
DIGITISED LAND RECORDS: EXAMINING THE LEGAL VALIDITY OF ELECTRONIC TITLE

Harshit Kumar Verma, BA LLB (Hons), Bennett University, Greater Noida, Uttar Pradesh

I - ABSTRACT

The real estate governance models in India are changing dramatically, shifting from historic and manual "presumptive titling" to a comprehensive, technology-enabled digital system available at a central agency, the Digital India Land Records Modernization Programme (DILRMP). The Unique Land Parcel Identification Number (ULPIN or Bhu Aadhaar) and the National Generic Document Registration System (NGDRS) are just a few such breakthroughs, designed to create an indelible common land database compatible between systems. Some attempt such as the Unique Land Parcel Identification Number (ULPIN or Bhu Aadhaar) and the National Generic Document Registration System (NGDRS) seeks to create an immutable, interoperable "Land Stack. The differences in technology saturation however, and legal enforcement are tremendous.

The present paper is an attempt to assess the effectiveness of electronic land records that can be used for the purpose of getting absolute ownership. It dissects the system of friction between automatic land records and basic laws of their registration, namely the Transfer of Property Act, 1882, and the Registration Act, 1908, which fails to provide a sovereign guarantee of land property, but only a record of its transactions. Additionally, the study delves into the practical issues related to the newly enacted Bharatiya Sakshya Adhiniyam (BSA), 2023, addressing authentication and admissibility matters in dynamic digital khasras and e-certificates.

Lastly, it covers a conflict with constitutional aspects and regulations that govern the public openness of land registries and the protection of data based on the Digital Personal Data Protection Act (DPDPA), 2023. The paper believes that although much of the technical infrastructure is already in place and in good shape, but a strong legislative redesign needs to be carried out in order to create absolute statutory enforceability around automated records that are not open to property fraud.

II – INTRODUCTION

Since the time of the British, Land has been an uneasy component of the Indian legal system, and the right to it is one of the most difficult to establish conclusively in the country. This problem goes back to zamindari system of governance imposed by British rule which allocated the source of revenue to intermediaries and not establishing a direct chain of adjudicated ownership between cultivators and the State.¹ The zamindari abolition in independent India was in the 1950s which resulted in a hodgepodge of hastily prepared, handwritten revenue records, Records of Rights, Khasras, Khatauni and mutation registers, which were kept up village by village, possibly in the personal possession of the village patwari or talathi and susceptible to loss, alteration and simple clerical error. This revenue record was compounded by a second, parallel paper trail under the Registration Act, 1908, in that it recorded transactions, but not the title being transacted.² Seven decades later, the outcome is a system in which ownership is never fully determined, and instead is retrodicted transaction by transaction from an unstable paper archive so unstable that land and property disputes are the most important category of pending civil litigation in India, and individual disputes can outlive the litigants who initiated them.³

The Government of India's land records digitisation programme should be seen in this context and it cannot be understood simply as a technology project, but rather as a step towards fixing the evidentiary problems of a system that has been structurally unsound since its inception during colonial times. The National Land Records Modernisation Programme was launched in 2008 and then reframed in 2016 as the Digital India Land Records Modernization Programme (DILRMP) with the ambitious goal of replacing the myriad of village-level record-keepers and departmental silos with an Integrated Land Information Management System (ILIMS) where textual Records of Rights would be interoperable with geo-referenced cadastral maps, registration documentation, and revenue-court records, all real-time and available to central queries.⁴ The computerisation of the Record of Rights is now said to be complete in more than ninety-five per cent of Indian villages⁵, and a series of increasingly elaborate modules has been

¹ B.H. Baden-Powell, *The Land-Systems of British India* (1892)

² The Registration Act, No. 16 of 1908, §§ 17, 49, India Code (1908).

³ RS Legislative Research, *Land Records and Titles in India*, PRS Legis. Research (discussion paper), <https://prsindia.org/policy/discussion-papers/land-records-and-titles-india> (citing a 2007 World Bank study and NITI Aayog findings on the share and duration of land-related civil litigation in India)

⁴ Dept. of Land Resources, Ministry of Rural Dev., Gov't of India, *Digital India Land Records Modernization Programme (DILRMP)*, <https://dolr.gov.in/en/programmes-schemes/dilrmp-2/> (last visited Jul. 10, 2026).

⁵ Press Information Bureau, Government of India, *Bhoomi Samman: Platinum Grading Certificate Scheme for*

added to the programme since then: the Unique Land Parcel Identification Number (ULPIN or "Bhu-Aadhar"); the National Generic Document Registration System (NGDRS); and, as of December 2025, a pilot "Land Stack" that combines land, ownership, registration and building data into a single GIS-based platform.⁶

The central question that this article seeks to explore is whether there has been a corresponding change in the legal substance, whether in essence, India has created a faster and more searchable window onto the same century-old presumptive title regime, without tackling the dichotomy between registration of transaction and proof of the title it is presumed to contain. In November 2025, the Supreme Court itself provided a very clear answer to this question, stating that a sale deed is a mere presumptive evidence of the transaction, never conclusive evidence of ownership and observing the need for a coordinated legislative examination of how new technologies, such as blockchain, could be incorporated into a conclusive titling system.⁷ This observation leads to the following query in the remainder of this article.

III - THE LAWS AND THE "PRESUMPTIVE" PROBLEM

A. Transfer of Property Act, 1882 and the Registration Act, 1908

The starting point of all analysis in Indian land title is to note that the transfer of property, a conveyance in so far as it is a transfer of ownership, can be effected only by a registered instrument of conveyance under Section 54⁸ of the Transfer of Property Act, 1882, which provides that a transfer of property is effected by a registered instrument of conveyance, and that for a value exceeding one hundred rupees, a transfer of immovable property must be effected by a registered instrument under Section 17⁹ of the Registration Act, 1908.

But it is not the function of this statutory mechanism to certify the title being conveyed. The Court went on to describe the entire regime of property transactions in India, based on the Transfer of Property Act, 1882, the Indian Stamp Act, 1899 and the Registration Act,

DILRMP, PIB Release (Dec. 22, 2023)

⁶ Press Information Bureau, Gov't of India, *Land Stack and Glossary of Revenue Terms (GoRT) Launch* (Dec. 31, 2025), <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2210204®=3&lang=1>.

⁷ Samiullah v. State of Bihar, Civil Appeal (Supreme Court of India, Nov. 7, 2025) (not yet reported in SCC at the time of writing), as reported in Debby Jain, *'Property Purchase Traumatic': Supreme Court Suggests Use of Blockchain Technology to Make Land Registrations Easy & Reliable*, LiveLaw (Nov. 7, 2025), <https://www.livelaw.in/top-stories/property-purchase-traumatic-supreme-court-suggests-use-of-blockchain-technology-to-make-land-registrations-easy-reliable-309136>

⁸ The Transfer of Property Act, No. 4 of 1882, § 54, India Code (1882)

⁹ The Registration Act, No. 16 of 1908, § 17, India Code (1908)

1908, as a "colonial framework" that has caused massive litigation, inefficiency, and confusion, and noted that such a regime makes property purchase seem "traumatic" for a prospective buyer who must trace a "long chain of ownership" from the previous deed, spanning decades, "merely to establish a marketable" (but not a guaranteed) title.

The doctrinal reality which the digitisation programmes outlined in Part I should be judged against. If anything DILRMP, ULPIN and NGDRS bring with them in terms of speed and ease of access, they do not diminish the reality of Indian law which still registers transactions and not titles, a reality confirmed by the judiciary itself almost 20 years after the computerisation.

B. Information Technology Act, 2000

The second statutory barrier is where the underlying instrument is electronically created or executed. Taken in isolation, these provisions would seem to imply that Indian law does not pose any objections to a fully electronic land transaction (with the proviso that this is subject to Section 3A¹⁰ in the case of electronic signatures), which may make such transactions appear relatively easy to complete, at least from a legal perspective.

The important result is that the very type of instrument that has the greatest relevance to real estate practice, the conveyance deed is expressly excluded from the general validating provisions of the IT Act, read with respect to its First Schedule, that leave no doubt as to the scope of the Act's provisions. As it turns out, under the deliberate design of the legislature, the sale deed, gift deed or lease deed that actually transfers or creates the interest remains bound by the traditional workflow of execution and registration, even if the record that is created as a result of this execution and registration process is digitised.

Another related issue is the framework of the Indian Stamp Act, 1899, which remains applicable and which continues to be executed on the place-of-execution basis, according to which duty on any instrument which relates to immovable property is payable in the particular State in which the property is situated (even though electronic execution mechanisms have been introduced in several States, such as the Stock Holding Corporation

¹⁰ Information Technology Act, No. 21 of 2000, § 3A, India Code (2000)

of India's e-SBTR system).¹¹

C. Section 65B of the Evidence Act, 1966 to Section 63 of the Bharatiya Sakshya Adhiniyam, 2023

A third, different level of difficulty relates to the proof itself: the admission of an electronic land record as evidence in a title dispute, once it is created. For almost 20 years, the question has been determined by the provisions of Section 65B of the Indian Evidence Act, 1872, which allows a "computer output" to be produced without the production of the original, provided it is established that the computer was used regularly and properly for producing such computer output and that there is a certificate issued under Section 65B(4) of the Evidence Act, 1872 which identifies the computer output and describes the manner in which it is produced.¹²

For many years the meaning of Section 65B was not clear. The mandatory nature of the certificate was reiterated by a larger bench of three judges in *Arjun Panditrao Khotkar v. Kailash Kushanrao Gorantyal*, which also held that the certificate requirement could be dispensed with where the certificate-issuing party had no control over the electronic record-producing device, but this was itself overturned in *Shafhi Mohammad v. State of Himachal Pradesh*, which asserted that in the absence of a standard there was no basis for relaxing the certificate requirement.¹³

The essence of the Bharatiya Sakshya Adhiniyam, 2023 is the same as that of the Indian Evidence Act, 1872 and Section 63¹⁴ of the new Act covers the same field as Section 65B of the earlier Act. Section 63 of the new Act maintains the same structure as its predecessor Section 65B, but adds two refinements of direct relevance to land-record evidence. First, the definition of the originating device is expanded to expressly cover 'communication devices', putting mobile phones and the like squarely in the frame, relevant where title negotiations or a no-objection communication are conducted through electronic messaging, rather than a formal instrument.¹⁵ Second and more significantly for institutional users of

¹¹ The Indian Stamp Act, No. 2 of 1899, § 3, India Code (1899); Lawcurb, *Stamp Duty on Online Electronic Documents: Current Practices and Legal Uncertainties* (Nov. 19, 2025).

¹² The Indian Evidence Act, No. 1 of 1872, § 65B (India) (repealed 2024).

¹³ *Shafhi Mohammad v. State of Himachal Pradesh*, (2018) 2 SCC 801, *overruled by* *Arjun Panditrao Khotkar v. Kailash Kushanrao Gorantyal*, (2020) 7 SCC 1.

¹⁴ The Bharatiya Sakshya Adhiniyam, No. 47 of 2023, § 63, India Code (2023) (in force July 1, 2024)

¹⁵ *Id.* § 63(1); RK Dewan & Co., *Electronic Records Now Governed by Section 63 of the Bhartiya Sakshya*

government land-record portals, the scope of Section 63(4)(c) adopts a dual-certification approach, with Part A to be provided by the person responsible for the operation of the device, and Part B by a qualified 'expert' this dual-certification requirement was lacking from the earlier Section 65B(4).¹⁶

This has led to a more onerous procedure than under the previous Evidence Act for those wishing to rely on extracts of the RTC, which are now available to be downloaded, or on e-Khata printouts, or on digitally signed encumbrance certificates, because the litigant must now be ready to comply with a more rigorous certification regime than the old Evidence Act despite the fact that the underlying document is part of a government program to make records more available and certain. As at the date of this writing, the identity of the "expert" competent to provide the Part B certificate for a typical government land-record portal output is still, in the end, subject to a court ruling, and poses an active risk to practitioners advising on opinions of title that rely on those digitised records.

IV - DILRMP INNOVATIONS

A. ULPIN (Bhu-Aadhaar)

The most conceptually important change that was introduced in DILRMP is Unique Land Parcel Identification Number (ULPIN) which is popularly known as "Bhu-Aadhaar". The ULPIN process is inherently linked to the georeferenced co-ordinates of a land parcel and is generated using a fourteenth cent code, an alphanumeric code based on a survey number, sub-division number, village name and boundary description in relation to neighbouring parcels based on standards set by the Electronic Commerce Code Management Association (ECCMA) and the Open Geospatial Consortium (OGC).¹⁷ When the code is issued, it will be permanently linked to the boundary of the land parcel because the parcel coordinates are fixed even if the land is subsequently transferred and subdivided, the code remains the same and the parcel now has a unique and traceable digital identity for the first time.

Adhiniyam, 2023 (Jul. 7, 2025).

¹⁶ Bharatiya Sakshya Adhiniyam, § 63(4)(c); Corpotech Legal, *Changing Scope of Certificate as per BSA 2023 for Admissibility of Electronic Evidence* (Jan. 7, 2025).

¹⁷ Dep't of Land Resources, Ministry of Rural Dev., Gov't of India, *Unique Land Parcel Identification Number (ULPIN)*, <https://dolr.gov.in/en/ulpin/>

The unevenness itself is instructive: ULPIN's value proposition is that it creates an unambiguous, tamper-proof geographic identifier for every parcel of land, and the only way in which it can accomplish that is to accurately survey the ground on which each land parcel is mapped. If the underlying survey is flawed, the resulting geographic identifier may be flawed. The challenge of reconciling the data of century-old cadastral maps with the data captured by satellites and drones is a problem that is especially acute in States like Uttar Pradesh, Bihar, and Assam, where implementation has been slow.

B. NGDRS & Automation

The most important aspect of NGDRS for title practice is its connection with State revenue departments, enabling a registered transaction to give rise to an automatic mutation of the related Record of Rights, thereby eliminating the need for an application, notice and waiting period that has been used to obtain mutation. NGDRS has been rolled out in seventeen States and Union Territories, with 88.6 per cent of integrated Sub-Registrar Offices NOW able to be processed for automatic mutation on the day of registration.

This is, however, at odds with the recent Supreme Court definition of mutation as being outside the proper scope of a registering authority's functions. The Court's decision in *Samiullah v. State of Bihar* also clearly sets another boundary: whereas automatic mutation, which happens when a transaction is registered, is an administrative convenience, making it easier to record the downstream connection of the transaction to the Record of Rights, it does not and, as stated by the Court in *Samiullah*, cannot create ownership rights or validate the underlying title of a particular transaction. An automatically generated mutation entry does not have more weight in court than a manually processed entry, and isn't an automatic upgrade, it's just an administrative convenience.¹⁸

C. Land Stack Initiative

To support the Land Stack pilot, the Department also introduced a multilingual list of

¹⁸ Debby Jain, 'Property Purchase Traumatic': Supreme Court Suggests Use of Blockchain Technology to Make Land Registrations Easy & Reliable, LiveLaw (Nov. 7, 2025) (*Samiullah v. State of Bihar*, Narasimha & Bagchi, JJ.).

“Glossary of Revenue Terms” (GoRT) to standardise terminology like khasra, dag and pula across vernacular, Hindi and English as well as Romanised scripts without replacing State-specific terminologies, a small but essential measure toward data interoperability in a federal land-administration system that has been historically fragmented, technically as well as linguistically.¹⁹

Combined, ULPIN, NGDRS and the Land Stack represent the most technologically advanced land-records system that India has implemented so far, but as Part IV of this article goes on to discuss, this technological sophistication is analytically distinct from legal conclusiveness, and the Land Stack pilot will have to be evaluated on the presumptive-versus-conclusive-title framework that has been discussed in this article, not only on the basis of its own engineering goals.

V - THE FRICTION BETWEEN CONSTITUTION AND COMMERCIAL PART

A. Transparency and Privacy – Land Record with Aadhar and DPDPA, 2023

At heart, land records digitisation is the task of gathering large amounts of data. A fully operational ULPIN-based, Aadhaar-verified Record of Rights not just captures the boundaries of a parcel, but also the identity of the individual, financial information (mortgage, encumbrance details), family information (succession, partition details) and history of residence in a single searchable digital document. This is exactly the kind of "informational self-determination" that Justice K.S. Puttaswamy (Retd.) in his 9-judge majority judgment in *Puttaswamy v. Union of India* recognized as a right protected by Article 21, as he held that privacy is not just the right to be left alone but extends to the right to control the dissemination of information, and that linkage of a unique biometric identifier to an unrelated database will be permissible only if it is read with significant limitations, such as restricting mandatory linkage of Aadhaar to private telecom and banking services; for in the absence of these limitations, the risk of profiling, surveillance and unauthorised secondary use will be too high.²⁰

But in reality, this framework is much weaker than it might seem in the context of land

¹⁹ *Land Records Go Digital: 19 States Enable Download of Digitally Signed, Legally Valid Records Under DILRMP*, Angel One News (Jan. 5, 2026), citing Dep't of Land Resources, *Year-End Review 2025*.

²⁰ Justice K.S. Puttaswamy (Retd.) v. Union of India (Aadhaar), (2019) 1 SCC 1.

records, where the Constitutional benchmarks are now being implemented through the enactment of the Digital Personal Data Protection Act, 2023 (DPDPA). But more importantly, Section 17(2) allows the Central Government to exempt any instrumentality of the State from the main obligations of the DPDPA, including the requirement to seek consent or to limit processing to specific purposes, or to not notify the person in case of a breach, on a range of grounds including the “sovereignty” of the State or public order or the “interest of the general public,” which has drawn sustained academic and civil-society criticism for being in conflict with the proportionality standard that Puttaswamy itself has set.²¹

Specifically in the context of land records, this raises a tension that would require the digitisation programme to come to terms with sooner or later: more accessible records that are more interconnected than ever before are essential to DILRMP's stated goals of combating fraud, transparency and ease of verification and the constitutional privacy jurisprudence that informed the DPDPA requires that this linkage be kept to a minimum, and that it be accompanied by enforceable safeguards against secondary use. While the aim of the digitisation project is to benefit the users of the data, the constitutional spirit of the DPDPA works against that end; the project is being pushed by the State, which is the primary actor exempted by the DPDPA.

B. Automatic Mutation Problem

The second misstep in Part III is more worthy of being examined more closely. As 88.6 per cent of Sub-Registrar Offices are now capable of automatically triggering mutation of the Record of Rights upon registration of a sale deed,²² a structural dilemma arises: what is the nature of a mutation entry created by a software integration as compared to one which is made by a revenue officer after the application is submitted and a notice is issued and thereafter a hearing?

The Supreme Court's response in *Samiullah v. State of Bihar* is that how a mutation is created (whether manual or automatic) is not of any legal significance, as mutation per

²¹ *Id.* § 17(2); see KSK Data Privacy, *DPDPA 2023 - Complete Guide* (2026); Record of Law, *Digital Privacy in India Post-Puttaswamy: Evaluating the Data Protection Law* (Aug. 2025) (noting a pending Supreme Court challenge, as of July 2025, to § 17(2) on proportionality grounds).

²² *Land Records Go Digital: 19 States Enable Download of Digitally Signed, Legally Valid Records Under DILRMP*, Angel One News (Jan. 5, 2026).

se is not a title and is not intended to be. The Court observed that a mutation certificate does not at all confer title and it was not the duty of the registration authorities to refuse to register because of missing or controversial mutation records as such, the Court held, it was a matter for the judicial domain rather than the administration.

If an automatic mutation entry is contested, however, a court will review the mutation entry in the same way as it would review any mutation entry made manually, namely by scrutinizing the underlying registered instrument, the underlying chain of title and the limitations of the mutation entry's evidentiary value, and this machine-generated provenance will not enhance or detract from its evidentiary nature. The practical problem this poses is not doctrinal, but perceptual; because the pace at which new entries are added automatically, and how they appear to fit seamlessly into the existing framework, may give the impression that there is no need to examine each change in detail, even though doctrine and doctrine alone is the only way to ensure that they actually fit.

VI – JUDICIAL VIEW ON THE FRAUD OF DIGITISATION

A. The Sham Deed Issue and Drafting

In addition to the mutation and privacy concerns mentioned above, in only a few months the judiciary has twice served as an opportunity for systemic technological reform through the process of land-title litigation. Systemic reforms, in the form of digitisation of registered documents and land records through secure, tamper-proof technologies like blockchain, are "essential to minimise the scourge of forgery and 'clever drafting' that clogs our judicial system," the Court noted in its observations, which underscore its underlying concern - evidence.²³ Decades-old paper deeds are increasingly vulnerable to both genuine forgery and opportunistic claims decades later that the deed was a sham or "clever drafting," which a well-implemented digital document, with a hard-to-alter timestamp, could help prevent.

²³ Debby Jain, 'Property Purchase Traumatic': Supreme Court Suggests Use of Blockchain Technology to Make Land Registrations Easy & Reliable, LiveLaw (Nov. 7, 2025) (Samiullah v. State of Bihar, Narasimha & Bagchi, JJ.); ThePrint, SC Pushes for Digital Overhaul of India's 'Traumatic' Land Registration System - 'From Paper to Blockchain' (Nov. 7, 2025).

B. The Blockchain and Conclusive Titling

This comment was in continuation of the more detailed discussion in *Samiullah v. State of Bihar*²⁴ two months ago. The Court did not consider the registration of deeds a problem confined to the mutation dispute alone, but thought it would be useful to take a broad view of the structural flaws in the registration regime, and blockchain was a technology that it deemed to be deserving of consideration, as it made the entries part of a chain of cryptographically linked records that cannot be altered without detection: "Each entry once validated on the DL becomes part of a chain of cryptographically linked records which cannot be altered without detection. Blockchain technology can transform land registration into a more secure, transparent and tamper-proof system. The Bench of Justices P.S. Narasimha and Joymalya Bagchi went beyond the immediate mutation dispute and considered the structural weaknesses of the Indian registration system.

Two aspects of the judicial intervention deserve to be highlighted for the purpose of this article. But, and importantly, the Court's own words make it clear that blockchain-based tamper-resistant records is quite a different thing from records that are correct; the technology of blockchain, on the Court's own terms, ensures that a record is not altered without being detected, it does not ensure that a record is correct. If a blockchain ledger is filled with a wrong or a fraudulently inserted entry, that entry will be preserved in the same cryptographic manner that it is preserved when it is correctly inserted. It is important to note that when the judiciary enthusiasts talk of blockchain, they are not talking of replacing the conclusive-titling reform that we've discussed in much of this article, but they are talking about the evidentiary infrastructure needed to allow for the appropriate functioning of a conclusive-titling system should it become a State-backed adjudicatory mechanism for resolving disputes over who owns what.

VII – CONCLUSION

The above parts of the article reveal that the technological infrastructure of the land in India is in the saturation phase and the legal infrastructure is undoubtedly lagging a lot. In the persistence of the registration-not-title dichotomy as the dominant principle in property law, in

²⁴ Justice K.S. Puttaswamy (Retd.) v. Union of India, (2017) 10 SCC 1.

the express exclusion of conveyance of immovable property from the Information Technology Act's validating framework, in the increased dual-certification burden now placed on a litigant to establish that a land record has been digitised under Section 63 of the Bharatiya Sakshya Adhiniyam, and the Court's description of the purchase of property in India as "traumatic" despite 20 years of digitisation, this structural gap keeps recurring: a fully digitised presumptive-title system remains a presumptive-title system, as a matter of law. Neither has the risk of an undiscovered defect been shifted from the purchaser to the State by the advent of digitisation nor has the legal consequence of an existing defect on discovery been changed.

This will involve activity by legislators on three fronts, all of which are currently under consideration in some form. First, the draft Registration Bill, 2025 should be passed without the electronic-registration provisions being diluted or the Bill being passed without them being incorporated into the main statutory text governing land conveyancing instruments, since it is the first draft bill to include registration online in the main text of the bill on land conveyancing instruments, rather than making it dependent upon a separate Information Technology Act, which expressly excludes land conveyance instruments. Secondly, the second proposed project, that of reviving the conclusive-titling project first advanced in the Draft Land Titling Bill, 2011, and again amended in the Model Conclusive Land Titling Act drafted by NITI Aayog, is in need to be revived but most likely as a phased and opt-in programme, rather than as a uniform national law that would require simultaneous cooperation from all States.

Most urgent, however, to this Supreme Court instruction, which was issued on November 25, 2025, is the Union Government's rush to establish the coordinating body requested by the Court, and the promptness with which the Law Commission of India (LCI) has considered the integration of blockchain in the framework of a prospective State-backed title guarantee, if one were to be made a law. In the meantime, until the relevant legislation is passed, the digitised Indian land record should not be viewed as anything more than a window on the same presumptive title on which Indian law has based itself since 1908 and which, according to the Supreme Court's recent, surprisingly frank, observation, remains the same today as it was then, in the minds of practitioners, purchasers and lenders: something that is faster and more accessible.