfolds in four stages: reservation, identification, contract preparation and payment.

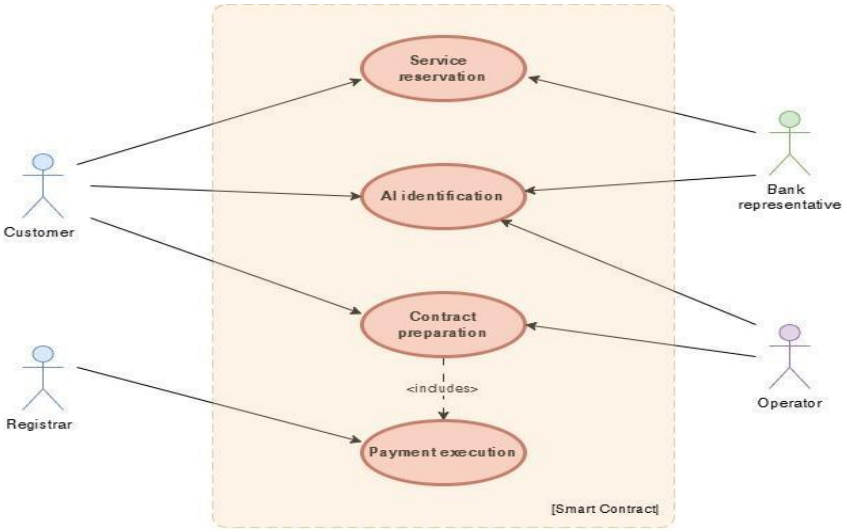
5.1. RESERVATION

A buyer, seller or third-party representative opens the Smart Contract module on napr.gov.ge, enters the cadastral code and personal data, receives a one-time SMS code to verify the phone number, adds the second party (and up to ten parties in total), selects a date and time slot and confirms. Time slots are normally offered between 9:00 and 17:00 the following day. Where a bank initiates the reservation, for mortgage and purchase-and-mortgage cases, same-day slots can be requested through the API. The bank holds three time slots for thirty minutes before confirming one of them. After confirmation, the system sends notifications by SMS and email containing the reservation number, the date and time and a link to the service terms.



5.2. IDENTIFICATION

Fifteen minutes before the session begins, the parties receive the session link. They join the video call, accept the recording terms, and are guided by the operator through the two-step Identomat check. The first step is document capture. The citizen selects ID card or passport, places the document inside an on-screen frame, and the system takes the photograph automatically once the document is correctly positioned. Both sides of an ID card are required. For a passport, the main page is sufficient. The second step is a dynamic selfie used for liveness and similarity. The face is placed inside an on-screen oval and the system again takes the photograph automatically.



The selfie and the document image are then compared with the photograph and document data held by PSDA. The system checks that the document is valid, in the sense that it has not been reported as expired, stolen or forged and that it belongs to the person in front of the camera. A similarity score of 85 per cent or higher is treated as a successful match. Up to five attempts are permitted. If all five fail, the operator terminates the session, since under the Public Registry instructions the absence of a successful identification is a ground for ending the transaction process.

5.3. CONTRACT PREPARATION

Once both parties are identified, the operator confirms the property details (address, area, ownership form, scope of sale) and informs the parties of any restrictions or third-party rights, registered at the moment of session start. The operator then enters the price, selects the service term and fee and requests the bank the parties' accounts. The parties confirm, by stating the last four digits, which account is to be debited and which credited. The system then generates the contract from a template, the operator reads it aloud while the parties review it on screen and the parties confirm by checking the relevant boxes and stating their consent verbally. If a party does not agree, the operator can produce a revised version of the contract, without limit, until the parties either agree or terminate the session.

After the parties have signed, the contract is signed with the qualified electronic stamp. The application is registered in NAPRWEB, which assigns a twelve digit case number and the bank is instructed to move the price into the escrow account. The audio and video recording is

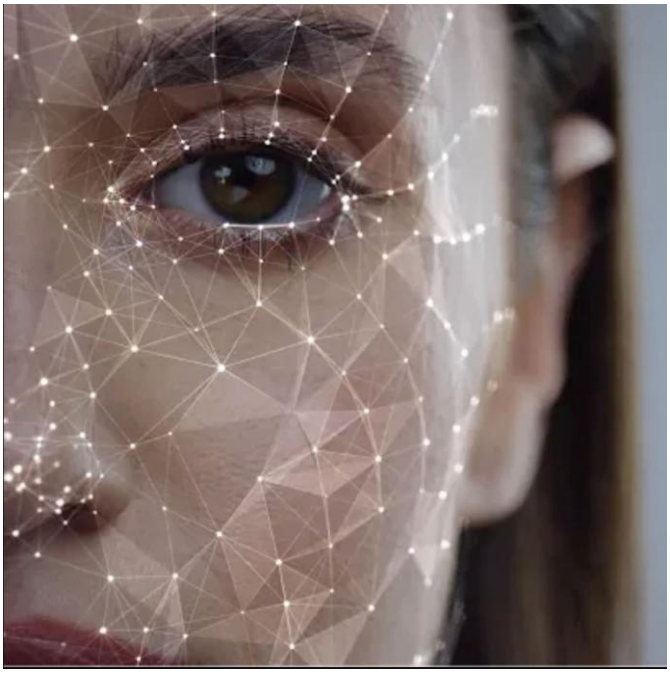
downloaded from Identomat servers and attached, together with the certified contract, to the registration application.

5.4. PAYMENT

The escrow account holds the funds while the registrar reviews the application. If the decision is positive, the price is transferred from escrow to the seller. If it is negative, the price is returned to the buyer. For purchase-and-mortgage cases, the parties choose between standard transfer (after the registrar's decision) and instant transfer (when the application is accepted for processing). Mortgage-only cases follow a parallel logic, with the loan amount rather than a purchase price.
A six month limit on the escrow service means that, if registration is suspended and not resolved within that window, the system automatically renews the case, the registrar terminates it and the bank returns the funds to the buyer.
This closes prevents transactions from dragging for years without resolution.

6. THE IDENTFICATION CASE: WHEN FAILED VERIFICATION IS A SUCCESS

In the course of operations, one session produced a sequence of failed verifications that, at first sight, looked like a system fault. A Georgian citizen completed the document step without difficulty, but the dynamic selfie returned a low similarity score on every attempt. The operator followed the standard procedure: improve the lighting, remove a headband covering part of the forehead, look directly at the camera, hold a neutral expression, center the face inside the onscreen oval. The match score remained below the threshold across all five permitted attempts.



The session was terminated and reviewed. On follow up, the citizen explained that, since obtaining a biometric passport in 2020, they had undergone several plastic surgeries that altered key biometric markers, including the eyes, nose and jawline. The image stored in the chip of the passport, and the person in front of the camera, no longer matched closely enough for the algorithm to confirm identity.
This is the result everyone wants. A face matching system has to tolerate ordinary

variation, such as ageing, weight change, facial hair, makeup or glasses, without flagging a legitimate user as an impostor. At the same time, it must not be so tolerant that it accepts a face that has been substantially altered, by surgery, deepfake or by another person standing in for the registered citizen. The mismatch in this case was not a failure of the technology. It was the technology doing what it was supposed to do.

The case has practical consequences. NAPR's procedure relies on three basics: the document presented in the session, the live face in the video and the identification data held by PSDA. Where any of the three is materially out of date, the citizen has to update the underlying record before they can transact through the Smart Contract. This is a small inconvenience compared to the alternative of widening the threshold and admitting a class of fraud that current fraudster tools (face swaps, synthetic identities, AI-generated personas) increasingly exploit. Identomat's system combines facial matching, liveness detection and anti-spoofing in one integrated workflow precisely without producing unmanageable false positives.

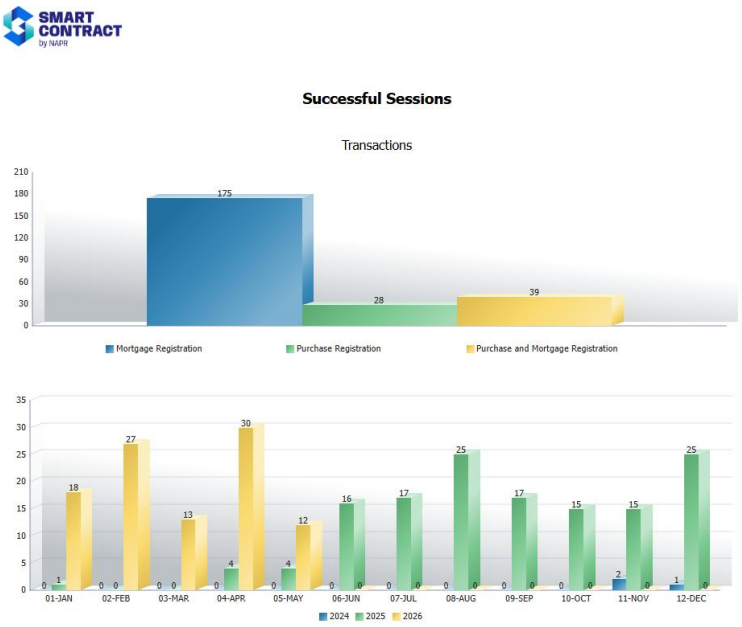
For other agencies considering similar services, the lesson is straightforward. The reliability of remote identification rests as much on the human supervision around the algorithm, the retry policy and the post-session review, as it does on the algorithm itself. Building those layers takes time, but it pays off when the non-standard case appears.

7. OPERATIONAL DATA AND OBSERVATIONS

By May 2026, the Smart Contract had completed 242 successful sessions: 175 mortgage registrations (72.3 per cent), 39 combined purchase-and-mortgage cases (16.1 per cent) and 28 stand-alone purchase registrations (11.6 per cent). The first three sessions took place in the closing weeks of 2024, 139 in 2025, and a further 100 in the first five months of 2026.

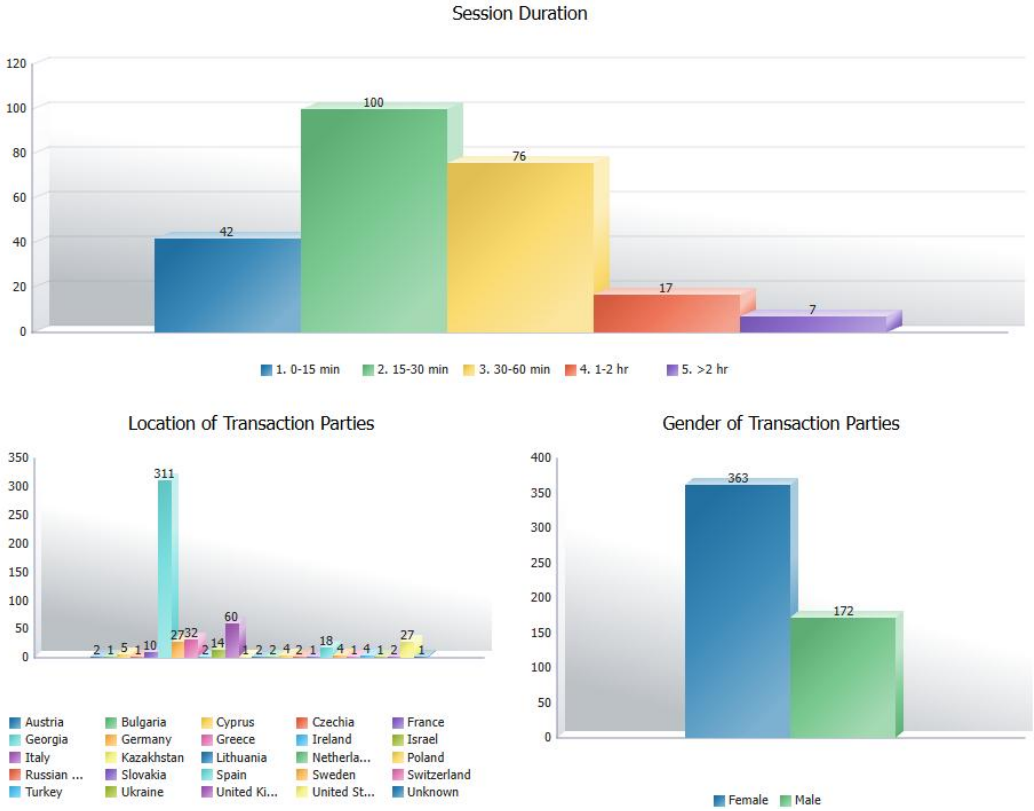
The data, taken together, support several observations.

Mortgage transactions dominate. When the project was being planned, the obvious use case was the diaspora purchase: a Georgian abroad buying or selling a property at home. After the launch of the mortgage transaction in April 2025, however, mortgage cases quickly became the largest category. By April 2026, the typical month was producing 25 to 30 mortgage sessions and only a handful of purchases. Mortgage sessions are dominated by transactions with Bank of Georgia, in which the bank's representative initiates the reservation and the owner joins the session remotely. The shift suggests that the most immediate



operational benefit of the service is not in cross-border transactions, where it is most visible to the public, but in the everyday domestic credit business of the banks.

Cross-border participation is broad but concentrated in Georgia. Of 535 transaction parties recorded by location, 311 (58.1 per cent) were located in Georgia and 224 (41.9 per cent)



abroad. Twenty-two countries are represented in the data. The largest sources of overseas participation were Italy (60), Greece (32), Germany and the United States (27 each), Spain (18), Israel (14) and France (10). The distribution tracks the established geography of Georgian emigration reasonably closely, although the prominence of Italy and Greece relative to traditional destinations such as Russia, which contributed only two cases, is striking. It may reflect both labour migration patterns and the willingness of those communities to engage with digital public services. One participant location was recorded as unknown.

The geography of transactions is concentrated on key areas. Out of 208 properties recorded by Smart Contract, 156 (75.0 per cent) were flats and 52 (25.0 per cent) parcels, with the parcels themselves dominated by agricultural land. Geographically, Tbilisi accounts for 117 properties (56.3 per cent), followed by the Black Sea cities of Batumi (18) and Kobuleti (14), with the remaining transactions spread across more than twenty municipalities from Telavi in the east to Zugdidi in the west. The concentration in the capital is unsurprising, since Tbilisi represents a comparable share of overall market activity. It also means that service can grow in the regions, where awareness is lower and bank participation in smaller markets limited.

The price data is inconclusive. NAPR records the purchase price as it appears in the contract, as it has no legal authority to verify whether the figure declared by the parties corresponds to the actual price agreed between them. The under-declaration of property prices, for tax or other reasons, is an ill practice that has unfortunately, been a feature of Georgian and many comparable real estate markets. Of the 208 properties, 150 (72.1 per cent) carry no recorded price, which is consistent with the dominance of mortgage-only transactions in which there is no purchase to value. Among the 58 cases with a declared price, the distribution is uneven: 11 sales were declared at under 10,000 GEL, 18 between 10,000 and 100,000 GEL, 18 between 100,000 and 200,000 GEL, and 11 above 200,000 GEL. The low-end group almost certainly reflects under declaration rather than actual transaction value. The bank mediated cases (purchase-and-mortgage in particular) are the more reliable source for analyzing real prices, since the figure has to correspond to the loan the bank is willing to issue. As the share of bank mediated cases grows, the Smart Contract data set may, over time, become a usable input for property market analysis as well as for informed decisions to be made on taxation.

The women are the primary beneficiaries. Of the same 535 parties, 363 were female and 172 male, a ratio of slightly more than two to one. This is consistent with earlier findings from a matrimonial property study supported by NAPR, which documented that women are active drivers of the Georgian real estate market. The Smart Contract data reinforces that picture and suggests, that remote service delivery is not creating a new gender gap.

Sessions are short. The intended session length was 15 to 30 minutes. From 100 sessions (41.3 per cent) fell into the 15 to 30 minute group, 76 (31.4 per cent) into the 30 to 60 minute group and 42 (17.4 per cent) into the 0 to 15 minute group. Together these account for nearly 90 per cent of all sessions. Only 17 sessions (7.0 per cent) ran between one and two hours, and 7 (2.9 per cent) longer than two hours. The shortest recorded session lasted 7 minutes and 41 seconds. By comparison, a conventional in person registration takes approximately 1 working day for an overseas buyer once travel and notary appointments are taken into account.

Adoption is steady. Volumes grew between mid-2025 and early 2026, peaked at 30 sessions in April 2026. Some of this volatility is normal seasonality. Some of it reflects the effect of communication campaigns. Awareness, rather than capacity, appears to be the constraint at this stage of the rollout.

8. PUBLIC-PRIVATE COOPERATION

The Smart Contract is a clear example of a public-private partnership in which responsibilities are well distributed. NAPR provides the legal framework, the registrar function, the operator function and the integration platform. JSC Bank of Georgia provides the escrow service and account-level integration. Identomat provides the AI verification stack. PSDA supplies authoritative civil registry data and the qualified electronic stamp. The World Bank GRAIL project (Resilient Agriculture, Irrigation and Land) provided the framing under which the service was built and continues to be developed.

Each of these arrangements is governed by a formal contract. The architecture document itself was developed iteratively, revised in response to World Bank review comments, and approved

in the final week of April 2025. None of this is glamorous work, but it is the part of digital government that determines whether a product survives or quietly stops being used after launch. Communications and marketing have been a non-trivial part of the rollout. A promotional video published in late 2024 received over a million views on social media. A follow-up video in April 2025, showing a Georgian citizen's experience of buying real estate from abroad, added another million views across Facebook, LinkedIn and YouTube. The broader 2025 campaign produced approximately 4.2 million views over the year. A separate piece by the World Bank highlighted the service for diaspora users, emphasising that Georgians abroad can now buy and sell real estate in Georgia without relying on proxies. Volume figures of this kind do not occur without sustained communication, and they would not be sustained either without the underlying product working reliably.

Smart Contract was the lead Georgian item in the EuroGeographics Annual Review for 2024. NAPR has also begun consultations with Sakpatenti, the Georgian intellectual property office, regarding trademark protection for the product, with the longer-term ambition of offering Smart Contract as a software-as-a-service product to other jurisdictions.

9. NEXT STEPS

The roadmap focuses on widening the list of transactions that can be completed through the Smart Contract framework. The first non-property addition, business registration of an Individual Entrepreneur, was in the testing environment at the time of writing. Other likely candidates include further commercial transactions, the addition of banks beyond Bank of Georgia and integration with construction companies for the sale of new-built properties. Each addition can reuse the identification, signing and recording blocks, while only a transaction specific contract template will change.

In parallel, the project continues to refine the operator's tools, the administrator control panel, and the search functionality used to retrieve sessions for audit, dispute resolution and analytics. Two operational improvements that went live on 23 July 2025, namely the full automation of the electronic-stamp signature flow and of session-recording transfer to NAPRWEB, illustrate the kind of day to day updates that are made to fine tune the software.

10. CONCLUSION

The Smart Contract by NAPR has shown that an immovable property transaction can be concluded entirely remotely without compromising legal validity, financial security or the evidentiary record. The service has handled 242 transactions across 22 countries in its first eighteen months, has settled millions in GEL and has generated a body of operational data that is beginning to support meaningful analysis.

Three points stand out for other agencies. The first is that remote identification is now a solved problem in principle, but only when AI-based matching is paired with operator supervision, a tight retry policy and access to authoritative source data. The case of the citizen with altered facial biometrics, described in section 6, is the example of why all three matter. The second point is that direct integration with the banking system, rather than a parallel payment process,

is what turns a digital signing tool into a genuinely useful registration product. The escrow design closes the gap between contract and registration that is responsible for a large share of disputes in the conventional process. The third is that public-private partnerships of this kind succeed when each partner does the part it is best at, under a clear set of contracts and when none of the partners is asked to take on commercial risk that does not properly belong to it.
The model is replicable. Most of the technologies (biometric identity verification, electronic signatures, qualified stamps, escrow accounts, microservice integration) are commercially available in many jurisdictions. The genuine work is in the alignment of legal authority, banking practice and institutional process, which is essentially political and administrative work. Georgia's experience suggests that the work pays off, that citizens use the service when it is offered.

BIOGRAPHICAL NOTES

Mr. Nika Jashiashvili is a legal professional and technology regulation expert currently serving as the Chief Product Officer for the World Bank's "Georgia Resilient Agriculture, Irrigation and Land" (GRAIL) project. In this role, he coordinates three major digital components: the development of the Immovable Property Registration System (IPRS), the National Spatial Data Infrastructure (NSDI) and the implementation of innovative electronic services. Prior to this, he served as a Product Owner at the National Agency of Public Registry (NAPR) under the Ministry of Justice of Georgia. He managed the development of the "Smart Contract by NAPR" service, successfully guiding it from concept to its successful launch in October 2024. As CPO, he continues to oversee its further enhancement and will be sharing insights on the implementation and impact of this innovative service as a speaker at the FIG Congress 2026.
His extensive experience at NAPR also includes roles in legal drafting and systematic property registration. Nika holds a Bar Registration with a Civil Law Specialization and earned a Master of Law with Honours from Ivane Javakhishvili Tbilisi State University.

Ms. Elene Grigolia is an experienced, PMP certified project manager with an in-depth knowledge of the land sector working in public service delivery for land administration and innovation technology in the National Agency of Public Registry (NAPR), Ministry of Justice, Georgia. Among her professional achievements, Elene as a Component Lead, successfully completed a large scale $US50 million World Bank land market reform program in Georgia. Within this program Elene was responsible for overseeing and communicating results of the ICT assessment to key stakeholders, ensuring uptake and smooth implementation of the new systems as a basis for national systematic land registration rollout. Elene has a proven track record of working with government stakeholders and the private sector to collect data, analyze results. Currently Elene serves as a Project Manager at the World Bank funded Georgia Resilient Agriculture Irrigation Land (GRAIL) project administered by the National Agency of Public Registry of Georgia. GRAIL aims to enhance land administration service delivery and

building digital governance infrastructure by focusing on enhancing NAPR's IT Systems, Electronic Services and building National Spatial Data Infrastructure.

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