



University of Oxford Research

The Future of Real Estate Transactions

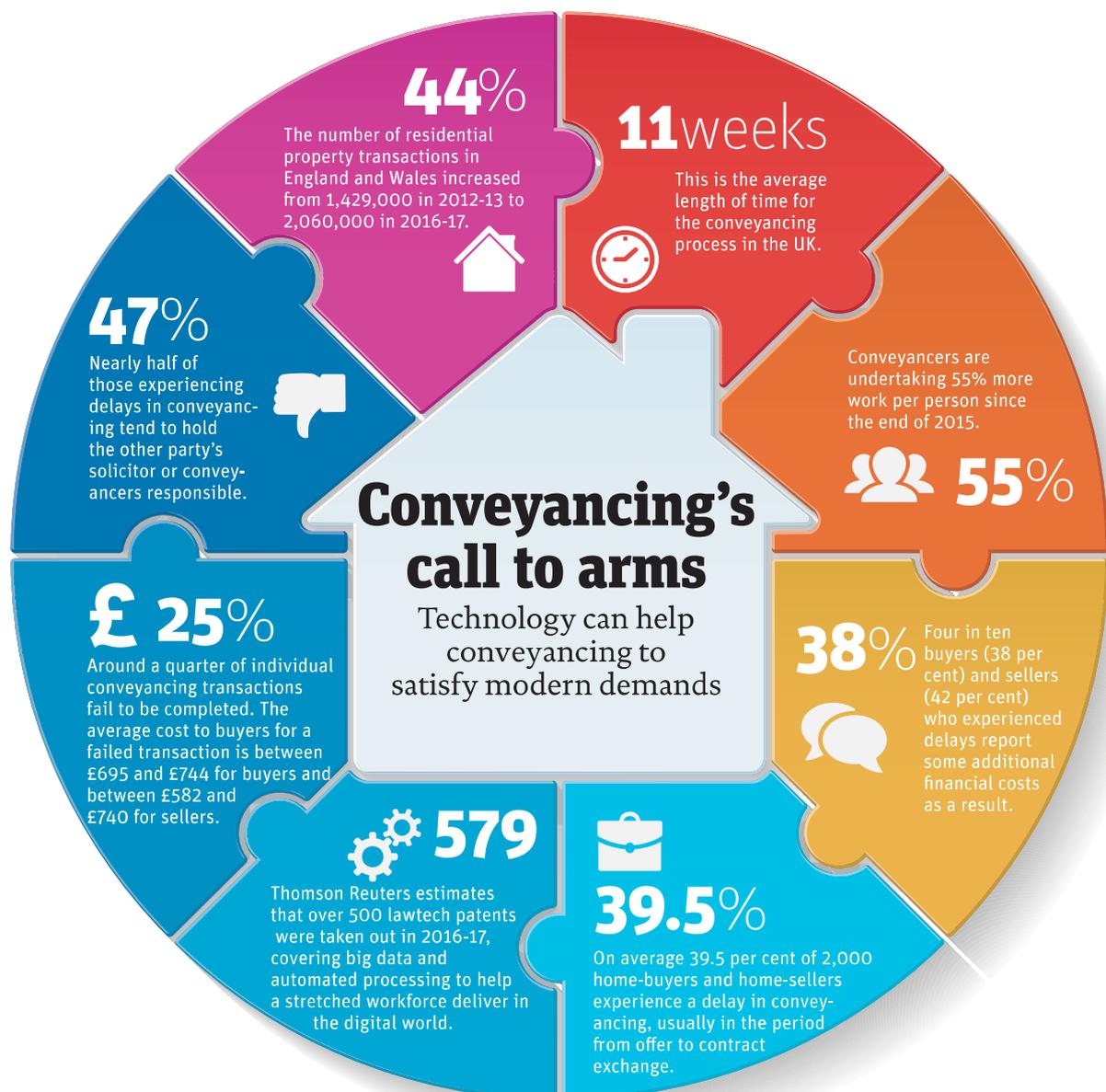


THE FUTURE OF REAL ESTATE TRANSACTIONS: *Technology, innovation and the real estate conveyancing process*

“If you always do what you always did, you will always get what you always got.” (Anon)

For many, this quotation could be fairly adopted as a criticism of a technology-averse and outdated real estate transaction process in England and Wales.

This report seeks to provide an objective view of the short to medium term potential for change. We highlight inefficiencies within the current transaction and conveyancing processes in England and Wales, we examine the reforms that are possible given recent and upcoming technological and social transformations, and we identify the blockages that are most – and least – likely to be overcome through digital innovation.



Source: *New Statesman*, 2018

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The Oxford Future of Real Estate Initiative at the Saïd Business School is led by Professor Andrew Baum and is a collaboration between Oxford academics and industry-leading organisations that aims to advance knowledge in real estate. Our research is grounded in real-world business questions. Further information on the research initiative can be found at: <https://www.sbs.ox.ac.uk/research/oxford-future-real-estate-initiative>.

Any reference to specific companies or organisations does not constitute a recommendation and is included solely for illustrative or case study purposes.

We welcome reader feedback and comments, which can be sent to us via e-mail at: realestate.reports@sbs.ox.ac.uk

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1. Introduction

Land shelters us, feeds us, and provides us with space for recreation, for shopping, and for work. With total global real assets valued at US \$238tn (Savills, 2017), land as an investment is a significant component of the global economy, accounting for between half and three-quarters of each individual economy's wealth (World Bank, 2004). How we as a society transfer ownership of this vital commodity is a matter of political and economic consequence. This report investigates how technology can help make this process faster and less expensive.

This report is primarily concerned with the institutional commercial real estate investment market. While the legal principles involved in residential and commercial property transactions are the same, the scale and level of risk are quite different, and the process is less commoditised.

A commercial land transaction broadly consists of five clear processes involving a host of actors. Sellers and their agents are responsible for the *preparation period* and the *marketing period* required to establish an asking price and negotiate a deal. One set of solicitors acting for the buyer and another for the seller are then responsible for the conveyance, which is the administrative process by which rights over land are created and transferred, with funds moving in the opposite direction. This includes all necessary legal works during the *due diligence period* and *post-exchange period*. Finally, a land registry must collect land taxes and record the legal ownership during the *post-completion period*. The transaction process is then complete.

In Chapter 2, we briefly look at the legal foundations of this process, primarily as it works in England and Wales, and examine the legislative developments that have taken place to facilitate its transformation from its origins as a paper based, or analogue, system. We identify the areas of inefficiency in the current process before examining historical attempts to streamline conveyancing and land registration through the use of technology.

Advances in computer performance, capacity and connectivity have created new 'digitised' methods of transacting real estate, currently prevalent in commercial conveyancing. Digitisation is the means through which we convert paper hard copies into unintelligent digital soft copies; data held within digitised documents are unable to be extracted through computer programmes and require human interpretation. In practice, digitisation can be thought of as scanning a page, uploading a photo, or creating a pdf, so as to have a digital copy of an original document.

By contrast, 'digitalisation' is the act of converting anything into a digitally readable format. Digitalised data enable computer programmes to automatically execute tasks without the need for human intervention. In practice, this means completing forms online to enable software processes to act upon the machine-readable, 'intelligent' information.

While many PropTech companies currently offer digitalised platforms which could streamline the property transaction process, the real estate industry is slow at adopting these new technologies, and it is arguable that the most significant transformation yet to take place is the normalisation of

technologies which automate current manual procedures. For this to occur, a step beyond digitisation must prevail and the data upon which the industry runs must be digitalised.

Chapter 3 uses a case study and a focus group to map the conveyancing process used in England and Wales. Through this process we examine the current use of digitised technologies and outline the key causes for delay within a commercial property conveyance.

In Chapter 4, we focus on the extent to which emerging digitalised technologies could solve these causes of delay and speed the broader property transaction process. These include blockchain and smart contracts, artificial intelligence and lease extraction technologies, machine learning and automated valuation models, the internet of things and property passports, virtual reality and satellite technologies. While we focus on commercial transactions, we also draw on the experience of the high street conveyancing firms and residential markets to explore common issues.

By conducting interviews with various Proptech start-ups and technology experts within major commercial real estate companies, we explore the barriers to adoption which exist for these emerging technologies and begin to highlight some of the pre-requisites needed before any real 'disruption' to the current process of a transaction can occur.

We conclude in Chapter 5 with a summary of our findings.

2. Conveyancing and registration processes

2.1 Introduction

Many economists and philosophers have expressed concern about the private ownership of land (Ryan-Collins et al, 2017). However, for those fortunate enough to be landowners it is vital to be able to prove land title. Land title provides financial protection, a store of value and a potential source of debt finance. If secure title is guaranteed by a reliable land registration system, land can be used to create wealth for the broader benefit of society and contribute to the eradication of poverty (World Bank, 2004). Insecure title to land prevents people from taking full advantage of its productive capacity and limits economic growth.

Land is a unique commodity: it is indestructible and immovable, and it is possible for many people and the public to have a multiplicity of interests over the same piece of land. Examples of public rights are those imposed by planning systems. Claimants of private rights over any piece of land can include:

- the freeholder(s) owns the plot of land in perpetuity
- the lender(s) finances a purchase and receives part of the ownership rights
- the leaseholder(s) leases the plot of land from the freeholder for a long-term interest
- the tenant(s) rents parts, or the full plot, of land from the freeholder, usually for a short-term interest
- spouses have occupation rights granted through family law
- adjoining neighbours may possess an easement such as the right to sunlight or a right of way through part of the land (this can also be held by the freeholder over their neighbours)
- third party organisations have holding rights including:
 - covenants: restrictions placed upon the land use
 - mines and minerals: ownership of any natural resource found beneath the Earth's surface
 - chancel repairs: the local church may have a right to charge locals for any maintenance

This very simplified account of the rights and liabilities which might affect a piece of land illustrates how necessary a robust land title is for its trustworthy transfer. An example of the potential complexity of the rights and restrictions attached to title is shown in Appendix 1.

Conveyancing is the practical application of land law, the business of creating and transferring rights in land. The relevant law is that of England and Wales, which does not apply in other parts of the United Kingdom. However, English imperialism has left its legacy and many other parts of the world use a similar common law system, including large parts of Africa as well as Australia, the US, Canada and the Caribbean.

A transparent and digital land registry, in which all land-related information is publicly available, all procedures and property transactions are clear, and information on fees for public services is easy to access, eliminates asymmetrical information between users and officials with respect to services provided by the land administration, thereby reducing disputes and increasing the efficiency of the real estate market (World Bank, 2018).

Her Majesty's Land Registry (HMLR) is responsible for recording the mapping and legal ownership in England and Wales in order to establish the legitimacy of any such interests. While the UK market benefits from being first in Jones Lang LaSalle's 2018 Global Real Estate Transparency Index (Jones Lang LaSalle, 2018), its digital registration process is currently ranked 47th out of 190 global economies on the 2018 World Bank's Ease of Registering Property Index (World Bank, 2018). (It should be noted that both of these metrics fail to separate out the processes in Scotland, Northern Ireland and the Channel Islands from England and Wales and thus may be skewed accordingly).

In this chapter we will outline the main components of the current England and Wales conveyancing and registration processes and identify delays in the transaction process identified by previous studies.

2.2 The England and Wales conveyancing process

The success of a property transfer can be measured by how closely the conveyancing process conforms to initial expectations, and the most important determinant of a successful property transfer is probably whether settlement occurs at its intended time. Expectations may be unrealistic, or intended time periods may be over-optimistic, but there is little doubt that delays (over-runs in transaction times beyond expectations) are a common feature of the current paper-based systems which operate around the world. In the UK, a report by The New Statesman (2018) found that delays occurred in close to 40% of all transactions surveyed.

Conveyancing in England and Wales is a 'reserved activity' under Section 12 of the Legal Services Act 2007. This means that it may only be carried out by authorised parties: solicitors, legal executives, or licenced conveyancers. In the institutional market, real estate deals are overwhelming brokered by investment surveyors from a handful of established firms. Indeed, with some institutional deals, there is never a public advertising process. Deals are brokered and concluded behind closed doors.

As most consumer/buyers must borrow money to purchase their home, the process is dominated by what their lenders want or are prepared to accept. Ninety percent of residential mortgages are carried out by members of the residential mortgage lenders' trade association, UK Finance. UK Finance produces a handbook of what lenders expect conveyancers to do. It is usual for the buyer's conveyancer to also act for the mortgagee (lender), although if a conflict arises the conveyancer must stop acting for both.

Traditionally, conveyancing was carried out by the parties' local solicitors. The liberalisation of the conveyancing to include 'conveyancers' (non-lawyers who had conveyancing qualifications and were the member of the Chartered Institute of Licenced Conveyancers) opened up the market. However, it was the internet that drove down the price of residential conveyancing: suddenly, non-local lawyers with lower overheads were able to undertake a conveyance for lower fees. Any online search will bring up a plethora of online conveyancers offering to work more quickly and cheaply.

SELLER

BUYER

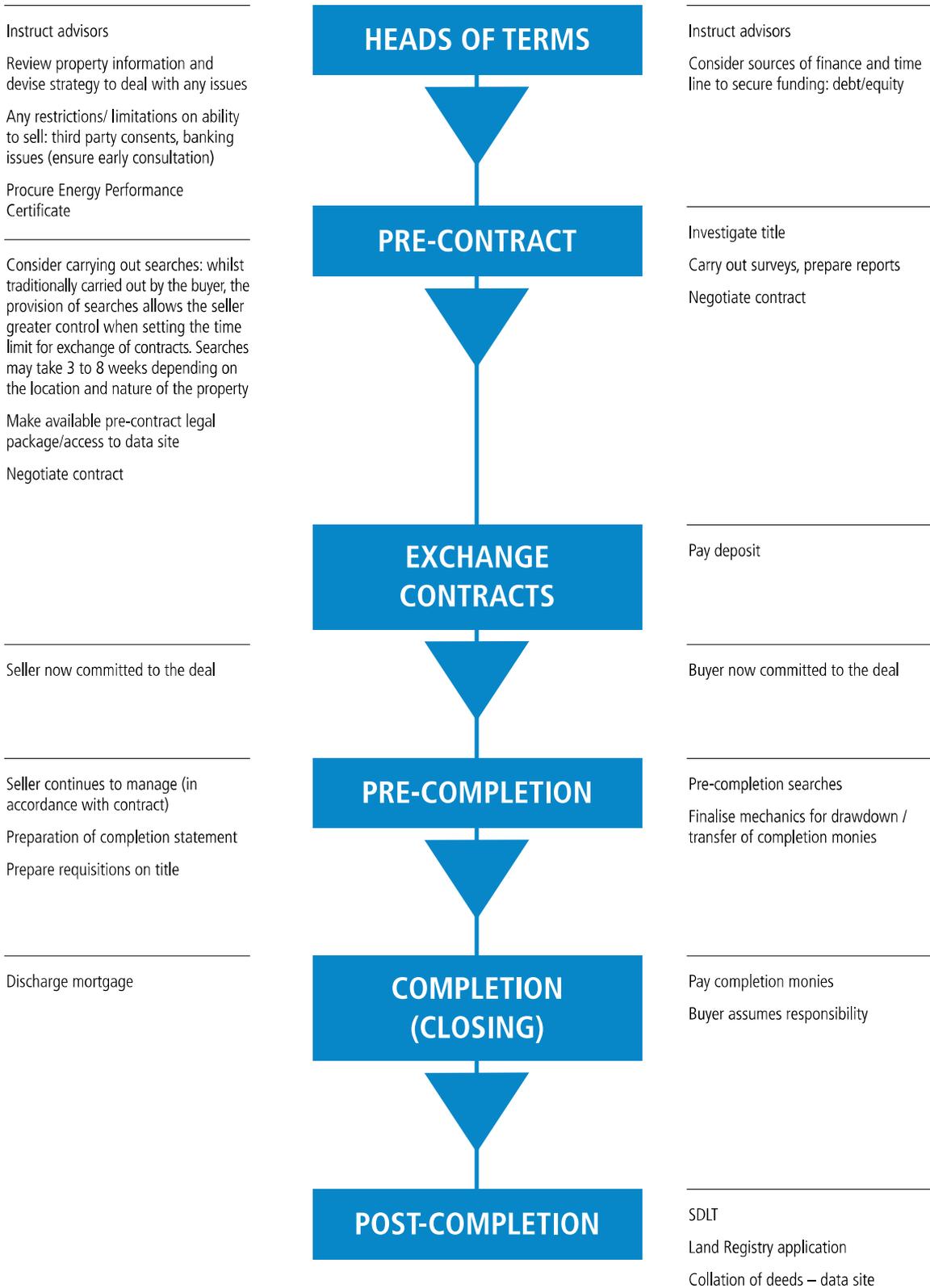


Figure 1: The UK commercial conveyancing process
Source: Investment Property Forum, 2012

Another factor in the commoditisation of residential conveyancing was the streamlining and standardisation of the conveyancing process driven by such works as the Encyclopaedia of Forms and Precedents and online sources such as Lexis Nexis and Practical Law.

Standardisation of documentation and process is a necessary pre-cursor to computerisation, and The Law Society's conveyancing protocol for residential transactions is very widely used. The protocol must be used by anyone who is acting for a member of UK Finance, covering an overwhelming majority of conveyances. The protocol identifies at least 150 separate steps in the process, depending on whether a conveyancer is acting for seller, or buyer and lender, and whether the property is freehold or leasehold. The process allows the simpler tasks to be done by machine or by less qualified staff under the supervision of an appropriately qualified lawyer.

The basic processes of conveyancing in residential and commercial work are the same. However, in institutional (larger commercial) transactions - a shopping centre sale, say - the subject property will almost always be tenanted; and the building might have a complicated ownership with freeholder, leaseholder and numerous tenants, and rights over common parts. We focus particularly on these larger transactions.

International conveyancing systems are briefly explored in Appendix 2.

Areas of inefficiency within the UK transaction process

McNamara (1998) identified the four periods needed for a successful property transaction. These are the preparation period; the marketing period; the due diligence period; and the settlement (or post-exchange) period. Critically, this study identified that, across all property types, the marketing phase of a property took the most time, followed by due diligence requirements. For a detailed description of the tasks to be performed within the due diligence and post-completion periods see Figure 1.

An empirical attempt to quantify the time taken for each of McNamara's four transaction periods was undertaken by Crosby and McAllister (2004). They did so through obtaining data for over 187 properties from three commercial property companies.

Figure 2 charts the overall transaction times recorded for the sampled commercial properties. The data allows a measure of the time from the first record of the proposed sale, which often coincides with the date the agent was instructed, to the completion of the purchase. The average transaction time for the 184 transactions where this information was recorded is 298 days, over 9 months. However, this average is skewed by a small number of very long transactions: the median transaction time is 190 days, or just over 6 months.

The longest process is the negotiation period, measured as the time from the first record of the proposed sale to the agreement of price. The average time is 178 days, but again this is heavily skewed, and the median is 88 days, nearly 3 months. This is consistent with McNamara's findings of what he dubbed the marketing period as being the longest process for any transaction. The due

diligence process, identified as the time between sale agreed and contract exchange, averages 83 days with a lower and less heavily skewed median of 62 days or 2 months, while the post-exchange period averages 19 days or nearly 3 weeks.

	Overall Transaction Time	Exchange to Completion	Price to Exchange	First Record to Price
Average	298	19	83	178
Median	190	19	62	88
Standard Deviation	381	19	82	325
Skewness	4.07	1.43	2.25	5.39
Number	184	185	178	179

Figure 2: Overall transaction time (days)
Source: Crosby and McAllister, 2004

They also discovered that that the value of the property has very little effect on how long it takes to sell. The relationship between price and total transaction time is not significantly different from zero. Of equal interest is the fact that the various components of the process are not correlated: a long marketing period is not followed by a long due diligence or completion period.

This study further explored the delays in the transaction process, characterising them as either 'events' or 'discoveries'. An event was a human-initiated problem, for example tenant failure, while a discovery was a step in the transaction process that was out of participant control, such as unknown asset defects or individual financing issues. These delays were found to occur most often in the due diligence stage of a transaction, with the four main influences identified as:

- Previously unknown or ignored inherent problems
- Changes in the asset e.g. tenant default
- Change in market conditions
- Changes in the circumstances of the purchaser, for example difficulty in obtaining debt finance

The use of debt was found to result in an additional due diligence process which could cause a major delay or a re-assessment of the offer price. For an overview of how a commercial transaction process alters through the use of corporate structures and debt, see Appendix 3.

The main conclusion drawn from this study was that a number of factors may cause delays in the sales process highlighted by Figure 3. Temporary, solvable problems include title problems, tenant disputes and outstanding rent reviews, issues that, if unresolved, would lead to a price well below market value perceptions. Other factors may be intractable but temporary: these include rent reviews and lease terminations.

- **Uncertainty of the timing of sale adds to the volatility of returns;**
- **Potential asset sales are pre-vetted and unsuitable properties may never come to market;**
- **By implication, time on market and probability of sale figures may overstate liquidity;**
- **Regular, routine valuations may neglect factors that delay sales or reduce the final price;**
- **From the case studies, median time from initiation to sale was around six months (190 days), but with major variations in time on the market;**
- **Most time was spent in the marketing stage (88 days), followed by due diligence (62 days), completion averaging just 19 days;**
- **It was argued that a purchase funded with debt was more likely to be delayed than a pure equity purchase.**

Figure 3: Summary of findings from Crosby and McAllister (2004)

2.2.1 Digitising the conveyancing process

Those close to the process suggest that the real estate conveyancing world has experienced more changes during the past 15 years than in the prior 300 years. The pressure for change is now constant. Real estate conveyancing is going through a major change brought on by a new electronic world (Gose, 2008), and numerous changes in both technology and culture are putting pressure on the conveyance process to change. Greater interconnectivity brought about by advances in technology has made the reliance on paper seem outdated. Dictated by societal preferences and demand, technology is reshaping conveyancing processes globally (Doversberger, 2010).

The establishment of a single system connecting all the agencies that supply information involved in property transfers can ease the conveyancing burden for firms or individuals. This single portal system is what is generally known as 'e-conveyancing', where all documents needed for a transaction are accessible to parties in a transaction through a single online platform.

The following three case studies, while residentially focused, will identify numerous issues with the establishment of any single conveyancing portal, highlighting factors often overlooked when advocating the adoption of fully functioning, innovative technology solutions.

Chain Matrix: an HMLR pilot scheme, 2008

In 2001, with internet-based technology newly available, the Law Commission published *Land Registration for the Twenty First Century* (Law Commission, 2001). This report sets out preliminary proposals to facilitate the implementation of e-conveyancing. The resulting legislative changes in the Land Registration Act 2002 came into force on 13th October 2003.

At the time, Law Commission believed that: *“within a comparatively short time, electronic conveyancing will be the only method of conducting registered conveyancing. Investigation of title will*

be almost entirely online. The technology will also provide a means of managing a chain of transactions by monitoring them electronically. This will enable the cause of delays in any chain to be identified and remedial action encouraged. It is anticipated that far fewer chains will break in consequence and that transactions will be considerably expedited” (Law Society, 2017a).

HMLR set about piloting its own e-conveyancing platform called Chain Matrix in Autumn 2006. The system would allow buyers, sellers, their legal representatives, estate agents and lenders to view the progress of every transaction in a property chain, thus highlighting where a bottleneck exists and notifying those responsible. HMLR thought that identifying the causes of the delays would encourage those responsible to improve their efficiency and to minimise reputational risk. It hoped that this platform would facilitate a simpler, more co-ordinated exchange of contracts and completion (Doversberger, 2010).

A second new technology trialled as part of the Chain Matrix pilot was that of an Electronic Funds Transfer (EFT) system, which would automatically execute a payment on behalf of the buyer to the seller’s bank account on completion and validation of all Chain Matrix requirements, thus negating the need for solicitors to hold funds in escrow prior to completion.

Chain Matrix was trialled in three cities in 2006-2007, and HM Land Registry planned to apply user feedback and adapt the matrix accordingly. However, Chain Matrix was abandoned after £4.6m had been spent on its trial.

While the technology worked successfully, the pilot failed because it attracted fewer than half the participants originally hoped for (Doversberger, 2010). This absence of adoption by conveyancers led to frequent breakages in the chain. Where one party had not adopted the platform, it required all other immediate parties to revert to paper-based processes in order to facilitate a transaction.

According to an HMLR Land Registry employee close to the project, the biggest problem was the lack of integration between Chain Matrix and solicitors’ individual case management systems. This led to the need for data to be input into both systems separately and the duplicating of processes, or ‘double keying’. As a result, any efficiency in time saving was lost.

HMLR’s Land Registry’s official evaluation report on the Chain Matrix and EFT service prototypes highlighted a reluctance by conveyancers to use the prototype. At one point, the disdain in England for the new technologies became so severe that its application resulted in large numbers of retirement among English real estate lawyers (Doversberger, 2010). The Guardian further added to claims around the lack of social acceptance of the new system, reporting: *“many citizens were not aware or not convinced of the benefits and prevented their conveyancer from entering their transactions onto Chain Matrix”* (Cross, 2009).

PEXA: a current Australian model

In 2010, the Australia National E-Conveyancing Development Limited (now known as PEXA) was created to deliver a single, national electronic conveyancing solution to the Australian property industry. A study of the Australian housing market found that under the paper system one in five property settlements were delayed, by a median period of seven days (PwC, 2015). The platform was aimed at reducing these delays, as outlined in Figure 4.

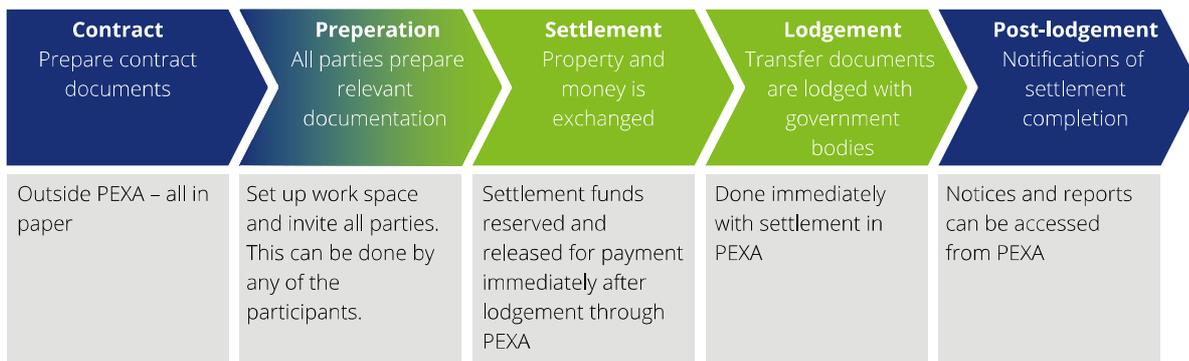


Figure 4: The role of PEXA in the conveyancing process
Source: Deloitte, 2018a

Despite the potential benefits of electronic settlement and ‘lodgement’, take-up of the PEXA platform reached just over 1.1% for lodgement of transfer instruments in 2016-17. A 2018 report by Deloitte attributed this disappointing result to high transition costs for practitioners, notably around the steep learning requirement and the need to run duplicate paper processes due to at least one other party to the transaction not being on PEXA. Deloitte concluded that the initial vision failed to foresee the difficulties in implementing a national system. In particular, the initial analysis did not account for the transition costs of moving towards a 100% solution.

Because the predicted efficiency benefits will only be realised once PEXA achieves 100% adoption, the Australian government is intending to impose limits for mandatory compliance by 2022. This will lead to time and cost savings to conveyancing firms (although consultations indicated that practitioners do not expect to reduce prices when the industry reaches a 100% digital system (Deloitte, 2018a)).

VEYO: a UK Law Society initiative, 2015

The Law Society, a professional association funded by membership fees from law firms in England and Wales, spent millions of pounds on its Veyo initiative, a failed attempt at introducing mass-market e-conveyancing. The service, due to launch in May 2015, aimed to allow solicitors, buyers, lenders and estate agents to monitor transactions in real time, speeding up the conveyancing process by allowing solicitors to upload and amend documents securely online (Pickford, 2015). Despite recognising a need for critical mass and offering increased transparency and trust, the scheme was later scrapped. What this highly anticipated product offering had failed to consider was the emergence of alternative software providers, able to both outperform and undercut VEYO.

“part of the reason [for VEYO’s failure] is due to a change in the market, with other software providers having been better able to respond to firm’s needs and the rising cost of Veyo outweighing the benefits ... there was a lack of clarity in regard to the integration with search providers, HMRC and mortgage lender approval of the project. As it stood in the first phase, only conveyancers had access to the portal, with no other agencies being integrated, meaning practitioners still have to juggle their case management system, HMLR’s portal, and search providers’ databasesnothing was in one place.” (Solomons, 2016).

The Chain Matrix and VEYO cases introduce a key thesis (Bower and Christensen, 1995): profit-driven private businesses may be more likely to introduce radical change than established industry consortia. On the other hand, PEXA shows that government action may impose change from above. The actions of all three actors (business, government and institutions) plus public support are all needed to contribute to radical change: we will return to this issue in Chapter 4.4.

2.2.2 Current technology: data rooms and cloud computing

Within commercial conveyancing, a type of technology known as a data room is used. This is a single portal that connects all parties and their advisers, and provides a repository for transaction information. Data rooms have been made possible through advances in cloud computing, where large files can be stored and accessed through an offsite network. This means that clients and advisers are freed from the need for expensive and complex in-house hardware. While data rooms are by no means specific solutions for real estate transactions, they are increasingly used by commercial conveyancers. Within a cloud-based data room using application programme interfaces, or APIs (a set of functions and procedures that allow applications to access the features or data of an operating system, application, or other service), it is possible to share information between the various parties involved in the transaction.

2.3 England and Wales land registration

Globally, the best registration systems tend to have simple fast-track procedures, digital registration, low transfer taxes, fixed registration fees and time limits for administrative procedures. They have introduced compliance procedures to keep registration disputes away from court proceedings and they also make the use of notaries and lawyers optional (World Bank, 2018). A comparison of international land registration systems can be found in Appendix 4.

The process in the UK is currently ranked 47th out of 190 global economies on the World Bank’s Ease of Registering Property Index 2018, requiring six procedures which take an average of 21.5 days to complete at an average of 4.8% cost of the total property value (World Bank Database, 2018). This includes property transfer taxes (stamp duty).

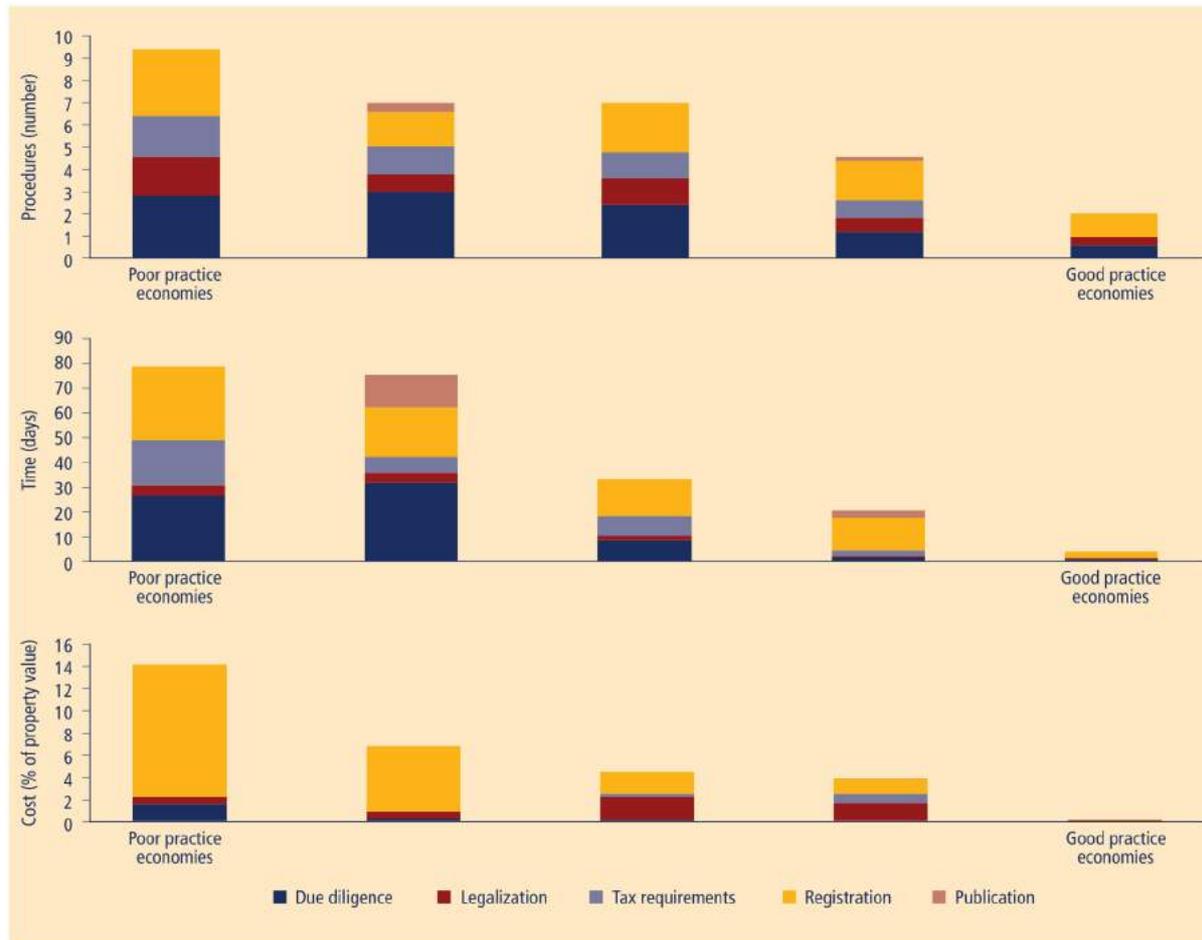


Figure 5: Global property registration processes: procedures, time and cost comparison
Source: World Bank, 2013

According to the World Bank (2007), lowering fees is the simplest way to make property registration more efficient. Charging fees and taxes on a percentage basis encourages fraudulent declarations of property values, and a fixed fee would be helpful. In England and Wales, property transfer taxes contribute significantly to the illiquidity of real estate as an asset class; maximum efficiency property transactions require the abolition of transfer taxes and their replacement by annual property taxes, as recommended by many, including the Adam Smith Institute (2017).

Depending upon the adopted system in any particular jurisdiction, proof of title can be established either by a land registration system focussed on the stock of land, or by a deed offering proof of the transfer of title. The deed system, based on flow rather than stock, does not require title registration, just as the purchase of any commodity requires only a receipt to establish ownership.

A deed registration system means that the deed itself, a document which describes an isolated transaction, is registered. This deed is evidence that a particular transaction took place but is not in itself proof of the legal rights of the involved parties and, consequently, it is not evidence of legality. Thus, before any dealing can be safely effected, the declared owner must trace his ownership back to a good root of title.

Out of the England and Wales common law title registration system, two parallel systems of conveyancing have emerged. In unregistered conveyancing, the seller has to show its right to sell by providing documents that show its entitlement to do so. Where land is registered, the entry of the proprietor's name on the title of the property at HMLR is proof of legal ownership.

Comprehensive and accurate identification of exactly which rights are recognized over what land is a key challenge for conveyancers. While the UK government has been keen to categorise and tax property holdings, the process by which the buyer and seller get what they believe they have contracted for is not straightforward.

2.3.1 Digitising Her Majesty's Land Registry

Globally, digitising the land registry has been found to significantly reduce the time taken for a transaction to occur (Figure 6).

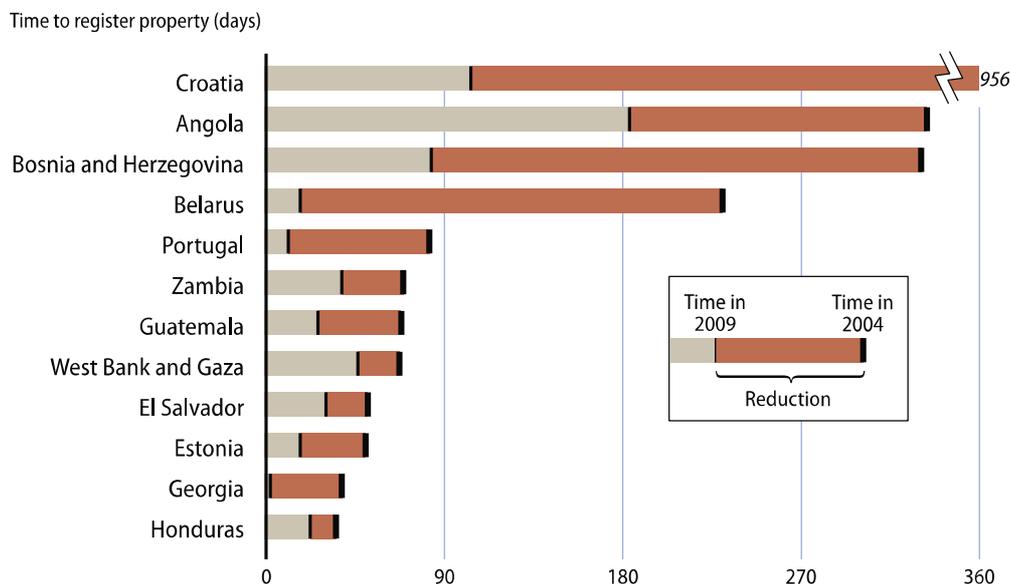


Figure 6: Time savings through digitised property registration
Source: World Bank, 2009

From 2008 onwards, HMLR stopped storing new original documents. From this point, all documents received by and within HMLR have been scanned and retained electronically. This process is still ongoing due to the wealth of analogue historical data; there is no intention to create digitised copies of many historic documents.

In 2017/18, 94.9% of service requests to HMLR were placed in a digitised format through electronic channels (HMLR, 2018c). The majority of these requests are lodged as PDF documents which limits opportunities for process efficiency and cost improvements through automation (digitalisation). Scanned records, while a big step up from paper-based databases, still rely on manual interpretation to extract information.

3. Real estate transactions today

3.1 Introduction

Data is fundamental at every stage in a property's lifecycle. When buying an asset, investors need information about building operations, cash flows, maintenance and capital expenses, potential risks, market assumptions, tenancy schedules and more. This data needs to be transferred efficiently from and to previous and current owners, legal advisors, property managers and others, but this process is commonly subject to inefficiency and delays.

Within real estate, analogue and digitised techniques still continue to define how we collect, interpret, manage, transact and record this data. These techniques include actions such as the arduous reading and understanding of lease clauses, the physical printing, signing and scanning/posting of paper contracts and the interpretation of hand-drawn plot boundaries on a poorly-copied PDF map. While these processes may be difficult and time-consuming, the end result seems to be a trusted system of transferring and recording land ownership: London is often said to be a target for global capital because of the reliability of this system, and the UK is ranked first in Jones Lang LaSalle's 2018 Global Real Estate Transparency Index, which includes Land and Property Registration as one of its input variables.

Despite this, the wider economic transition towards digital technologies is putting pressure on the real estate industry to follow suit: *"The current structure of real estate transactions incentivizes and rewards agents to take large percentages that just aren't necessary given the emergence of new technologies that make searching for properties, communicating and transacting easier than ever before"* (Fraser, 2018a); *"the data needed should not be held in the filing cabinets of solicitors offices but in a digital format with the plot of land to be transacted...the current practices required by the UK legal system are outdated... conveyancing has become a process for the conveyancers and not the end consumer...the current use of technology simply digitises existing poor procedures"* (interview with Simon Davies, Nimbus Maps).

There are underlying process changes which need to occur before technology can be successfully implemented. Problems include the format in which data is held; incompatibility in the systems which enable the data to be used; and a reluctance to guarantee the accuracy of information by a seller to a buyer in the transaction.

At their most extreme, the perceived inefficiency of established practices include professionals re-digitalising already digitalised documents: printing from a digitalised file, and then signing, scanning and returning the paper document to a counterparty who uses lease information extraction technology to re-digitalise the necessary data. To what extent are these practices the major causes of transaction delays? Where are the bottlenecks in the transaction process?

3.2 Causes for delay within the England and Wales conveyancing process: a process map

We now focus on the major causes of delays within the current commercial conveyancing process in England and Wales. In exploring this, we brought together HM Land Registry, two major law firms (BCLP and Anon-Firm) and a leading real estate advisory firm (CBRE) through the medium of a case-based focus group aided by a process map defining the transaction process for a small office building (Figure 7).

The case

- Address: 6 St Giles Court, Reading, RG1 2QL
- Occupier: Property Funds Research
- Owner/vendor: ABC Ltd Retirement Scheme, acquired in December 2000 for £112,500
- Acting for vendor: Anon-Firm, CBRE
- Buyer: Kingsgate Residential acting on behalf of an unknown private individual
- Acting for buyer: BCLP, Kingsgate
- Agreed purchase price: £187,500
- Financing: 100% equity



Figure 7: The plot of land to be transferred (BK280355)

A transaction mapping exercise was used to highlight key causes for delay in the current process of commercial conveyancing. We began by identifying the process stages. Based on the studies by McNamara (1998) and Crosby and McAllister (2004), real estate transactions are characterized by four different stages. These are: the preparation period, the marketing period, the due diligence period, and exchange to completion, referred to in this report as the post-exchange period. We add an additional fifth stage, the post-completion period, incorporating the title registration process.

The preparation period

This period begins with a trigger event – the vendor decides to sell. The vendor assembles the relevant data in consultation with his/her lawyer and real estate advisor or property manager and instructs the adviser or a third party to act as broker/selling agent and to prepare some marketing materials.

Cause for delay #1: the vendor may not have maintained accurate or digital records of relevant information

It is the duty of the selling agent in conjunction with the seller's lawyers to collect as much relevant information about the property as possible in order that an accurate asking price can be set. As the selling agent is motivated by a quick sale and will not collect a fee until a successful transaction has been completed (Levitt and Dubner, 2005), it is in the agent's interest to present relevant, accurate, up to date data to pre-empt and reduce any future delays. This task will not only reduce the transaction time but will also minimise the risk of a price chip or, worse still, an aborted purchase.

This first problem arises when attempting to collate this required information. Data is often not readily available, is sometimes lost, and is held in numerous formats across several organisations. Some of this information will be outdated and found only in the completion pack from the vendor's original purchase of the property. With many vendors providing information which has been stored in paper format, or composed of varied-quality scanned documents, the extraction of relevant data can become a tedious, manual, unsatisfactory process.

Resulting questions about the accuracy of any information collected at this pre-sale phase leads to the need for further checks throughout the conveyance process. The duplication of work from solicitors on both sides of the transaction in obtaining and checking required documents in their various forms and from various organisations is a major inefficiency. As Highman (2015) notes: *“The common problems with tenancy schedules are that they are not well maintained or completely accurate and so they cannot be relied on. While they may be created from the original lease detail entered into the ‘property management software system’, accuracy in the process is commonly missing over time.”*

Mistakes creep in when property managers or lawyers fail to read leases accurately and overlook critical dates and/or lease clauses. This will then impact the tenancy schedule content and details. While the terms of leases often change over the duration of the tenancy, the lease schedule is rarely updated to reflect the revised position.

If the seller were required to warrant that the tenancy schedule is correct, this would serve as motivation to keep details up to date and a lot of the duplication of processes during this pre-sale stage could be avoided. But the seller is not required to do this – *caveat emptor* is the basis of contract law, meaning that the buyer alone is responsible for checking the quality and suitability of goods before a purchase is made. *Caveat emptor* adds a hugely powerful dose of realism when a pension fund is acquiring a very complex commercial property. To reverse this would require a change in contract law - a little unlikely for such a fundamental and deeply-embedded principle - or the more widespread adoption of institutionally-agreed representations and warranties insurance, which is rarely used outside the larger more complex real estate transaction.

The marketing period

During this stage the vendor's agent makes the marketing data available to the potential buyers and their advisers. Note that *caveat emptor* means that the broker is not responsible for the accuracy of any information, even if it is expressed via a glossy sales brochure. Prospective buyers will generally visit the property and may carry out non-intrusive surveys, and they may also use drones, GPS and/or virtual reality to avoid the need for or to supplement visits. The seller's solicitors will make some basic information available to the potential buyers through the data room, but the buyer will feel responsible for assembling a lot of information at this point.

The selling agent asks for bids (over one, two, maybe three rounds); and eventually agrees heads of terms with purchaser. The parties agree a target time schedule for exchange and completion – probably over-optimistically.

Cause for delay #2: inconsistent approaches to data rooms

Even within an individual firm, many of the software packages used during a transaction do not match up. The same information describing a tenancy schedule could pass through many different digital programmes before finalisation. The lack of integration between the software used to produce spreadsheets and tables with that used for creating detailed legal information packs is compounded by individual firms having their own systems for logging the extracted information and uploading documents for file sharing, all the while editing formatting errors and navigating differing file storage protocols.

Despite the best efforts of the seller's solicitor to consult their own historical database as well as all holders of relevant property information, there is still a feeling that this will inevitably still fall short of the information requested by the buyer's solicitor: each property is unique, and the vendor cannot always predict what the buyer's solicitor is going to ask for.

The lack of a standardised format within data rooms leads to disorganised headings for folders uploaded by third parties. This makes locating any relevant uploaded information a more difficult process than is necessary. Differing software systems at individual firms may have blocks on downloading files whose names contain certain characters which do not meet the requirements of their cyber-security firewall. This is particularly pertinent in cases where the seller's solicitor does not have the capability to host a data room and instead uses a generic file sharing platform such as

Microsoft's Dropbox.

The due diligence period

During the due diligence period, the buyer's legal team runs searches of utility providers, local authorities and others who hold or may hold information relevant to the value or future utility of the property. They will normally use a specialist agent to do this (such as Search Acumen, for example). Such private businesses can be expected to innovate efficient data solutions: see, for example, PlaceTech, 2019.

Cause for delay #3: performing adequate searches via under-resourced or non-motivated authorities and utilities companies

The search process may create significant delays. This may be due to inefficiency and under-investment in record-keeping; cutbacks in the government funding of local authorities; or a lack of motivation where the search fee (if there is one) does not cover the work involved.

The topic of discussion which took up most time during the mapping process was to do with the bottlenecks existing within the search process. With some authorities taking up to 40 days to respond to requests for information, this stage undoubtedly has the potential to cause the biggest stumbling blocks for any transaction. Despite *caveat emptor* placing the cost of any missed search information onto the buyer's side of the transaction, the time it takes for search information to be received means that this process is sometimes initiated by the seller's solicitor so that exchange can take place on or before the desired deadline. This approach raises its own issues including confusion over who may place reliance on the results and the fact that searches quickly become out of date and therefore unacceptable, particularly where there is a debt funder. An alternative approach is for the buyer to arrange for insurance to cover the fact either that they have not initiated the search process at all, or that they are still awaiting some results. The latter approach, whilst pragmatic, is frustrating for buyers who are effectively paying twice for what they hope will be the same outcome.

Every property deal requires the same set of standard searches, while more complicated properties and transactions will require additional information. A wide range of data needed for either scenario is held by third party organisations and a considerable amount is maintained within local governments' land charge departments. Local land charge departments are responsible for holding and providing information relating to specific rights over the land including charges recoverable by local authorities for statutory works, planning conditions, tree preservation orders, community infrastructure levies, compulsory purchase orders, conservation areas, listed buildings and light obstruction notices. Depending on the operational structure of these different departments, each unique to the local authority in which the property is located, this information could be held in a manner of mixed formats. For example, according to Search Acumen, Brighton still uses card indexes, making it one of the hardest authorities to deal with, while the most efficient search requests are completed by previously privatised departments such as the environment agency.

Despite the clearly superior performance of departments and local authorities with higher levels of funding or digitisation, the system of requesting data has not changed in line with advances in modern

technology. Necessary search information still needs to be individually requested from each department in order to achieve the degree of due diligence required for a property transaction. Additionally, most of this information is not openly available to the public, producing a monopoly over its distribution and allowing local authorities to set charges at a level they desire.

However, there is hope on the horizon. HM Land Registry is currently working towards a comprehensive, national, digitised Local Land Charges system, allowing solicitors to access important data for land and property searches that previously took up to 40 days to receive when processed by local authority systems. Graham Farrant, chief executive and chief land registrar at HM Land Registry, commented: “*By centralising and digitising the local land charges information of local authorities in England, we are helping to improve conveyancing. Search results from the new register will be instantly available in a standard, easy-to-read format*”. The service was first launched on 11 July 2018 with Warwick District Council. Several local authorities are currently working with HM Land Registry to migrate their Local Land Charges data to this central register. Once all English local authorities migrate their data, the digital register on the government’s website will offer instant search results to anyone in England (Isherwood, 2018).

Cause for delay #4: identifying the correct parcel: no single, true plan

HM Land Registry deals with around 20 million enquiries each year; 5.5 million of these concern changes to title. 25 million titles are held, and HM Land Registry holds 30 million scanned deeds.

Because HM Land Registry is not digitalised, there are inconsistencies between the paper and/or digitised maps held by HMLR, the plans given to conveyancers, the parcels of land identified on any site visit and the boundaries provided by geolocation or satellite imaging technology. Boundaries can become a major cause of dispute. One of the reasons why HM Land Registry is not yet digitalised is a fear that the number of disputes created by differences between any attempt at an official, digitalised map and what exists on the ground may completely clog the system. Figure 8 shows how in some counties of the UK as much as 33% of land is not registered at all, making this process of true parcel ownership and identification ever more difficult.

Establishing authoritative data is compounded by HM Land Registry’s use of the *general boundaries* principle. As opposed to *fixed boundaries*, where the precise geometrically surveyed co-ordinates of any parcel of land are entered into the register and legally guaranteed as fixed, the general boundaries principle relies mainly on physical boundary features, man-made or natural. These physical boundaries are sometimes flexible. Without any requirement to register precise survey data, there is no legal record of exactly who has rights to certain plots of land. A common example used is ‘the hedge and ditch scenario’, where a land owner has dug a ditch along his boundary line and used the excess soil to plant an adjacent hedge. Under general boundaries it becomes difficult to determine whether the land owner has legal rights over the ditch, the hedge, the central point of one or the other, both or neither. In an urban setting where small strips of land can hold large value, disputes occur more frequently, centred around movable boundaries such as fences, walls and footpaths.

Historical registry techniques identified these general boundaries using a pencil outline drawn upon a low-resolution map. Subsequent manual copying of these historical maps along with more modern

digitisation and subsequent transference between online data rooms has created many variations of the same 'truthful' boundary. Some of these difficulties can arise from issues as trivial as the sharpness of pencil and scale of map used, whereby in some instances the blurred or faded mapped boundary line can represent an area metres in width on the ground.

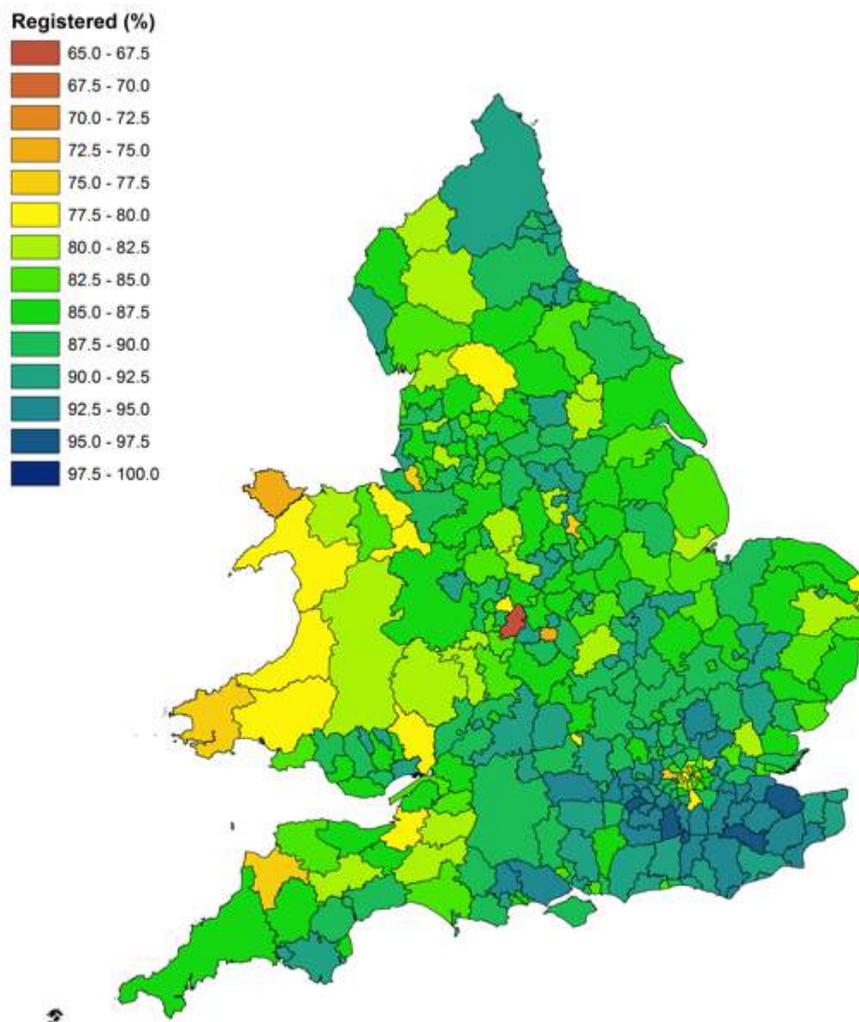


Figure 8: The coverage of HM Land Register by county (Dec 2018)
Source: HMLR, 2018b

Further difficulties exist in the label with which different organisations use to identify the parcel of land to be transferred. There are several ways to locate a single parcel of real property, regardless of any boundary variations. The most common identifier used is the postal address and post code. However, anyone who has tried entering a postcode into an outdated satellite navigation system will know this is fraught with problems and that postcodes can cover several properties. Ordnance Survey grid references provide another positioning identifier, but members of the general public typically do not know the exact grid reference of the property they own.

Search providers will identify real estate parcels using a Unique Property Reference Number or UPRN (a unique alphanumeric Ordnance Survey identifier for every spatial address in Great Britain

providing a comprehensive, complete, consistent identifier throughout a property's life cycle), but this does not overcome the problem of vertical division. Our example transaction plot in Figure 7 is labelled BK280355. This is an example of the Land Registry Title Number. Utility companies will all use separate account reference numbers for the same billing address. This lack of consistency of identification can also have financial implications through local authorities often attributing numerous parcels to the same property, leading to multiple search charges.

Cause for delay #5: completing standard enquiry forms: *caveat emptor*

A report into the US housing market by Nanda (2012) found that the average sales price of houses in a metropolitan area increased by an additional 3 to 4% over a four-year period if the state had adopted a Property Condition Disclosure Law. HMLR has developed a parallel disclosure mechanism. The Commercial Property Standard Enquiry Forms or CPSEs were introduced in 2002 to reduce bottlenecks during the due diligence period. They provide an interesting case study in the context of this report.

The CPSEs were prepared by, and continue to be maintained by, the London Property Support Lawyers Group, whose members are drawn from about 20 major law firms, both London and national. The project was sponsored by the British Property Federation, whose endorsement was a sign that the CPSEs were developed to benefit owners and managers of property and not only lawyers. They are made available, free of charge, through the British Property Federation website (BPF, 2019).

For commercial property, form CPSE 1 is designed to cover all transactions, whether freehold or leasehold, vacant or tenanted. The following supplemental enquiries are intended to be used in conjunction with CPSE 1:

- CPSE 2: where the property is sold subject to commercial tenancies.
- CPSE 3: where a lease of a property is being granted.
- CPSE 4: where the property is being sold is leasehold.
- CPSE 5: where a lease of a property is being surrendered.

The rationale behind the CPSEs is that if known information about any potential risks involving the transaction of the property were disclosed by the seller prior to exchange of contracts, this would speed up the due diligence process on the buyer's side and create a more efficient timeline by avoiding any late re-negotiations. This is supported by findings by Stern (2007) who revealed that the timing at which information, particularly about any defects, is revealed to the purchaser during the conveyancing process plays a significant role in both the eventual negotiated purchase price and the speed at which the transaction occurs. Defect disclosure which takes place during or before the search process rather than the contracting or offer period drastically reduces information-processing delays. The CPSEs should also reduce the time and effort necessary in transactions burdened with a lack of transparency, while also reducing the number of uncompleted transactions.

Disappointingly, CPSEs have served to cause further unwanted bottlenecks, due once again to the nature of *caveat emptor*. Although sellers do have a duty of care not to misrepresent any issues that affect the property, some sellers lack the motivation to go through the unnecessary burden of attempting to locate information relating, for example, to fire safety deficiencies or asbestos and potentially reducing their negotiating power. Although there is still a risk of misrepresentation, many

enquiries on this form are completed with terms to the effect that *“the buyer should rely upon its own searches and enquiries”*.

However, *caveat emptor* is unlikely to be overturned as a principle of contract law. Our focus group commented that if England and Wales were to switch to a system whereby the seller had to warrant the accuracy of this information, a larger problem could occur if the trusted disclosures genuinely missed important information. This was a secondary finding of Nanda (2012): within the US states which had adopted a Property Condition Disclosure Law, lawsuits relating to undisclosed information increased dramatically. For this reason, in the absence of standard insurance coverage it would be difficult to employ a conveyancing framework under which *caveat venditor*, or seller beware, existed.

Cause for delay #6: reviewing and reporting using non-integrated software

Once the buyer’s solicitor has received all the necessary documentation it is then her duty to run her own set of due diligence checks on the information provided and request any outstanding details. In light of any unwanted findings, she will report the information provided in order that the buyer and his team might formulate a new offer, opening up the possibility of another phase of negotiations and possible transaction failure.

In reporting to the client, the buyer’s solicitor will consolidate all necessary information into one report including planning advice, rights of and burdens on the title, and key information on the occupational leases. Extracting the relevant information for this report once again throws up the issue of data formats.

The siloed operations of each party within a transaction has led to the growth of specific technologies focused on one specific aspect of a real estate transaction, showing little understanding or consideration for other, related industries’ data requirements. While technology has been designed which can smooth certain operations, many tasks still rely on archaic platforms, designed with no real estate specific purpose. Many additional enquiries have no standardised structure or platform and instead rely upon an individual’s preferred habits and often a heavy reliance on the use of Microsoft Word and Outlook.

The most up to date, and by no means universally-used, lease information extraction technologies use artificial intelligence systems to identify the relevant terms and clauses from a contract to create a digitalised, machine readable copy, saving human data inputting time and error. While data extraction technologies such as Leverton, Kira and HighQ (which are now commonly used within the legal profession) can recognise key points such as landlords, tenants, rents and terms, these systems are unable as yet to deal effectively with complexity. Crucially neither do they register (at any meaningful level) with those on the agency side of the transaction, where data platforms such as Yardi and Argus are the common language.

Robert Sanderson, managing director of legal software firm *Ochresoft*, recently spoke of how the level of technology being utilised by many conveyancers is relatively basic and increases the risk of fraudulent activity, adding: *“Exchange of information through insecure email is the absolute root cause*

of the misdirection of funds. It's the elephant in the room" (New Statesman, 2018).

The post-exchange period

In many transactions there is a period of time between exchange of contracts and completion/closing/settlement. During this post exchange period the parties will have time to comply with any conditions precedent (conditions that must be complied with before completion can take place). This will often include gaining the consent of a third party to the transaction. They will also tidy up administrative details, accounting records, agree completion apportionments and move money to the right place in readiness for completion.

The post-completion period

After completion, Stamp Duty Land Tax is required to be paid within 14 days of completion. Title is then registered using HMLR form AP1, generally submitted electronically by the purchaser's solicitor. HMLR aims to return this form within five days.

Cause for delay #7: filing for registration: a lack of transparency over requisitions and delays in registration

When a transfer of ownership takes place, it is required by law that the new ownership of the property is registered with the government through Her Majesty's Land Registry. This process is often done through the online portal or business gateway provided by HM Land Registry, which dealt with 94.9% of service requests in 2017/18 (HMLR, 2018c).

HMLR (based on the current interpretation of the Land Registration Act 2002) does not yet recognise digital signatures, such as an encrypted thumb print or a secure computer password, for ID verification on title transfers. Any registration of a transaction still requires a personal signature. Although HMLR has recently developed the capacity to register digital mortgages, this is currently not possible for all required transaction documentation.

To ensure the validity of any transfer of title, HMLR must first run checks on the information provided and consult their database for any prior issues (for example, disputes between previous owners) which have not been resolved and which may prevent them from legally registering a new owner. HMLR must also deal with applications in the order in which they are received. This means that complicated titles can often create large backlogs. Where title registration cannot be validated and therefore processed, a query known as a requisition is raised of the buyer's solicitor.

Andrew Robertson, head of customer policy at HMLR, states: *"In the first six months of 2017, our caseworkers sent over 450,000 requisitions, covering nearly 700,000 individual points. We send 5,500 requisitions daily: the equivalent of processing 139,000 updates to existing registers or 19,000 new title applications over the course of one year. And these numbers only show the cost to us. There is also, of course, a cost to conveyancers."* (Robertson, 2017)

While requisitions relating to the incorrect completion of required documentation are generally easily resolved, the key cause of frustration for the conveyancing community is the delay in receiving a substantive response to an application and the lack of practical guidance to allow solicitors to prepare applications in such a way to avoid the requisitions in the first place. There are also issues where third parties refuse to give consent for evidence required to clear titles of historic charges and encumbrances. Free-format requisitions are those which cannot be easily categorised and currently make up 25% of all cases (Robertson, 2017).

A major implication of this delay between completion and registration (often referred to as the 'registration gap') is that during this period the new owner is not able to raise debt or finance the property and holds no official rights over its occupation. So common is this delay that clauses exist in most contracts for the seller (and registered legal owner) to act on behalf of the buyer while the requisitions are dealt with.

It is suggested that more transparent information over the potential for requisitions on a particular title could be made available early on in a transaction to allow parties to prepare the requisite paperwork while there is still a commercial incentive to do so, thus saving time and money for all concerned.

3.2.1 Analysis of the causes for delay

The most causes for delay exist within the due diligence period of a commercial real estate transaction.

It is evident that many of the identified causes for delay represent either a data storage or transfer issue. If we were to start from new, and design an ideal system for modern property transactions, what steps would need to be implemented?

All participants to the mapping process agreed that an openly accessible, single pool of up to date, standardised property information could reduce most of the bottlenecks highlighted, although concerns over the implications this would have for data security would remain. This follows IPF (2004), which concluded that there is no one ideal source of transaction data for commercial real estate.

It was suggested that not all information needs to be standardised, but if each property carried with it an industry-defined set of required up-to-date information that would impact most on its ease of transaction, this would be a good start. This information could be traded along with the title of a property and form a necessary foundation upon which technology can be iteratively laid. This leads to ideas about 'property passports' or 'log books'.

A 2018 report from the British Property Federation and Future Cities Catapult cited the establishment of a property passport as one of the key drivers to foster innovation within the real estate industry:

“Data and information about built assets will play an increasingly important role in enabling innovation

and creating more frictionless transactions across the property lifecycle. Whilst initiatives such as BIM [Building Information Modelling] will create more consistent asset information in the future, data about the mass of existing property will continue to be unstructured. Organisations such as RICS, the Centre for Digital Built Britain, BPF and BEIS should work together and with industry to develop a property passport. This would be a data standard for core information to be generated and maintained throughout the property lifecycle and for different users. This might include core asset, financial and building performance information, and could build on recent BEIS consultation on standards for smart systems and a flexible energy system. Our recommendation is for the property industry and government to work together to set up a property passport with common data standards for core information.” (BPF and FCC, 2018).

However, the impact of technology will (in the absence of top-down regulatory change) be restrained by old-fashioned risk aversion and conservatism. If we can imagine the veracity of the data held in a property passport being guaranteed and backed by representations and warranties insurance, then the due diligence phase may be significantly quicker. Insurance packages will seek to provide protection against false or missing information. Lower insurance premiums could be offered to landlords in exchange for accurate information, enabling a more accurate predictor of risk. Similar enhanced terms could be offered by lending organisations who have a vested interest in compiling as much accurate and up to date information about a property as possible.

Property passports and many other digitalised technology applications are considered fully in Chapter 4.

4. The future of real estate transactions

4.1 Introduction

In Chapter 3, we identified the causes for delay in commercial real estate transactions. It is clear that removing these bottlenecks would speed up property transactions. The aim of this chapter is to explore how this may be achieved. Amongst others, Dijkstra (2017) points us towards digital technology: *“Contracts, transactions, and the (associated) records ... are fundamental for the commercial real estate industry. However, the management of those assets has not kept up with the economy’s digital transformation”* (Dijkstra, 2017).

Before we embark on what may appear to be an optimistic vision of the near future, we should attach a couple of reservations. First, some of the potential solutions are being developed specifically for the high street conveyancing firms and the commodity-like residential markets. Second, the size and complexity of larger institutional transactions, and the capital sums involved for both equity and debt investor, may severely limit the appetite of the major actors to transfer risk management measures away from trusted human and towards machines.

Notwithstanding these reservations, we believe that the correct regulatory environment coupled with a group of currently available or emerging technologies could facilitate an openly accessible, single pool of up-to-date, standardised property information which will act as a foundation for more efficient transactions. In this chapter we will draw on an extensive literature review and interviews to highlight the operational, regulatory and social barriers which need to be overcome before technology can flourish.

4.2 Digitalising the transaction process

Given the size of the asset class and the money involved, it is not surprising that the world of real estate is awash with new companies and technologies attempting to automate and innovate almost every stage of the transaction process. Start-ups offering products to streamline the transaction process are underpinned by a number of key technologies, utilised in differing quantities and combinations.

4.2.1 Satellites and drones

Satellite technology allows boundaries to be inspected using a multitude of new imaging methods. Orbital Witness and Nimbus Maps both use satellite imagery to innovate the preliminary investigations of title, while digitalised techniques are also being used to assess the physical condition of properties. The real estate industry is currently the second biggest user of commercial drone technology (after photography). It is becoming an essential part of the necessary due diligence undertaken for a real estate transaction, as well as enabling the use of aerial photography during the marketing period. *“Drones can survey potential sites and conduct inspections quickly, increasing the efficiency of site selection, inspections, regular maintenance and more. They can also reduce risks by ensuring all parties have more comprehensive and thorough information about a property. They make conducting inspections safer, as they eliminate or reduce the need for someone to climb up onto roofs and other*

tall structures to perform them.” (Welles, 2018).



Figure 9: Marketing footage from a drone
Source: Drone Dispatch, 2017

4.2.2 Blockchain transactions: smart contracts

Blockchain technology

Blockchain offers a new way of storing, accessing and processing digitalised information. Blockchain files are intended to be immutable and held in a decentralised manner (distributed ledger technology) enabling access for trusted parties. This openly accessible, real time, ‘single point of truth’ is the key factor leading to the current experimentation with blockchain in all major sectors of the economy.

Blockchain is also said to offer durability, because there is no centralised repository. It would not be possible for a natural disaster or a cyber attack to disable the many discrete repositories of the blockchain. As any one party cannot alter the chain unilaterally, it also offers a greater degree of transparency and authenticity over more conventional architectures, which can potentially be tampered with.

For a more detailed explanation of the underlying distributed ledger technology or “blockchain”, please refer to Saïd Business School (2017): *Proptech 3.0: The Future of Real Estate, Chapter 7*.

Blockchain has the capability to transform all global ownership records and transaction processes for every conceivable asset type. It has spawned a generation of apostles: see, for example, Tapscott and Tapscott, 2016. In *Blockchain: Towards Disruption in the Real Estate Sector*, Dijkstra (2017) summarises the potential effects of blockchain technology on the real estate transaction process:

“A first major change through the application of blockchain lies in the registration and processes of

real estate titles, due diligence processes, simplification of currently complex transactions, faster turnaround times of transactions and more liquidity. Blockchain's technology allows contracts to be smart and can therefore be executed under predetermined conditions. Real estate finance can also be further automated with Blockchain, or it can contribute to the simplification of crowdfunding. The big advantage of these movements is that the real estate market will become more transparent, the quality of real estate data will increase, and fraud prevention becomes more effective."

Blockchain is not a single operating system, but the underlying technology upon which different protocols are built. Ethereum is one of the major blockchain protocols currently in existence, along with Bitcoin, Ripple and HyperLedger. Each protocol has its own unique blockchain code and each has advantages over the other in terms of transaction speeds, storage capabilities and application. The Ethereum blockchain is currently the most relevant of these, due to its enhanced ability to power smart contracts.

A 'smart contract' is the name given to a piece of computer code that is capable of monitoring, executing and enforcing an agreement (Szabo, 1996). It has been suggested that smart contracts, in conjunction with distributed ledger technology, would be a way of revolutionising real estate transactions. For example, a smart contract could simultaneously transfer funds from buyer to seller while registering the buyer as the new real estate title holder, once all contracts had been digitally signed, exchanged and validated.

Deloitte (2017) hypothesise how a new blockchain based model of transacting real estate could function, shown in Figure 10.

Residential-focused smart contracts are being piloted to varying degrees of success by start-ups ChromaWay in Sweden, and Propy, predominantly in the USA, but also facilitating cross border transactions, as well as the Cook County Recorder of Deeds, USA, and HMLR, England and Wales.

The ChromaWay model

In their 2017 report *Blockchain and real estate: mining unexplored terrain*, Deloitte state that a serious inefficiency under the present conveyancing process is that "*auditors, banks, financial authorities, appraisers and owners each individually have to validate the data which they receive. All these validations result in higher transaction costs in the brokerage, legal, recording, and banker fees*" (Deloitte, 2017).

ChromaWay, based in Sweden, has developed a private blockchain-based transaction system to eliminate the need for multiple verifications of the same data. In June 2018, they revealed a live demonstration of a fully integrated blockchain transaction involving collaboration from the Swedish land registry as well as numerous IT companies. In the press release for this event, it was stated that the pilot was aimed at solving the regulatory issues surrounding blockchain real estate transactions (ChromaWay, 2018).

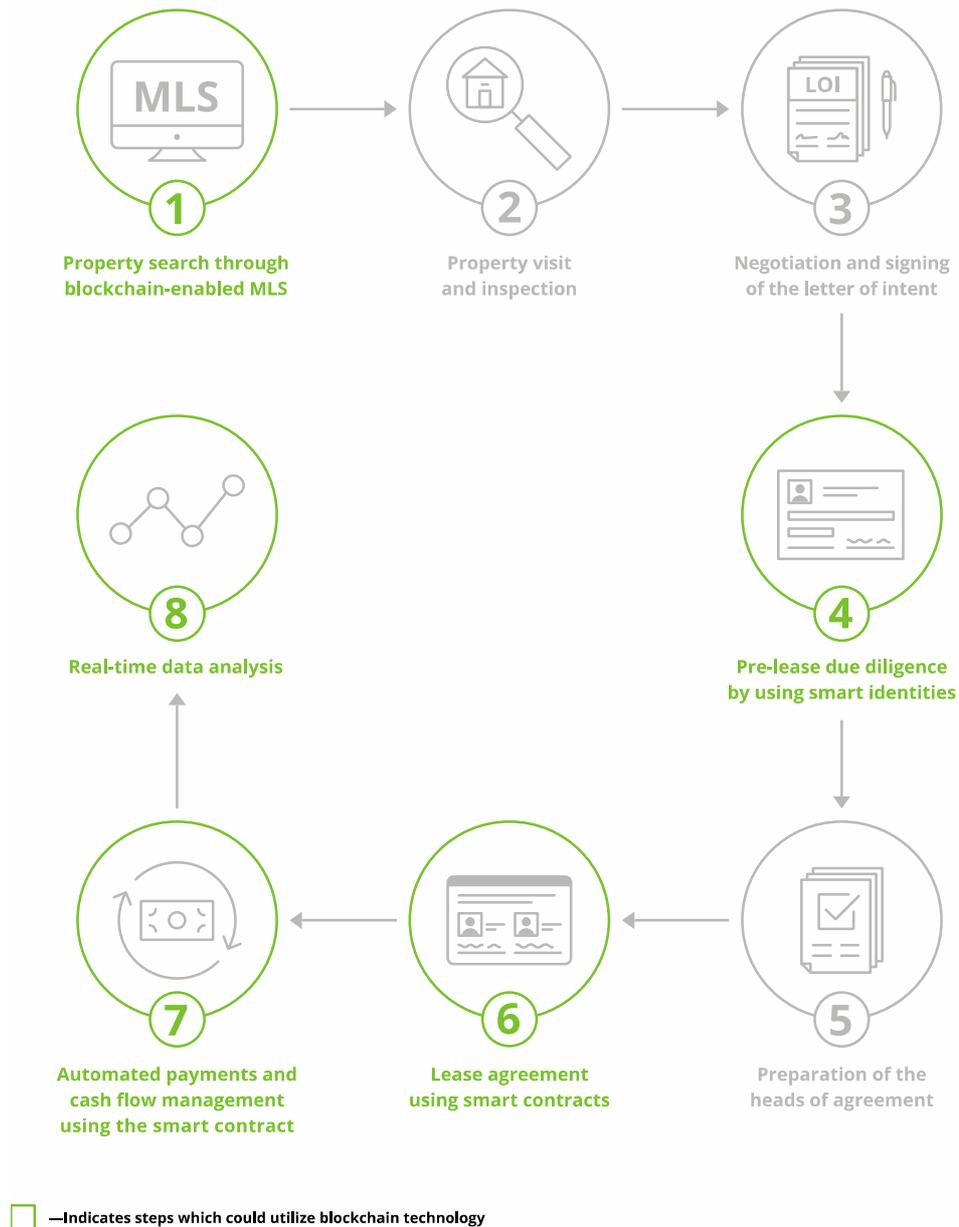


Figure 10: Using blockchain in a commercial real estate transaction
Source: Deloitte, 2017

Two key barriers emerged from this process. The first involved problems around identity verification, with the demonstration using existing centralised technology to validate signatures throughout the chain of transactions. The second related to the legal recognition of blockchain-based contracts, with the necessary contracts still needing to be converted into an EU standard format to be independently evaluated. It is estimated that the successful development and implementation of their platform could save Swedish taxpayers over €100 million a year (Fraser, 2018b), but the cost of the necessary regulatory change was not estimated.

The Propy model

Propy are one of several companies credited with the world’s first ever blockchain-based property transaction. In November 2017, Propy brokered the sale of an apartment in Kiev, Ukraine, to Michael Arrington, co-founder of the technology media website TechCrunch, for \$60,000 via smart contracts on the Ethereum blockchain. They have since gone on to sell numerous properties in a similar fashion in California and Vermont, USA, and in 2018 were involved in selling an Italian 17th century mansion valued at around €40m by way of blockchain-based auction.

Due to legal constraints, blockchain-based transaction companies such as Propy are obliged to follow the existing structure of a real estate transaction while recording each phase in a parallel blockchain procedure. Any transaction documents must also be registered through the traditional ‘wet ink’ methods with the appropriate government registry. A copy of a Propy title registry document can be seen in Figure 11.

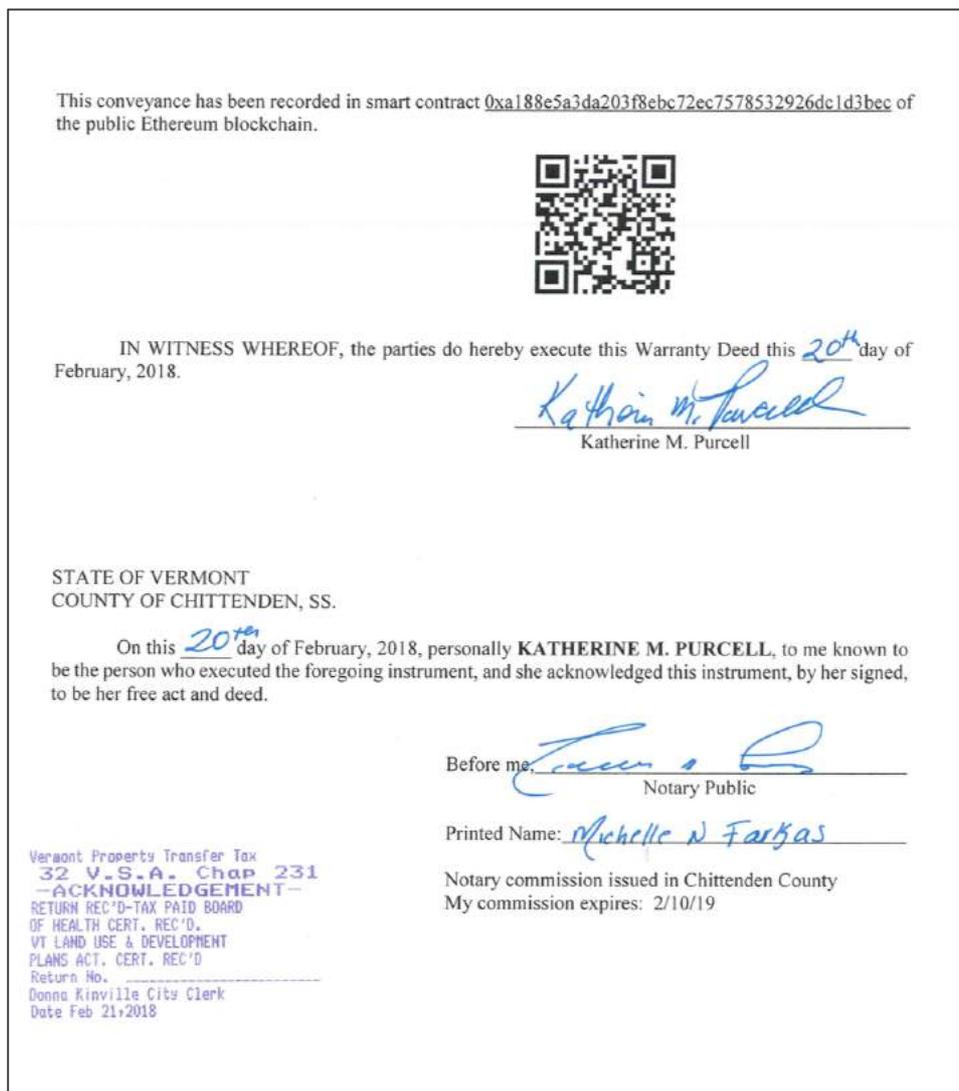


Figure 11: A Propy blockchain title registry document
Source: Propy, 2018

The duplication of processes currently occurring with blockchain property transactions eliminates a lot of the potential efficiency gains of this new technology. Propy says it intends to navigate these legal constraints through providing a core blockchain framework which requires minimal customisation: *“we intend to incorporate a modular system into Propy’s smart contracts platform that allows regional governments to provide local rules and regulations related to real estate transactions.”* (Propy, 2018).

Cook County Recorder of Deeds pilot

A pilot by the Cook County, Illinois, USA Recorder of Deeds in 2016 *“designed a blockchain real estate conveyance software workflow that can be a framework for the first legal blockchain conveyance in Illinois and possibly the US”*. While this pilot software was deemed to have fulfilled its intended outcomes, a report by Spielman (2016) concluded that the new system would not be adopted. The key reasons cited were a lack of critical mass and social acceptance: *“If the use of blockchain were to be extended to the maintenance of a records system, it would be most optimal if the record-keeping ledger were to be distributed across all land records offices in Illinois, allowing economies of scale and the ability to create true distributed consensus. With the CCRD office slated for consolidation with the Cook County Clerk by 2020, it is not prudent to undertake any large conversion effort without knowing the commitment of the elected official who will ultimately run the combined office.”*

A similar story occurred in the Pelotas and Morro Redondo municipalities of the state of Rio Grande do Sul, Brazil, when blockchain start-up Ubiquity completed a successful pilot in 2017. Conclusions in the report from Flores et al. (2017) found that the system was not adopted due to opposition from officials who feared being replaced, and the high costs associated with implementation.

HMLR blockchain investigation

After their May 2018 exploration into how blockchain is capable of improving the transparency of the property buying and selling process, HMLR’s Digital Street is investigating the potential for blockchain to enable users to sign an agreement and deliver the transfer digitally. This process can remove the duplication of ID verification from the buying and selling process whereby a buyer might have to prove identity to both lawyer and mortgage lender. Additionally, it is intended to show that such smart contracts can speed automation, for example to move funds and to update the land register (Ledger Insights, 2018).

They are doing so in partnership with enterprise blockchain software firm R3 and their Corda blockchain. Corda is already being used in industries from financial services to healthcare, shipping, insurance and more. Originally the plan was for HMLR to complete research and development by March 2019, but progress has been slower than scheduled and the timeline is already delayed.

Blockchain interoperability

There is no single blockchain platform that is the market leader for real estate transactions (PlaceTech, 2018). With interoperability, concern about picking the ‘wrong system’ would be minimised. In future agents could buy and sell property via a blockchain on each of their preferred platforms, meaning property sales and auctions using this technology could become commonplace. The development of interoperable blockchain based transaction platforms is hypothesised by Graglia and Mellon (2018) in Figure 12.

Level	Name	Description
0	No Integration	No use of blockchain
1	Blockchain Recording	Public blockchain used to record documents related to land transactions
2	Smart Workflow	Blockchain used to record progress of a transaction
3	Smart Escrow	Smart contracts used for escrowing payment
4	Blockchain Registry	Central database replaced with a permissioned blockchain
5	Disaggregated Rights	Various rights to a single parcel are disaggregated and managed via blockchain
6	Fractional Rights	Rights for a given parcel are fragmented and managed via blockchain
7	Peer-to-Peer Transactions	Rights are transacted without intermediaries on Level 4 system
8	Interoperability	Different blockchain registries merge

*Figure 12: The levels of blockchain integration into real estate transactions
Source: Graglia and Mellon, 2018*

Interoperability is unlikely to become a reality any time soon as it would require the development, use and interaction of blockchain-based systems for all parties in a transaction including registries, banks, buyers and sellers, while there also exist huge difficulties in writing the complex and specific legal requirements of any individual transaction into the code of a smart contract.

4.2.3 Property passports: IoT and BIM

Many of the identified blockages in the commercial conveyancing process surround the lack of openly accessible information concerning a particular piece of property. The transaction mapping process

confirmed the benefit of clients providing time for seller's lawyers to produce good quality due diligence information (often located on data sites). With technical, legal, financial and environmental due diligence all currently requiring separate procedures, there are plenty of Proptech and LegalTech start-up companies focusing on alleviating each of these issues. However, the most innovative, and therefore most challenging, of ideas has come from companies taking a more comprehensive approach to the due diligence process, attempting to create property passports.

Property passports

"The relationship between Blockchain and real estate has not yet been proven in practice. It is expected to develop further in the form of registering transaction processes and the DNA passport of a real estate object" (Veuger, 2018).

The idea of a property passport is a simple one: to store all the information relating to an individual property in its own unique digital data file, to be maintained by the owner or tenant and transferred along with the title. Some proponents argue that tying the data required for a transaction to the plot of land to be traded in the form of a property passport, rather than distributing this data to and across owners and adviser, could be the most important idea currently being developed.

While blockchain offers transparency and auditability of information contained within a property passport, it is not essential to its creation. Dijkstra (2017) suggests that creating a solid, trustworthy and reliable digital identification of a building is inevitable for the future transaction process, but digitalisation does not need blockchain. A property passport which sits at the nexus of many new technologies, combining official land registry title documentation with data from technologies such as Internet of Things and Building Information Models, could create a 'digital twin' of both the functioning and rights over an asset. In the most optimistic minds, a complete property passport serves to warrant a higher asking price at re-sale, providing a motivation for owners to keep information correct and up to date.

The potential for certain information contained within a property passport to be made available to prospective buyers also answers any concerns raised around the unfavourable timing of defect disclosure during the real estate transaction process. In a report into the England and Wales residential conveyancing industry, the New Statesman (2018) writes: *"The most talked-about change to the way of doing business is making sure that there is much more information available about a property at the point that it is put onto the market"*.

Attempts have been made in the past to create an industry standard where all information is provided upfront to reduce abortive transactions. In England and Wales, Part 5 of the Housing Act 2004 required that a Home Information Pack (sometimes called a Seller's Pack) was to be provided before a property in England and Wales could be put on the open market for sale with vacant possession. The pack contained a set of documents about the property including searches and surveys, a cost to the seller, previously borne by the buyer.

The scheme started in 2007 (coinciding with the 2007-2009 housing market slump) and was suspended in 2010. Ultimately, such schemes seem doomed by the principle of *caveat emptor*. A buyer's solicitor will only rely on a seller's information if the seller is prepared to guarantee the accuracy of that information. In the event of an error in that information, which leads to loss, the buyer will have a recourse against the seller. Similarly, unless the seller is prepared to guarantee the accuracy of its information to a lender, the lender will do its own due diligence to mitigate risk.

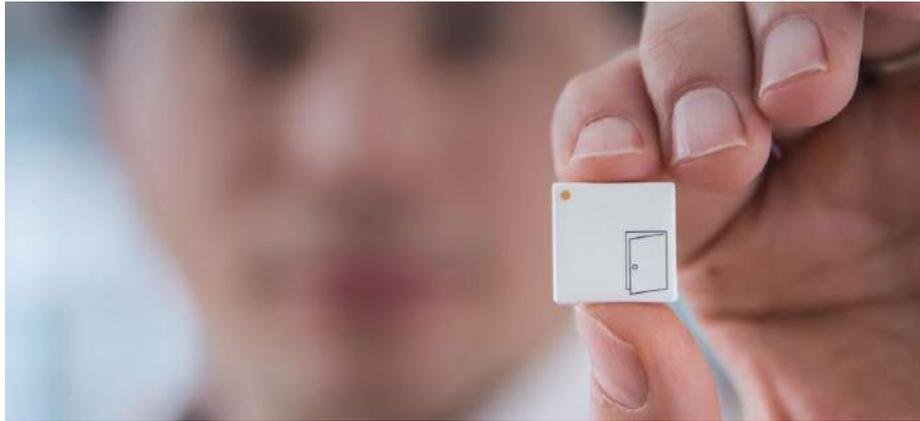
The Investment Property Forum published its Readiness for Sale guide (IPF, 2012), again suggesting that required information is readily available in a single, accessible location. It is a useful checklist when preparing for a sale. Sellers' solicitors often use data sites for this, but the systems between different firms and parties are not always easily compatible. Potential solutions are likely to emerge from the private sector, which is currently thinking about ways to incentivise owners to maintain digital property passports. Companies attempting to provide similar such services include *Architrave*, *Chimni*, *Property Made Liquid*, *Search Acumen*, *Nimbus Maps*, *Orbital Witness* and *Home Owner's Passport*.

It is unclear how these new product offerings intend to get around the problems posed by *caveat emptor*. Any inaccuracy in the data held in a property passport would lead to a claim against the vendor which would have to be backed by an insurance contract. The insurance industry already offers protection through 'representation and warranty' insurance for larger commercial and institutional transactions; this product would need to be offered much more widely, and possibly made mandatory in any conveyance.

While iterative steps can be made using current technologies and existing APIs, a comprehensive and transparent property passport in the form envisaged will require the integration of many emerging technologies, namely Internet of Things and Building Information Modelling.

The Internet of Things

The smart building movement is based around the ability to record and act upon data produced within any property. In order for operational efficiency gains to occur, there needs to be a way to capture the data required. Micro-sensor technology provides the toolkit with which emerging Proptech companies have begun to experiment as micro-sensor technology has developed.



*Figure 13: A wireless IoT sensor
Source: Disruptive Technologies, 2018*

With the development of ever smaller, cheaper and smarter sensors, potentially located within other devices (even lightbulbs: see Goeee), the real value for the real estate industry comes in the connectivity between the individual sensors and platforms able to record their output. This connectivity between devices and sensors of any sort has been labelled the 'Internet of Things' or IoT.

Proptech companies in this field range from Disruptive Technologies, who have built the world's smallest wireless IoT sensor (Figure 13) which can be discreetly placed around an office to measure energy usage or desk availability, to Asset Mapping, who are creating an IoT based platform to deliver real time building facilities management analytics

Building Information Modelling

Another increase in real estate information transparency could come with the further development of Building Information Modelling (BIM) technology. The US National Building Information Model Standard Project Committee uses the following definition:

"Building Information Modelling (BIM) is a digital representation of physical and functional characteristics of a facility. A BIM is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition" (NBS, 2014).

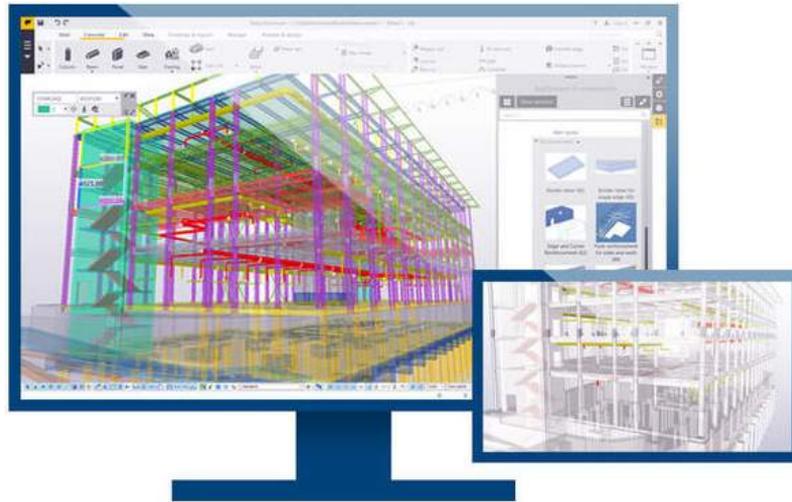


Figure 14: An example BIM platform
Source: Tekla, 2018

In essence, BIM can be thought of as a digital simulation or 'twin' for any property that is modelled, initially associated with the architecture and construction industries but increasingly used throughout a building's lifecycle, as shown in Figure 15.

"Today, the creation of digital assets, such as an avatar of a building, will provide better control management and data. This will help lower costs and risks during the construction and the lifetime of buildings since it will require less rework, change orders and errors on site." (Melki, 2018).



Figure 15: Applications of BIM for differing users during a building’s lifecycle
 Source: NBS, 2013

“Stakeholders in a project will not need to guess or verify if they have the most recent version of a survey, floorplans or time schedule. All of these facets of a project will be integrated in real time and be accessible to all parties.” (Archambault, 2018).

However, the impact of BIM on transactions will be limited to new buildings for some time. Much of the information on historic developments will be unavailable or held in incompatible formats, and the task of retrofitting a BIM model is unlikely to be cost effective.

4.2.4 Artificial intelligence and machine learning: lease information extraction, AVMs and instant mortgages, VR/AR

Artificial Intelligence and Machine Learning are two terms often confused. According to Marr, (2016): *“In short, the best answer is that: Artificial Intelligence is the broader concept of machines being able to carry out tasks in a way that we would consider “smart”. Machine Learning is a current application of AI based around the idea that we should really just be able to give machines access to data and let them learn for themselves.”*

The potential deployment of Artificial Intelligence (AI) and Machine Learning (ML) within real estate suggests a boom in new models for predictive analytics. This could see a shift in the way properties are identified, valued, marketed, negotiated, financed, managed and disposed. While its applications are of more obvious use in the capital markets, in the context of this report AI and ML are also enabling

the collection and standardisation of digitalised real estate data, all be it into the hands of private organisations.

Lease information extraction

Differing data formats has been identified as a key cause of many of the bottlenecks identified in the commercial conveyancing process.

Advances in artificial intelligence combined with machine learning protocols has generated a new era of image recognition software. The increased processing power of machines over humans enables them to handle large data sets in a fraction of the time. These advances have led to a rise of document recognition software such as Leverton, Kira, Proda and HighQ. These programmes are taught to extract, digitalise and compile all the relevant data from a scanned paper document.

However, with no standard industry wide lease format used, the technology is not instantly applicable across all firms, and must be specifically applied and taught each individual organisation protocol. This leads to frequent teething problems in accuracy. The current lease data extraction platforms also have difficulties interfacing with other commonly-used software systems across the conveyancing and real estate industries.

While lease information extraction technologies may still not be perfect, their goal to digitalise real estate data is key to the functioning of many other AI based technologies: *“If [property] information is correct and up to date, the whole due diligence process may change ... since all transaction history and information of properties is available, valuations can become automatic.”* (Dijkstra, 2017)

Automated valuation models

Property valuations are commonly required in order for buyers to formulate investment decisions and to establish a fair asking price. Stale valuations can elongate the negotiation period, as sellers might have unrealistic expectations based on out of date transaction evidence (Baum and Hartzell, 2011). The valuation also affects debt financing, as loan-to-value ratios are usually key conditions imposed by lenders.

Automated Valuation Models (AVMs) utilise machine learning to make predictions about the price of any individual property based on publicly available real estate, economic, spatial and increasingly so called ‘alternative’ data sets. Much of the information input to these models can be accessed through ‘scraping’ the websites of large real estate brokers. Scraping is a term used in data science to describe the use of computer code to extract relevant information from a third-party website for use within another model or database. Information can be scraped and updated in real time, enabling an AVM to refine future predictions.

Crucially, these models might avoid the stale valuation problem, as a relationship with stock and bond markets (for example) might be established so that a fall in the financial markets might indicate a fall

in house prices even in the absence of comparable transaction evidence. In a world in which all properties on the market are listed, with an independent and public valuation discoverable by the seller, the buyer and lenders, the transaction process would be faster, and the liquidity of this huge asset class would be greatly improved.

The success of residential AVMs has been proven by a US group known as the iBuyers, consisting predominantly of Opendoor, the recent recipient of US\$400m from Softbank's Vision Fund, and OfferPad. In the UK, residential AVMs are being pioneered by Hometrack, owned by listing site Zoopla, as well as start-ups Nested and Proportunity. Their proposition is simple: they will offer a potential seller of a property an instant purchase at a guaranteed price. This price is determined by the lower boundary error rate of their AVM, which typically sits far below market price. The iBuyers then make money on the subsequent open market resale, while the original seller has benefited from a hassle-free transaction and earlier receipt of funds.

The more digitalised data AVMs are able to factor in, the more accurate they become, and the less risk is involved in any purchase. In time, it is feasible that an AVM could be fed via data held within property passports and purchasing companies will be able to guarantee instant offers at, or very near to fair market value.

However, the requirements for commercial property valuations are significantly different and many believe that an accurate AVM will prove difficult to achieve. GeoPhy is one company attempting to dispel this assumption. The GeoPhy website claims that their current model has a median absolute prediction error of 7.9%, meaning their average predicted asset value is 7.9% higher or lower than the actual eventual transaction price. This is deemed to be twice as accurate as traditional appraisals for commercial real estate (GeoPhy, 2018), a claim that requires serious examination.

Instant mortgages

As examples suggest, having the ability to accurately determine what a property might be worth can aid mortgage lenders and banks in establishing the amount they are willing to loan. The advantages of using AVMs over traditional asset appraisals are that they can reduce the cost and time employed in valuing a property – and they do not offer the risk of fraud potentially associated with self-seeking appraisers.

One UK-based company selling their AVM as a service to mortgage lenders is Hometrack. As the data provider behind Zoopla's upcoming 'property valuation report' feature, Hometrack states that 12 out of 15 of the UK's largest mortgage lenders use their AVM, accredited by all of the major rating agencies, to *"give lenders lower costs and a faster time to yes, without increasing risk."* (Hometrack, 2018)

From this foundation, HM Land Registry is exploring how it might assist in the development of instant mortgages as part of the Digital Street initiative. While HMLR is not developing this idea in house, the goal is to be able to understand changes in the way real estate is transacted and to help to facilitate any new system, speeding up the home buying process through enabling access to the right

information from the right sources earlier (Tombs, 2018). HM Land Registry's willingness to cooperate with anyone with instant mortgage capabilities will enhance the strength and accuracy of any underlying ML based system.

Virtual and augmented reality

Crosby and McAllister (2004) discovered that the longest time required for any commercial real estate transaction over the period of their UK study was in the marketing period. Therefore, any technology which is able to bring increased efficiency to the way in which buyers and sellers are connected could reduce overall transaction times.

Virtual and augmented reality offer a new way of using artificial intelligence to visualise previously two-dimensional floor plans and photos, offering an interactive three-dimensional video model of a piece of real estate, able to be accessed remotely and cheaply. With real estate trades becoming increasingly international, VR and AR technology can help to reducing wasted trips and sight visits.



Figure 16: Virtual reality viewings
Sources: Morley, 2017. Augment, 2016.

Additional applications of AI

Kurilyak (2018) compiled a list of examples of technology applications that could indirectly impact on the real estate transaction process. These include the following:

Automated underwriting process: machine learning can be used to analyse income data. This will help to speed the underwriting process of debt and equity invested in commercial real estate.

Predicting time to close: machine learning technologies can also predict the expected time of closing a property in a market taking into account factors like market cycles and season.

Effective lead management: machine learning can analyse historical sales records to predict the properties that are most likely to sell within a certain time frame and assist in planning for a realistic marketing period.

Report generation: machine learning and natural language generation can help to prepare consolidated reports which are useful during due diligence.

Deal matching: investors can use machine learning to identify properties that match their criteria and to avoid wasting time on properties that do not fall within their investment parameters.

4.2.5 Digitalising land registration: chatbots

HMLR are convinced of the benefits of the digitalisation of their services. Digitalising land records would allow them to connect with all other agencies involved in an individual conveyance such as planning, utilities and culture, enabling the frictionless access, transfer, automation and validation of required information. A digitalised database allows users to conduct quicker title searches and provides powerful protection against double registration.

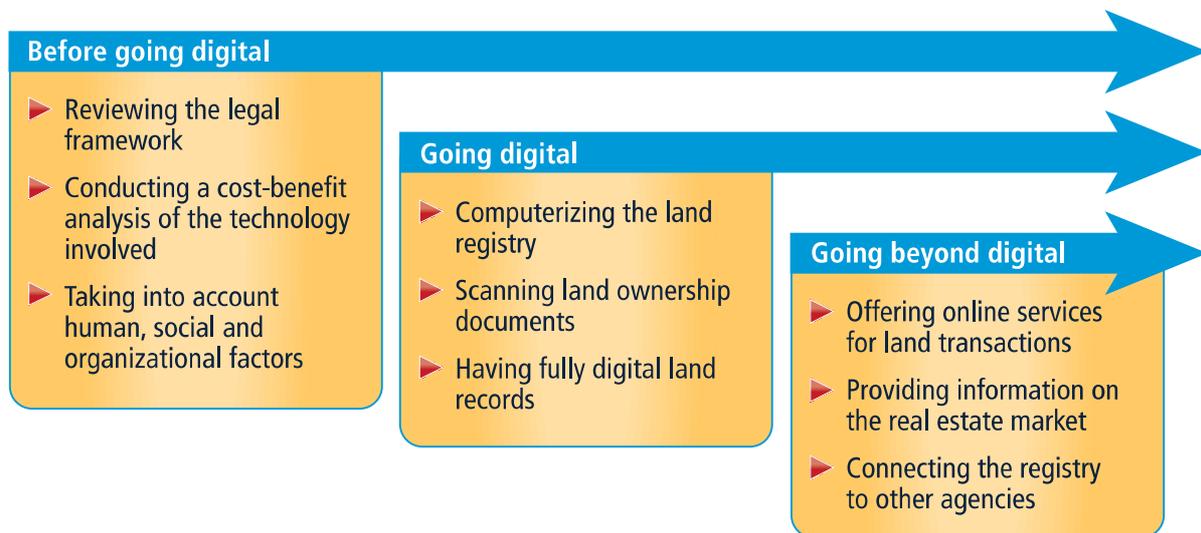


Figure 17: Stages of digitalising land records
Source: World Bank, 2016

While the submission of information in pdf documents causes conveyancers to make mistakes, the increased use of digitalised forms would guide the conveyancer towards more compliant submissions more of the time. In turn, these more accurate data sets would provide better insight for the property market itself.

Ironically, it is countries without a history of land registration, or indeed a strong tradition of land rights, that now have more technologically advanced registries. Examples of this are in countries formerly under Soviet control and without private property rights, such as Moldova, Estonia and Georgia. There, it has been possible to start with a clean slate, harnessing the power of the internet to create digital end-to-end systems which integrate land mapping, land registration, land valuation and land taxation under one ministry. This contrasts with the situation in England and Wales, where a system of land registration originally devised in the Victorian era is currently under the process of modernisation.

Figure 18 provides an indicative timeline of how HM Land Registry plans to transition towards a fully digitalised land registration system by 2021.

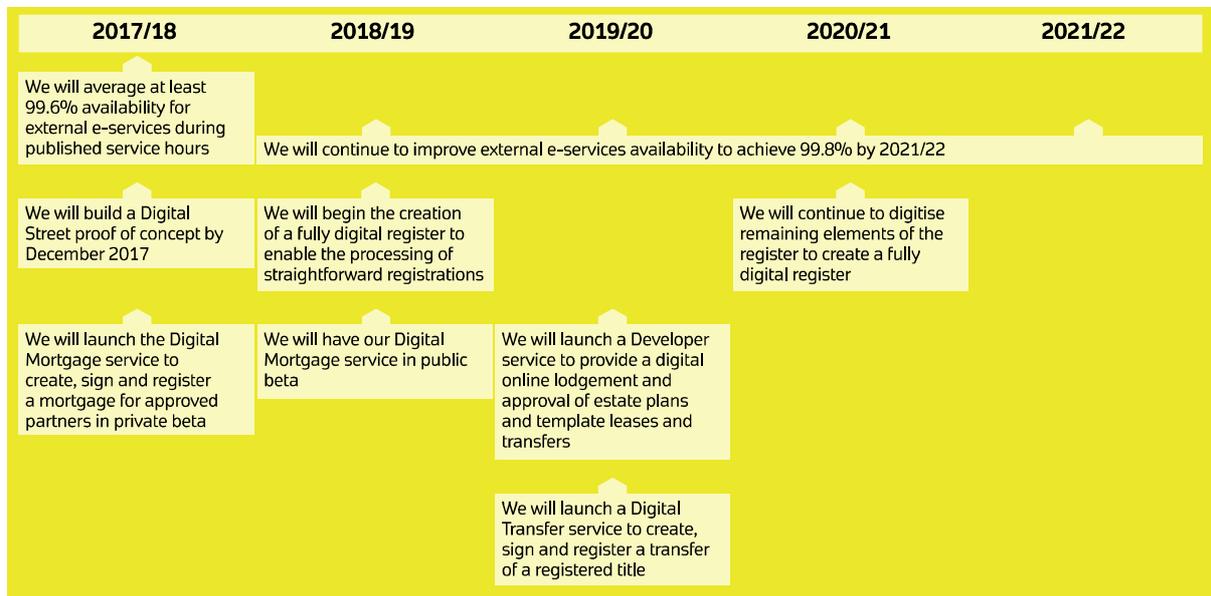


Figure 18: Her Majesty's Land Registry digitalisation targets
Source: HMLR, 2017

HMLR's Business Strategy 2017-2022 set out an intention to create a digital register to maximise the accessibility and re-use of their data. They will be doing so with the aid of a newly launched initiative called Digital Street, aimed at propelling England and Wales to the forefront of global land registration innovation. Digital Street will "provide an opportunity to work closely with proptech, fintech and lawtech start-ups and innovative businesses, such as challenger banks, to explore how a digital register might enable new business models to make conveyancing simpler, faster and cheaper" (HMLR, 2017).

Speaking of the project in 2018, John Abbott, director of digital, data and technology at HMLR, revealed "we've already created a digital register for a small selection of properties, which is a first step towards having a register that is fully machine-readable and able to be updated instantly" (Abbott, 2018). This digitalisation of the English and Welsh land register is being explored through the application of blockchain and artificial intelligence technologies. HMLR believe blockchain might be give them "the ability to operate and update in a secure and tamper-proof manner", while "AI might assist conveyancers by processing and interpreting data from the register and taking unstructured data from documents to automatically identify the main information needed to complete the transaction" (HMLR, 2017).

The ongoing second phase of the Digital Street project has seen HM Land Registry partner with software company Methods, who have been charged with assembling a team of global blockchain experts to expand upon these initial trials. John Reynolds, Innovation and Delivery Director at consultancy *Blockchain Digital*, commented: "Digital Street and blockchain has the potential to synchronise and optimise the way all participants in the property market interact, from solicitors to

banks, from surveyors to estate agents” (HMLR, 2018a).

With digitalised data and machine learning comes the ability for chatbots, automated online question and answer simulations able to interface with customers at all hours of the day. HM Land Registry’s Digital Street project is exploring using this idea through the ‘Property Assistant’ concept. Property Assistant will hope to offer instant help and advice about the steps homebuyers need to take to purchase a home and make the process easier to understand.

By using machine learning to identify any potential hazards (such as a high risk of flooding) or covenants restricting certain uses at the beginning of the purchasing process, HMLR hope that Property Assistant will help to reduce delays caused later through their requisition protocol. The Property Assistant chatbot concept interface can be seen in Figure 19.

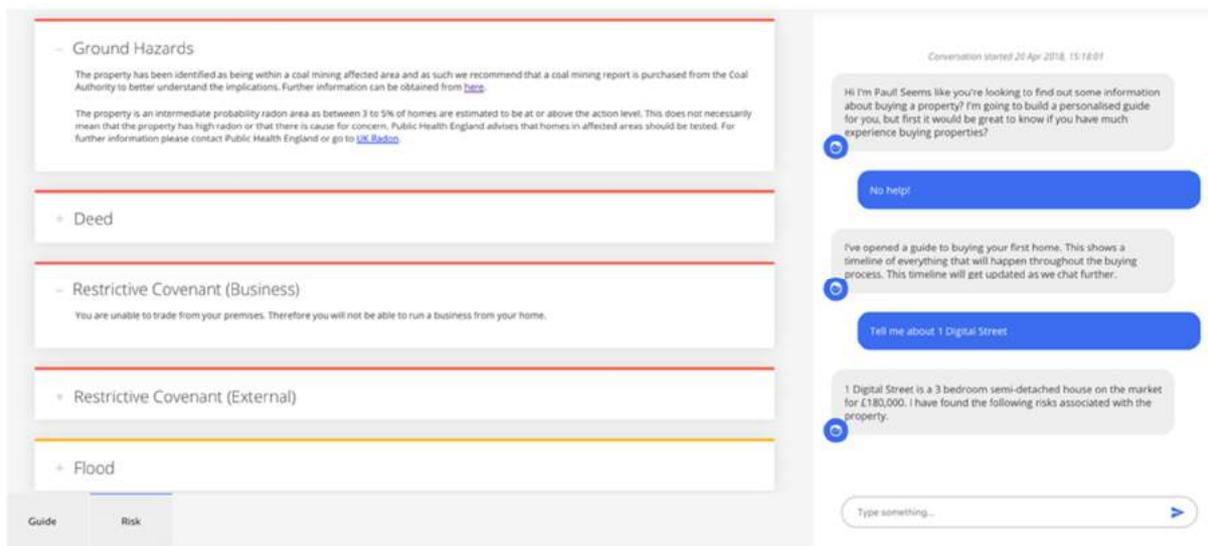


Figure 19: Digital Street chatbot concept interface
Source: Tombs, 2018

If we compare this user-friendly interface with the example HMLR title document reproduced in Appendix 1 we can see the value of a plain English and layperson-friendly interface. However, HMLR would not wish to assume liability for ‘translating’ conveyancing language into plain English. Such translation could potentially alter proprietary rights, and therefore leave them open to claims.

It is also difficult to see why registered freeholders would volunteer to ‘clean up’ their own titles, unless there was a clear financial advantage to them. Even if they did so, they could not unilaterally arrive at a declaration as to their liabilities to surrounding landowners or other third parties, so the process would have to be a consensual one.

Nevertheless, at least as far as residential and simpler commercial titles are concerned, we take the view that a revision of titles in both layout and language would be a substantial improvement in speeding up the transaction process.

4.2.6 *Blockchain land registration*

Blockchain has the potential to offer a wide range of benefits over even the most advanced current systems of land registration. If blockchain land recording is further developed, the real estate market could become more transparent as the availability and quality of real estate data will increase.

The increased liquidity realised from the open access to trusted, accurate data could radicalise the way in which we see real estate transacted. The need for title insurance will be reduced, as proof of ownership can be established indelibly on the blockchain. The creation of more complete and reliable property records will provide a valuable tool for analysts, regulators, and land management officials (Graglia and Mellon, 2018). Goldman Sachs estimate that the successful introduction of functioning blockchain technologies could lead to an annual savings of \$2-4 billion in the US real estate title insurance market alone (Goldman Sachs Group, 2016).

The nature of blockchain – a series of data blocks, linked in a chain, implying sequential additions of data every time an asset is sold – appears to mirror the deed system. It is possible, therefore, that blockchain adoption should be expected in countries using deeds rather than a common law title system as proof of land ownership. There is no central register of Bitcoin ownership; legal entitlement is evidenced by the last transfer, as with the deed system.

While in principle blockchain technology offers many benefits to the land registration process with positive knock-on effects for the real estate industry, procedural elements still need to be addressed. The initial bitcoin blockchain protocol envisaged a public blockchain refereed by independent data miners. It is inconceivable that HMLR will work this way. However, a private or hybrid blockchain authorised by HMLR and distributed via subscribing law firms can be imagined. Graglia and Mellon (2018), list seven pre-requisites needed for any successful blockchain land registry:

1. *An identity solution*

Existing identity validation systems are not based on blockchain platforms and therefore not built to run the necessary checks for KYC and AML regulation. SecureKey in Canada is perhaps the only national ID system currently residing on a blockchain but has yet to be included in any blockchain land registry trials. It makes no sense to impose a new digital ID requirement on all who transact on blockchain-based registry systems as this will severely limit the number of qualified participants. Previous attempts to drive technology into the conveyancing process proved that the chain is only as strong as the weakest link. Instead, an existing validated identity system will need to become accepted for a multitude of purposes. An established system will result in higher quality information and more widespread acceptance.

2. *Digitalised records*

Blockchain works on a computer algorithm to ensure the validity of any input information. This algorithmic process is known as hashing, where everyone needs the same copy of digitalised information in the same format in order for validation to occur. At present, there is no way to formulate a hash for a paper document, though it is possible to scan a paper document and hash that scan.

However, any subsequent scan of the same hard copy would have a different hash from the original due to minute differences in the copies. As it is this hashing that empowers blockchains to mitigate against the alteration of records, any paper or digitised document will not create a single verifiable version of truth. As a result, any registry needs to be completely digitalised before blockchain is integrated. Note that both Sweden and Georgia currently have fully digitalised land recording systems.

3. Multi-signature wallets

Current blockchain databases are accessed using a private key, a unique code known only to the transacting individual, often held in a secure online storage wallet. Problems arise with blockchain-based real estate transactions when an honest user's private key or storage wallet is stolen, lost, forgotten or manipulated by a third party. The encryption built into blockchain ensures that only those holding the associated keys can register or transfer a property, so there needs to be a way to recover the property associated with those keys in the event of any mishaps. One solution to this issue may be multiple signature wallets, which require verification by a minimum number of keys before a transaction is completed. A land registry private blockchain system could also require a registrar/notary to sign off on the transaction.

These multiple-signature wallets could be configured in any number of ways. The Law Society (2017b) reported that Fujitsu has developed transaction restriction technology requiring multiple holders of partial keys to prevent the misuse or abuse of keys based on pre-set policies for secure blockchain operations.

4. A private or hybrid blockchain

Blockchains can take the form of public ledgers, private ledgers or hybrids of the two. On a public chain there is only a record of the transactions by two willing parties identified by their public keys, a unique code known to the network for transaction identification purposes. Generally, if fraudulent data was entered and discovered, the only recourse for correction is another transaction reversing the prior entry. On a public chain, questions of enforcing real estate ownership in events such as divorce proceedings and inheritance are difficult to answer. In a hybrid chain, decisions can be tracked on a private chain accessed only by registered authorities, while hashes of the key documents can be recorded on a public chain to ensure their validity. This hybrid chain will enable the necessary adjustments by the registrar or judiciary to be made, which is critical when managing real assets.

The decentralised nature of public blockchains means that their storage capacity is at present limited to that of the combined total of all computers on the network. Registries contain deeds, titles, maps, plans, and so on. All of these documents must be stored somewhere. Public blockchains cannot viably store such large amounts of data. The solution is for registries to store the documents on a dedicated server and post the associated hashes to a public blockchain. If a blockchain-based record of the actual data rather than the associated hashes is desired, registries will need to use a private blockchain, capable of handling very demanding data storage requirements.

Registries need to know who is registering or transferring property records. Public blockchains allow anyone with the correct keys to broadcast valid transactions, regardless of who or what they are. A

private blockchain is needed if registries want to ensure that only parties who have validated their identity to the satisfaction of the authorities are transacting. If nothing else, tax authorities will not be content to hold a public key liable for stamp duty and other property taxes.

Percic (2018) feels that “*private blockchains offer nothing more than any traditional database can; any database can offer permissions, multiple input validation, multiple copies, append-only writes and logs of all people accessing it*”. This leads to a highly pertinent question: are blockchain registries really a better alternative to existing systems, or are they being hyped for publicity and brand elevation?

5. Accurate data

One of the merits of a blockchain is that it is ostensibly immutable, so it is important to make sure that any existing data that is transferred onto the blockchain is accurate. All existing registries, whether digital or paper-based, contain inaccuracies. Ideally, the registry should be cleaned and current before it is put onto an immutable platform. The reality is that any cleaning of a registry carries the risk of creating disputes that would hinder a transition for years. For example, digital records of land boundaries will on occasion clash with boundaries found on the ground, especially in a system of general boundaries as employed by HM and Registry.

6. Connectivity infrastructure and a tech aware population

Before a registry adopts a digitalised platform, they should consider the costs and support requirements that go with it. An initial response may be that these additional costs make a project unattractive, but the counterargument is that a new system should eliminate a number of prospective operating costs. Blockchain software is complex and the hardware requirements substantial. It is hard to imagine that most public agencies have the resources to take on these additional responsibilities. While in the future we may see servers employed and software distributed on a subscription basis, registry authorities will still incur the recurring costs of employing network experts. Network maintenance and troubleshooting costs will shift to the blockchain provider (as they would with existing service providers) who must be able to guarantee a very low rate of failure. This failure occurs most frequently in the secondary software associated with blockchains like wallets, exchanges, and smart contracts which can be soft targets for hackers. In jurisdictions where connectivity is limited, or consumers are not comfortable with digital transactions, a blockchain registry may not be optimal.

7. A trained professional community

It will be vital to engage the professional communities who will interact with the blockchain registry early on in any transition. For example, lawyers will need to understand a number of issues, including how to present and interpret records from the blockchain and how to harmonize evidence rules with output from the blockchain. To do any of those things, they will first need to be trained in the fundamental concepts, capabilities, and vocabulary of the blockchain. Even with a clear picture of the technical and structural requirements for a blockchain registry, a great deal of work will remain in the form of education and capacity building. Without this, blockchain adoption will be impossible. We are aware, for example, of two successful pilots for a blockchain land title registration system, while neither were adopted by their representative regional land registries.

Blockchain's application in England and Wales

“In the implementation of a blockchain based Land Registry system, one should not underestimate the complexity of the legal system, the meaning of the rights in rem [the legal recognition within any jurisdiction], the complexity and variety of different transactions and the (part played by) legal professionals in the chain of conveying immovable property. Without standardizing parts and elements of this process, this complexity may be the (barrier) to success”. (Dijkstra, 2017)

While HMLR may be vulnerable to human error, the same will be true of distributed ledger technology. The Chief Land Registrar has some authority to rectify mistakes, and if the mistake is beyond his or her power, then application can be made to the appropriate judicial body. It is unclear how this would work with a distributed ledger.

While not covered by our commercial transaction mapping, fraud is a major problem for residential conveyancers. It is unclear how distributed ledger technology on its own could guard against fraud. One of the criticisms of the New Zealand land registry, which is more advanced than HMLR in terms of its digital technology, is that it has made itself vulnerable to fraudsters. It is unclear how a fraud will be unwound if the blockchain is treated as the ‘one source of truth’.

Further, in England and Wales, property rights can be created informally. An example of this is proprietary estoppel, which arises when one party has acted in detrimental reliance on another's representation with regard to a piece of property. It is thought that blockchain would not be able to accommodate this valuable mechanism for unfair conduct, just as it would not be able to address issues such as rescission for misrepresentation or undue influence. Clearly, there would be a need for flexibility to be built into the architecture, so that judicial orders could be given effect. This, however, is at variance with the ethos of the blockchain where the code is the law. Just as with HMLR, blockchain architects will have to find a way to accommodate the difficulties of the description of rights over property and their inherent complexity.

The tokenisation of titles

Blockchain could also permit the efficient unbundling of property rights. A landowner could sell an easement to a neighbour quickly and cheaply. Investors could buy small shares in a rental property and receive their portion of the rent via an automated payment. In principle, this could allow individuals that cannot afford to buy entire parcels to invest relatively small amounts of money in real estate.

While highly unrealistic at present due to the distinct lack of digitalised real estate title information, blockchain-based land registries supporting the tokenisation of titles could have vast implications for financial inclusion, creating an international market for small real estate investments spread across multiple jurisdictions, introducing a class of real estate investors not limited by geography.

4.2.7 Analysis of applicable technologies

Figure 20 details the various technologies we have discussed in this chapter and their potential use in removing the blockages we identify in Chapter 3. We should stress that where we have identified the applicability of any technology, this does not mean that the cause for delay will be fully resolved, but only that the given technology may help to streamline the process.

	Blockchain transactions: smart contracts	Property passports: IoT & BIM	Satellites & drones	Lease information extraction	AVMs & instant mortgages	VR/AR	Digitalised land registry: chatbots	Blockchain land registration
#1: the vendor may not have maintained accurate or digital records of relevant information	✓	✓	✓	✓	✓	✓	✓	✓
#2: inconsistent approaches to data rooms	✓	✓		✓				
#3: performing adequate searches via under-resourced or non-motivated authorities and utilities companies		✓				✓	✓	✓
#4: identifying the correct parcel: no single, true plan		✓	✓				✓	✓
#5: completing standard enquiry forms: caveat emptor		✓	✓		✓	✓		✓
#6: reviewing and reporting using non-integrated software	✓	✓						
#7: filing for registration: a lack of transparency over requisitions and delays in registration							✓	✓

Figure 20: The applicability of technology to our causes for delay in the commercial transaction process

As we can see, the property passport concept seeks to resolve most of the causes for delay in the commercial transaction process and our analysis indicates this is the biggest enabler of broad real estate liquidity currently being developed.

The cause for delay with the greatest quantity of applicable technology is #1: that the vendor may not have maintained accurate or digital records of relevant information. This is closely followed by our cause for delay #5: completing standard enquiry forms: *caveat emptor*. This is likely due to the fact that the same technologies which seek to provide transparency and accuracy surrounding the condition of a property are replicable in both the marketing period and for completion of CPSEs.

4.3 Barriers to the adoption of technology

We can see that several technologies are being developed to reduce the time and cost of an average property transaction. However, the existence of a relevant technology alone does not automatically lead to its implementation. Regulation, innate conservatism, and a reluctance to commit to untried

innovations all play their part.

In the case of complicated, institutional sale and purchase transactions, conservatism appears easily justified. With larger commercial transactions, the negotiation of contractual terms may be protracted, and due diligence contains many additional variables. Combined with this are the legitimate concerns of the lenders who construct sophisticated, deal-specific lending packages. The same may not be the case for residential transactions, where there is less variation in property types and financing structures.

The barriers to the adoption of applicable technologies can be categorised as operational, regulatory and social.

Operational barriers identify the process changes needed in either the legacy systems of the real estate industry or the platforms developed by technology start-ups.

Regulatory barriers highlight the legal issues which new technologies have overlooked, or issues which the industry must confront in order to deliver successful technological adoption.

Social barriers relate to the more behavioural and emotional limits to the adoption of any new system of transacting property.

We collected further specific data about these barriers to adoption through conducting interviews with a group of start-ups and a second group of real estate technology professionals (see acknowledgements). The aim of this division was to identify the expectations of start-ups regarding the required or expected adoption rate of their technologies and to contrast these requirements with the identified strategies of those whose task it is to foster innovation within the sector. Any similarities in the perceived barriers common to each group are likely to be significant. All quotations used from these interviews have been anonymised.

4.3.1 *Operational barriers*

Software process integration

A lack of clarity in operational requirements was shown in this report. Deficiencies in operational understanding is evidenced by examples such as e-conveyancing platforms Chain Matrix and PEXA. One of the major issues was the problem of duplicate processes. The lack of standard data formats across the industry leads to the inability of any single platform to integrate with all firms' individual case management systems.

Cushman and Wakefield (2018) suggests that for technologies to become truly disruptive, convergence with other technologies is key. For instance, cell phones caused minimal disruption until they were connected to the internet and became smartphones. The technologies under consideration

today need more supporting infrastructure than currently exists. All of them require extensive cybersecurity support and a regulatory framework.

Standardised digital data

Jimmy Vestbirk, founder of online LegalTech forum Legal Geek, suggested:

“The industry is playing catch-up when it comes to putting the digital foundations in place before applying technologies. There is a big disconnect in the legal profession that you do not see in other industries. For example, unlike in the health sector, conveyancing data is protected on standalone servers on individual premises, so any reform that utilises customer data cannot take its lessons and apply them to the next firm. Because of this, there are some real technological challenges for us to get hold of clean data.” (New Statesman, 2018)

The biggest obstacle the England and Wales conveyancing industry has to overcome, before true technological advances can be made and creative disruption happen, is the necessary reliance on historical documentation such as architecture plans, leases, title deeds, official copies and maps. This means that a world of automated conveyancing is still a long way away.

Digitalising the historical title records held by HMLR would be the single largest enabler of new technology and would help create a more efficient transaction process. Uploading the current paper records into a format from which the relevant data can be extracted and acted upon digitally will be costly, labour-intensive and time consuming (in the absence, of course, of a new technology designed for this purpose). HMLR registry has not yet digitised all of its current records, and does not intend to digitise all of it, making full digitalisation of the data a very distant prospect.

Reporting on the digitalisation of the real estate industry, Deloitte (2017) finds: *“There is a necessity for more transparency and standardized interoperable data structures. Technical innovations and a growing availability of open geospatial data will improve transparency and reduce information asymmetry in the upcoming years ... Blockchain requires a complete ecosystem where all the participants in the industry need to do their part to fully create one single uniform data standard. The accuracy of data that is registered needs to improve by creating standards for measuring real estate data.”*

Where land registries have already been digitalised, for example in Sweden and Georgia, these standard data formats already exist. It is no surprise that these two countries are leading the way in their exploratory development of blockchain land registries. There is also a feeling that newly developing nations, with no historical land records or registry yet in existence, may ‘leapfrog’ existing registries in implementing new technologies such as blockchain (Kshetri, 2017), as with the example of ex-Soviet nations adopting internet-based systems of land registration (Chapter 4.3). *“Propy is working with the governments of several emerging countries where, due to systems’ inefficiencies, corruption and the lack of regulatory complexity, a transition to a new system is expected to be more straightforward”* (Propy, 2017).

Critical mass

Even supposing that data is digitalised and standardised in a consolidated database, a critical mass problem will remain. Any party unable or unwilling to participate in the use of new technologies can create a backlog for all others who have adopted the new system. Unless the governing body is willing to impose mandatory use (as is the case in Australia), this will be a problem. In libertarian societies it is assumed that the market will prevail, and innovators will need to develop irresistible value propositions, leading to the prospect of unicorn businesses.

This challenge is exemplified by the business models of start-ups CREID and Nimbus Maps, both of which have been planning to use user-generated data to create more transparency within the real estate market. In the case of CREID, their core residential automated valuation model needs to attract regular traffic and user feedback, but the generation of that traffic is a challenge. How often would you communicate with an app that values your house? In addressing this type of challenge, we confront the vicious circle identified in *Proptech 3.0: The Future of Real Estate* (SBS, 2017): real estate is a big industry of large valuable assets generating considerable fees, but these assets have no velocity (transact rarely), limiting the value of transaction-related technology. The rental market is likely to espouse digital solutions, as both commercial and residential property sectors are characterised by faster rental turnover and shorter leases, completed with minimal due diligence.

Transition costs

The cost of a system transition from paper to digital, mandatory or voluntary, is a huge obstacle that many industry professionals and high street conveyancing firms will struggle to overcome. A transcript released by Legal Futures (2017) captured the differences between the local and the corporate conveyancing worlds. The following exchange took place between Eddie Goldsmith, Partner at Goldsmith Williams, and Paul Saunders, Managing Director of Legal Eye:

Eddie Goldsmith: *Is there a huge gulf between the 100 top firms and the high street? Has the high street still got its quill pen and no case management system, or has the high street upped its game considerably as well?*

Paul Saunders: *There is a huge gulf. That does not necessarily make the service that they are delivering bad, and in some instances, it makes it a lot better. There are a lot of firms that still run without any form of case management system. There are firms existing still without using email or any other electronic forms of correspondence.*

An annual UK report surveying the operations of 230 conveyancing firms released by the Council of Licensed Conveyancers (2017) further exaggerates this gulf in technology adoption. While 88% of firms had a website, 57% of those websites had no functionality (operating solely as a marketing brochure). Only 14% of websites provided access to an online portal for the exchange of documents.

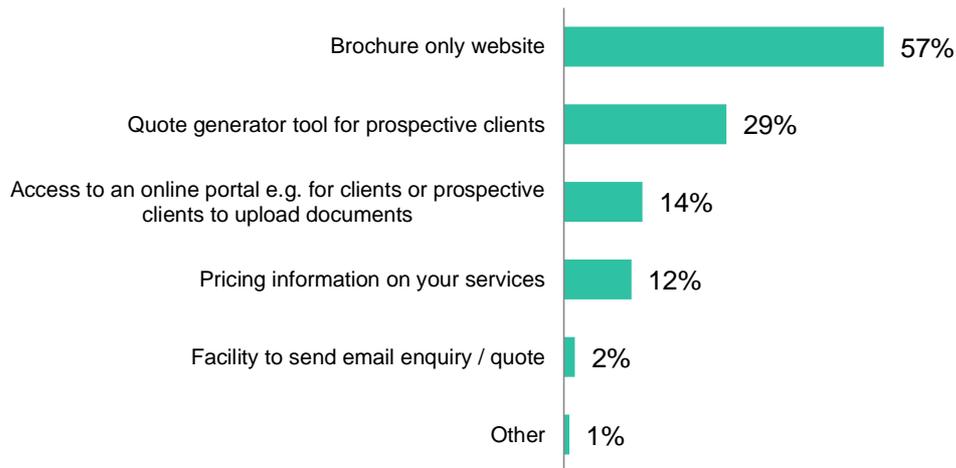


Figure 21: Level of functionality of UK conveyancing firm's websites (base = 203)
Source: CLC, 2017

Data security

Assuming that the digitalisation of society and the fourth industrial revolution continues, data and hardware security and the threat of cybercrime will become paramount. Advances in technology such as quantum computing could threaten the integrity of all current digital systems. Graglia and Mellon (2018) suggest that a blockchain registry would need to be built on a hybrid or private system with exclusive access permitted to registrars and judiciaries, but this centralisation would make the targets of any cyber-attack easy to identify.

The Council for Licensed Conveyancers revealed that in 2017 the UK conveyancing industry felt that their largest business risk over the next 12 months was cybercrime: see Figure 22. (Note also that online conveyancing was the lowest reported risk.)

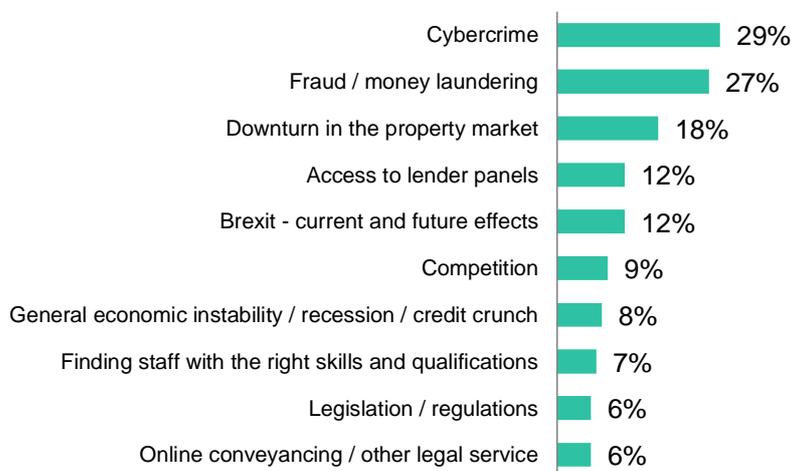


Figure 22: The perceived risks to conveyancing businesses

Source: CLC, 2017

Advocates of blockchain and digitalisation in real estate cite the increased security gained in the event that a disaster or natural hazard were to take place at a paper-based registry office, resulting in the loss of all land ownership files. With blockchain and cloud computing, the main servers required to run the database are held in datacentres, mega-warehouses containing all the network processing infrastructure. Long-term questions exist over the sustainability and cost of the energy required to supply these datacentres, and how much file destruction would result if these structures succumb to disaster, hazards, or acts of war?

4.3.2 Regulatory barriers

“The inefficiencies and roadblocks in real estate exist in the walls built by legal and regulatory systems that are now antiquated and out of place among contemporary technology” (Fraser, 2018a).

Legal framework and technology transparency

Creating a functioning technology platform does not automatically guarantee implementation. The feeling that many current start-ups do not understand the full nature of the challenge posed by the complexities of the real estate industry was shared by many interviewees, leading to the comment that *“some [start-ups] offer great technology solutions that simply cannot work in the real world. For example, some completely ignore the legal and public sector influence in the real estate purchasing process”*. Optimistic claims for PropTech are more credible where there are far fewer regulatory or statutory hurdles to overcome. For example, we may see a far easier adoption of PropTech within the marketing period than the due diligence period.

The need to understand the legislation on which current transactions rely presents a major barrier to technologies that otherwise could prove truly ‘disruptive’. One interviewee felt that *“any new conveyancing solution cannot attempt to bypass the current law.”* Whilst Propy purports to internationalise property transactions, it is clear that it relies on domestic law systems in order to make international agreements binding.

It is also important to note that it is not the prevalence of individual technologies which will ‘disrupt’ the transaction process, but the nexus of these technologies enabled via trusted regulatory frameworks giving rise to new business models that will most likely have the biggest impact.

While existing conveyancing data must first be digitalised before many technologies can be implemented, technology alone cannot do away with the existing conveyancing processes and legal structures unique to each jurisdiction. The challenge for new technology is to iteratively work within these constraints whilst specific (de)regulation is implemented to enable the desired efficiency gains.

On 6 April 2018, the government in England and Wales changed the land registration rules (the amendment of the Land Registration Rules 2003, and the revocation of the Land Registration (Electronic Conveyancing) Rules 2008 and the Land Registration (Proper Office) Order 2013) to further to enable digital land registration. These changes have allowed HMLR the possibility of introducing fully digital conveyancing documents such as mortgages and transfers, and using electronic signatures as opposed to traditional ‘wet ink’. However, these are only preliminary steps that give the Chief Land Registrar the statutory authority to permit these new technologies once satisfactorily proven, in order to allow HM Land Registry to continue with its digital transformation programme and to modernise and simplify its services.

Tom Durbin St George, director of software provider Easy Convey, feels that society does not like the idea of government mandating a particular technology, deeming it “*anti-competitive*”. He feels this lack of direction has resulted in disunity in the technological solutions offered (New Statesman, 2018). Getting the balance between compliance and innovation right will not be easy for those tasked with regulating this new technology.

The Law Society released a 2017 publication (Blockchain: Legal Implications of Distributed Systems) in which the following considerations were highlighted:

Legal jurisdiction: where blockchain systems are decentralised and servers can be spread around the world, pinpointing where a breach or failure occurred may be complicated, leading to jurisdictional confusion over the appropriate cross border action. Additionally, a network breach may can be located in multiple jurisdictions, posing complex jurisdictional issues and contractual relationships.

Liability: there is an inability to control and stop the functioning of public blockchains, which causes a number of considerations in terms of liability management and insurance.

Legal status of Decentralised Autonomous Organisations (DAOs) as entities: where the entity is essentially self-governing software engaging in or facilitating commerce, what legal status, if any attaches to DAOs? Against what, or against whom could a claim be brought.

The enforceability of smart contracts: since smart contracts are pre-written computer codes, their use may present enforceability questions if attempting to analyse them within the traditional ‘contract’ definition, e.g. concepts such as ‘offer’ and ‘acceptance’, ‘certainty’ and ‘consideration’ are unlikely to be relevant to many coded programmes.

The right to be forgotten: with blockchain databases supposed to be immutable, how does one go about removing their personal information from a foregone transaction, and how does this comply with new European GDPR regulation?

One key area identified by Graglia and Mellon (2018) as a pre-requisite for a blockchain land registry system is the need for a solution to establishing the identity of the parties. The Law Society believes

this to be a major area of concern that needs addressing before the technology can begin to operate in the manner claimed:

“A key barrier to the wider deployment of blockchain-based products is a lack of standardised methods for businesses and individuals to automatically validate the identity of the transacting parties. Blockchains do not inherently contain the ability to comply with existing Know Your Customer (KYC) and Anti-Money Laundering (AML) requirements. Applicable transactions must enable all parties to verify the identity of everyone in the transaction. As a result, digital identity will play a huge role in the future of blockchains used by financial institutions, especially around the need to validate and authenticate identity information” (Law Society, 2017b).

Further questions of the legal framework surrounding blockchain real estate transactions include:

- What are the tax implications of a blockchain cross-border disposition and purchase of a property?
- Is it possible to create a blockchain registry, thus automating the search due diligence process, under HMLR’s policy of ‘general boundaries’ giving no precise mapping of the plot of land to be traded?
- How would a blockchain registry respond in complicated yet common circumstances such as the inheritance of an estate, or its division under divorce proceedings?
- What would happen to the registry of land ownership should the underlying private blockchain registration company go bankrupt?

In the case of Propy, blockchain is used as a conveyancing service to record the stages of the transaction in a more secure and safe manner. Propy is merely digitalising the existing title documentation and storing it in a blockchain system. Companies who wish to change the nature of title representation by tokenising the title deeds will have to overcome the legal obstacles to this re-conception of land ownership. This is probably not the correct approach to incorporating blockchain into the property transaction process in England and Wales.

At present, few governments are taking the necessary regulatory steps to foster the growth of blockchain real estate transactions. There is no jurisdiction offering legal recognition of blockchain hashing or the process of smart contract execution as proof of ownership in any form.

The US state of Vermont is close to the forefront of any such a legislative transition. In July 2016, Vermont passed the S296 Blockchain Bill. The new law presumes that documents written to the blockchain are authentic. As long as verification can be obtained as to the date and time of recording of information in the blockchain then the information qualifies as a self-authenticating record and a

regularly maintained business record for purposes of any legal proceeding in a Vermont court (Blocknotary, 2018).

Traditional contract law may need to be modified to take account of the automated nature of smart contracts, their validity and enforceability. This is likely to prove a challenge for lawyers and legislators (Law Society, 2017b).

Ontario offers an example of an existing system that could solve the problem of authenticity of documents relating to land. Under the Land Registration Reform Act 1990, only *“lawyers entitled to practice law and who have obtained the required Real Estate Practice Coverage Option (REPCO) from Lawyers Professional Indemnity Company are able to approve electronic documents containing compliance with law statements”* (Law Society of Upper Canada, 2015). Once such a record is entered, the law deems that it is capable of being relied on as authentic. Such a system could employ blockchain technology to improve its authenticity (Lemieux, 2016).

The appeal of blockchain in real estate is its potential ability to simplify, speed up and add security to current transactions. If it is required merely to mirror the status quo, then most if not all of the advantages presented by this new system would be destroyed.

“For the Propy Registry to ultimately deliver on its full promise, it will need to transition from a ledger that mirrors official land registry ledgers to being the official ledger of record. For a government to adopt this technology, it would need to recognize the legality of the electronic deeds and the ledger” (Propy, 2017).

Blemus (2017) concludes: *“Confidence in this new technology by regulators and legislators is to be earned. Blockchain innovators need to work closely with their legal and financial advisers to set up and fine-tune coherent and credible standards of practice and frameworks. Meanwhile, legislators and regulators are invited to create study groups with professionals, academics and Blockchain enablers.”*

This is not a short-term issue.

4.3.3 Social barriers

“The biggest challenge for the actual application of blockchain is perhaps the human factor. Blockchain is a disruptive innovation, which potentially changes the current roles and tasks of players in the real estate market. In this sense, it is more than just a technological innovation. The organisational changes and the adjustment of processes, ways of working and methods, as a result of technological opportunities offered by blockchain, are likely to be a challenge” (Deloitte, 2017).

Human nature is arguably the biggest barrier to technological adoption. Resolving social barriers to change is a far more complex procedure with no clear guidelines on how this might be achieved.

The New Statesman (2017) finds that many industry professionals agree that the conveyancing industry culture is a drag on progress. They believe there are too many silos in the transaction and that nobody wants to collaborate. There is also a common feeling that a lot of the reform being discussed could be put in place now but has been opposed due to cultural resistance and positive protectionism.

Beth Rudolf, Director of Delivery at the Conveyancing Association, blames estate agents and brokers for a lack of adoption or acceptance of new technologies. *“The majority [of estate agents] do not have encrypted email for a start. Even where they were given tools, perhaps through some of the panel managers, they still do not use those to get their updates. They will still pick up the phone and ring the conveyancer, much to everybody’s frustration”* (Legal Futures, 2017)

Damaged revenue

Industry pushback was a large factor to blame in the rejection of the Electronic Funds Transfer System developed by HM Land Registry. Chain Matrix pilot organisers felt that a fear of lost interest revenues to solicitor firms holding transfer funds in escrow accounts prior to completion was a key motive behind the technology’s eventual dismissal.

Risk of disintermediation

Technology-related jobs tend to support wider employment. It is estimated that one additional job in the technology sector generates 4.9 new non-technology jobs in the same city (three professional and two non-professional positions), as new jobs create additional demand for local services (Moretti and Thulin, 2013). This does not prevent incumbents defending their patch.

The Chain Matrix case study also revealed that many real estate lawyers chose to retire due to their dislike of the prospect of new technology disrupting their existing processes and a lack of willingness to re-train.

Several interviewees suggested that lower value intermediaries within the real estate industry, such as property managers and conveyancers, were most likely to have their roles disrupted and therefore would be most likely to obstruct the implementation of new technologies.

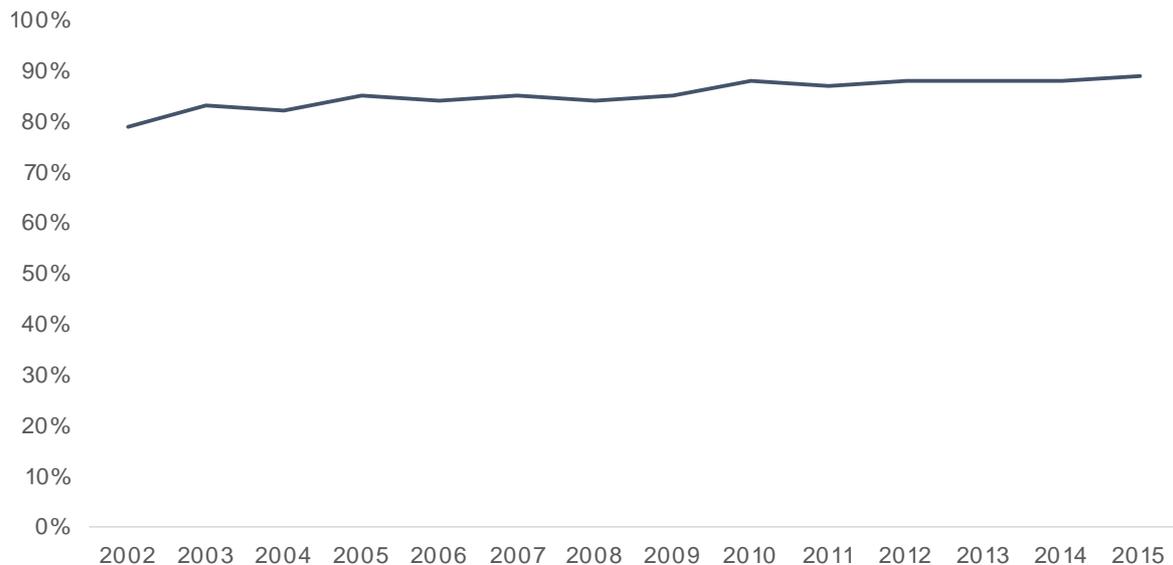


Figure 23: Homes sold using an agent in the US
Source: Mike DelPrete, 2018

Figure 22 details the industry perception that the lowest risk to conveyancing businesses comes from digital transformation, with only 6% of those surveyed by the Council for Licenced Conveyancers feeling online conveyancing was a threat. What is not clear from this figure is whether this reflects a feeling that any potential disintermediation will not happen, or whether business will actually be enhanced by the introduction of new technology.

In an example taken from the residential real estate brokerage industry, Mike DelPrete (2018) reveals in Figure 23 that, despite 90% of home sales being originated via online portals such as Rightmove, Zoopla, Trulia and Zillow when searching for a property, “consumers want to work with an agent in order to reduce the chances of a potentially costly mistake when selling their house. Agents are insurance.”

Trust in innovation

There is a lack of trust based on a lack of understanding of the new technology solutions able to bring increased efficiency to certain stages and processes. This has resulted in numerous social barriers, difficult to deconstruct. As might be expected, every start-up we interviewed commented on the trust and understanding needed for their platform to achieve success, and the common ‘industry push back’ from real estate professionals. In addition, the misuse of data by multinational social media businesses, and healthy suspicion about the dangers of fuelling potential data monopolists, holds back many private sector data collaborations.

This is often coupled with a lack of real estate knowledge within the technology start-ups. There is a paradox in the transparency of technology: as more complex technology is used, creating additional transparency within the market, the process increases in complexity, and becomes potentially less transparent at the technical end.

It was suggested that the biggest change at the moment is in processes which are not core to real estate operations. Technologies which automate tasks currently outsourced by major companies present an easier investment decision and less industry pushback. Technology will only be adopted if the cost of its development and implementation is less than the tasks it is designed to replace.

While real estate organisations believe that a simple solution is to increase technology education and training initiatives, many start-ups believe that the real drive for technology adoption will come from the public, with educated customers demanding more democratisation exemplified by the transition towards online banking applications.

Clients are also reluctant to place trust in new technologies. In the case of Chain Matrix, they favoured a familiar quality of service at the expense of efficiency, preventing their conveyancer from entering transaction documents onto the Chain Matrix platform. This could be due to the fact that any financial benefit in doing so did not result in client savings, as exposed by the Deloitte report into firms using PEXA (Deloitte 2018a).

Collaborative attitude

The real need is not for new technology solutions, but for access to data which, for various reasons, is currently difficult to access.

“New technology is not the answer, but ensuring open source, good quality data. The major injustice is the fact that this data already exists, but the protectionist attitude with which the real estate industry currently guards it allows incumbents to charge a premium for their services to the landlords, the ones holding all the risk and to who the data should rightfully belong.”

This “*democratisation of data away from agents and into the hands of the landlords*” is achievable through data aggregation platforms such as VTS who offer users increased market insights in exchange for inputting private details regarding their assets. However, any platform’s success is reliant on a critical mass of users and data.

At the same time, knowledge of the opportunities available to such a data monopolist make it logical to resist any move to create it. For that reason, a consortium approach, in which information is anonymously provided to refine machine learning models for all who subscribe might be more palatable. Indeed, an initiative by a centralised government agency, such as HMLR, might be the only possible basis for a trusted data aggregator. Hence, blockchain and other data aggregation technology is more likely to be adopted in developing countries where historically, there is no trusted land registry.

4.3.4 Analysis of technology adoption

Figure 24 uses a traffic light system to highlight whether we perceive that a previously identified applicable potential technology has managed to overcome our identified barriers to adoption.

		Blockchain transactions: smart contracts	Property passports: IoT & BIM	Satellites & drones	AVMs & instant mortgages	Lease information extraction	VR/AR	Digitalised land registry: chatbots	Blockchain land registration
Operational	Software process integration	Red	Yellow	Green	Yellow	Green	Yellow	Yellow	Red
	Standardised digital data	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Red
	Critical mass	Red	Red	Green	Yellow	Green	Green	Red	Red
	Transition costs	Red	Yellow	Green	Yellow	Green	Green	Yellow	Red
Regulatory	Data security	Red	Red	Yellow	Yellow	Green	Green	Yellow	Yellow
	Legal framework	Red	Yellow	Green	Yellow	Green	Green	Yellow	Red
	Technology transparency	Yellow	Green	Green	Red	Yellow	Green	Yellow	Green
Social	Damaged revenue	Red	Yellow	Green	Red	Yellow	Green	Yellow	Yellow
	Risk of disintermediation	Red	Yellow	Green	Red	Green	Yellow	Yellow	Red
	Trust in innovation	Red	Yellow	Green	Yellow	Yellow	Green	Green	Red
	Collaborative attitude	Yellow	Red	Green	Yellow	Green	Green	Green	Green

Has the technology overcome the barrier?	No	Somewhat	Yes
	Red	Yellow	Green

Figure 24: The extent to which applicable technologies have overcome barriers to adoption

From this analysis, those technologies most likely to impact the commercial transaction process in the near term are:

- *Satellites and drones* - allowing boundaries and property conditions to be inspected through a multitude of emerging imaging methods and location data.
- *Lease information extraction software* - using machine learnt image recognition software to digitalise hard and soft copies of documentation required for the transaction process
- *Virtual and Augmented Reality* - using image capture software to enable interactive, remote inspections and viewings

The biggest barrier to any wide scale adoption is the operational issue of an absence of standardised digital data. This barrier has yet to be overcome by any single technology. This is closely followed by the social concern of disintermediation and operational problems of data security.

Having identified the technologies most likely to streamline the transaction process in the near term, we can refer to their applicability to our causes for delay (Figure 20) and hypothesise which periods of the transaction process are to become more efficient (Figure 25).

	Satellites & drones	Lease information extraction	VR/AR
#1: the vendor may not have maintained accurate or digital records of relevant information	✓	✓	✓
#2: inconsistent approaches to data rooms		✓	
#3: performing adequate searches via under resourced or non-motivated authorities and utilities companies			✓
#4: identifying the correct parcel: no single, true plan	✓		
#5: completing standard enquiry forms: caveat emptor	✓		✓
#6: reviewing and reporting using non-integrated software			
#7: filing for registration: a lack of transparency over requisitions and delays in registration			

Figure 25: The applicability of the most imminent technologies to the causes for delay in the commercial transaction process

Extrapolating this analysis to include our five periods of any commercial transaction, we can infer that imminent technologies are most likely to shorten the preparation period and the marketing period in the near future.

4.4 The drivers of change

Proptech has the potential to increase market transparency, improve liquidity and bring lower transaction costs. This could have a positive impact on the value of investment assets.

A fully digitalised HMLR could connect all the agencies involved in an individual conveyance, enabling the frictionless access, transfer, automation and validation of required information. This would reduce the reliance on human processes and cut out many of the transaction bottlenecks caused by disparate sources of information. However, HMLR is still in the process of digitising; full digitalisation technologies are being trialled, but full digitalisation is a long way away.

The most talked about technology in the context of real estate transactions is blockchain. Blockchain advocates suggest it promotes efficiency, trust, security and resilience in the context of current land title recording methods. However, blockchain is clearly over-hyped, would take decades to become established and brings with it many new challenges primary to do with trust. Meanwhile, practitioners

like to grumble about HMLR, but there are no issues of trust regarding HMLR as an institution - if losses are suffered due to HMLR negligence, then HMLR has a statutory duty to compensate the service user.

While fully automated, peer to peer, cross border real estate transactions could be facilitated by the use of blockchain conveyancing software, transactions must comply with existing legislation. At the moment, all we have are pilots and tests under laboratory conditions.

Less radical technologies seeking to digitalise the information needed for the transaction process are having more success, albeit for more specific procedures. These include the internet of things, building information models, geospatial technology, artificial intelligence and machine learning.

In the quest to generate a single pool of up to date, standardised property information, investment is needed to first create standardised, digitalised data. As with the wider economic digital transition, real estate regulation and data transformation will be driven by one of four major forces: top down from government regulation, bottom up from tech businesses tending to monopolise, via business and trade associations, or via public democratisation.

Whichever succeeds will determine whether this single pool of up to date, standardised property information is either open access for the benefit of the market and the public or held by a private monopoly which will likely exploit their power for commercial gain. Examples of ambitious property data businesses include CoStar, VTS and Stessa. What would happen if Amazon or Facebook were to make a move into the commercial real estate market?

The new, tech-enabled world is creating a pointed and general challenge to modern business and society in general. Will we allow technology-owning monopolies to grow and control us (Susskind, 2018)? Or will we rely on mechanisms of social order, which govern the behaviour of a set of individuals within a given community, building regulatory institutions identified with a social purpose, mediating the rules that govern living behaviour?

5. Summary and conclusions

5.1 Summary

In the pursuit of efficiency, it is important to ensure the systems by which real estate – the primary capital resource of any economy - is registered and conveyed are transparent, secure and quick. Those economies best able to harness the economic and social benefits which come with a high quality of land administration and transference have simple fast-track procedures, low transfer taxes, fixed registration fees, digital registries and time limits for administrative procedures.

The UK is currently ranked 47th out of 190 global economies on the World Bank's Ease of Registering Property Index, requiring six procedures, which take an average of 21.5 days to complete, at an average of 4.8% cost of the total property value. Stamp Duty is clearly a large component of this measure. Maximum efficiency property transactions require the abolition of transfer taxes and their replacement by annual property taxes, as recommended by many, including the Adam Smith Institute (2017).

Proptech has the ability to bring increased market transparency, liquidity and bring lower transaction costs. This should positively impact the value of investment assets. The digitalisation of both data and current processes is evident within the emerging technologies attempting to embed themselves into the transactions process. Digitalised data enables computer programmes to automatically execute tasks without the need for human intervention. At its most ambitious and radical, the technology world imagines a single, distributed system of recording real estate ownership and transactions - the blockchain world – as the ultimate solution. This blockchain world is decades away, and may never happen unless it is mandated by regulation and/or supported by industry groups.

Within the commercial real estate sector, technology is digitising the current workflow, offering a more efficient transfer of information than a paper-based process. However, the lack of comprehensive digitalisation limits the automation of more arduous tasks. This has led to seven key causes for delay in the transaction process, which all broadly represent a data storage or transfer issue. An openly accessible, single pool of up to date, standardised property information could reduce most of the causes for delay highlighted.

An example of standardised property information is the property passport, a digital file containing the legal and physical data relating to an individual property, held and transferred along with its title. The idea of a single property information database somehow attached to the plot of land to be transacted is currently also being explored through the use of geospatial technologies. Using mapping and satellite technology it is possible establish an irrefutable plot boundary identifier upon which to link its legal documentation. Clearly, despite many start-up businesses evangelising about their vision, only a centralised land registry can drive this degree of change.

There is, however, a clear split in the transaction process between the digitally-sensitive preparation and marketing phases, easily capable of digital disruption or innovation, the due diligence phase, which is less easily disrupted thanks to the caveat emptor principle, and the post-exchange and

registration phases, which (even assuming considerable government funding and commitment) will take a long time to be digitalised.

In the preparation and marketing phases, the nexus of many technologies developing in parallel will truly 'disrupt' the transaction process. It is conceivable that at some point in time we will rely on automated valuation models with access to digitalised IoT and geolocation data held alongside ownership rights held in a property passport. Virtual reality inspections and viewings would help in removing risk and uncertainty from buyers, who will need to offer a price close to or at the AVM estimate. Sellers will have no reason to expect a different price and this first phase of the process will look very different in 2030.

However, when we move on to consider the due diligence phase, the impact of technology will (in the absence of top-down regulatory change) be restrained by old-fashioned risk aversion and conservatism. *Caveat emptor* adds a hugely powerful dose of realism when a pension fund is acquiring a very complex commercial property. To reverse this would require a change in contract law - a little unlikely for such a fundamental and deeply-embedded principle - or an institutionally-agreed innovation such as an economical and standardised insurance product. For less complex residential property, if we can imagine the veracity of the data held in a property passport being guaranteed and backed by insurance, then the due diligence phase may be significantly quicker.

Finally, the transfer of title recorded by a digitalised land registry could be rapid, trustworthy and secure. However, this will require a lot of patience, funding and government will.

The existence of relevant technologies which propose to reduce the time or cost of an average transaction does not mean that they will automatically be implemented. Operational, regulatory and social barriers to their adoption must first be overcome.

Start-ups working on highly specific process improvements coupled with data-sharing industry associations and groups, supported by motivated and educated government agencies will help to shorten the time taken to buy and sell real estate; but it is highly unlikely that a new start-up introducing digital technologies will have a radical impact on the transaction process due to the many barriers which still exist.

5.2 Conclusions

In the quest to facilitate an openly accessible, single pool of up to date, standardised property information, investment and innovation will be needed by four groups: government, private businesses, industry associations (institutions) and the public.

It is unlikely that any single group can – or will be allowed to - drive this change alone. Governments have limited budgets (although switching from a transaction tax such as Stamp Duty to an annual property tax might help). Private businesses amassing large digital datasets and tending to

monopolies are likely to become increasingly unpopular and subject to pushback. Collaboration will be needed.

Government will need to continue to encourage the digitalisation of national and local authority records and to define clear regulations surrounding real estate data ownership.

Businesses will continue to innovate ways of extracting and transferring digital data across platforms, and creating products which will encourage transaction efficiency (for example insurance backed property passports).

Industry groups will develop standards and protocols encouraging common standards for digital data and record keeping, including the intelligent application of distributed ledger technology.

The public – all of us – will need to develop a much clearer sense of responsibility for collecting and storing data describing our most valuable assets, and a much better sense of the value of this data. This is a basic requirement before we can talk about democratisation.

Some countries are better placed than others to implement new technologies. They have embraced digitalisation partly because they have shorter and less complex ownership histories. That does not describe England and Wales, or the UK as a whole.

Human beings will protect themselves in a *caveat emptor* world by talking their time and being thorough in the research process before committing large capital sums. Until we arrive at the instantaneous transaction, buyers and sellers will wish to pay professional advisors for risk mitigation and, on occasion, risk transfer. Robots dealing with other robots and AI will feel less constrained by risk, but robots need digital data. In England and Wales, in the interim period between the current day and the instantaneous transaction, we will therefore have to digitalise all data, including the precise digital mapping of what are currently general boundaries, removing all disputes and thereby avoiding any need for requisitions of more data.

Blockchain – a limited, private version of a distributed ledger - property passports, geospatial technologies and artificial intelligence-driven automated valuation models have the potential to overcome the majority of these blockages. However, digitalisation of the land registry is the single most necessary reform, and this is not around the corner. To overcome the single most resistant barrier to applicable technology - a lack of standardised digital data - will require a huge effort. Where that effort will come from is a very demanding question.

Can private sector innovation produce an incentive for all landowners to accurately and digitally map their landholdings and agree the boundaries? Will adequate government budgets be made available to cope with a likely torrent of disputes? Will the legal and property professions find a way to create an institutional approach to the digitalisation of ownership records? Will you and I engineer democratisation by taking responsibility for maintaining our property data? The answer to all of these

questions is the same – the capability of the technology will easily outpace the capacity of the system to employ it, and radical change will be slow.

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Appendix 1: an example of an HMLR title document

Title number SGL29472

This is a copy of the register of the title number set out immediately below, showing the entries in the register on 6 FEB 2019 at 14:51:21. This copy does not take account of any application made after that time even if still pending in HM Land Registry when this copy was issued.

This copy is not an 'Official Copy' of the register. An official copy of the register is admissible in evidence in a court to the same extent as the original. A person is entitled to be indemnified by the registrar if he or she suffers loss by reason of a mistake in an official copy. If you want to obtain an official copy, the HM Land Registry web site explains how to do this.

A: Property Register

This register describes the land and estate comprised in the title.

GREENWICH

- 1 (09.04.1921) The Freehold land shown edged with red on the plan of the above Title filed at the Registry and being Blackacre, Long Lane, London (ST3 7SF).
- 2 (19.08.1995) LEASE The basement of the title is subject to a lease of twenty one years separately registered as GRL13670

B: Proprietorship Register

This register specifies the class of title and identifies the owner. It contains any entries that affect the right of disposal.

Title absolute

- 1 (01.05.1998) PROPRIETOR: JANE DOE and JOHN DOE of Blackacre Long Lane, London, ST3 7SF.
- 2 (24.10.1879) The mines and minerals below a depth of 100 feet from the surface together with ancillary rights of working are excepted.
- 3 (24.10.1879) The land has the benefit of the rights granted by but is subject to the rights reserved by the Conveyance dated 24.10.1879 referred to in the Charges Register.
- 4 (12.02.1921) The property is subject to the following rights contained in a conveyance of the land in this title dated 12 February 1921 and made between (1) Simon Paul and (2) Joan Slimson

"The Property is sold subject to the full right and liberty for the Vendor and his successors in title (and all persons authorised by him or them), in common with Purchaser and his successors in title (and all persons authorised by him or them) at all times and for all purposes connected with the use and enjoyment of the Vendor's Retained Land (being Whiteacre) to pass and repass (with or without vehicles) over and along the alleyway within the Property as is shown coloured pink on the plan attached to this conveyance the Vendor and Purchaser each paying one half of the cost of maintaining the said alleyway in a state of good repair and condition"
- 5 01.05.1998) RESTRICTION: No disposition by a sole proprietor of the land (not being a trust corporation) under which capital money arises is to be registered except under an order of the registrar or of the Court.
- 6 (11.06.2014) RESTRICTION: No disposition of the registered estate by the proprietor of the registered estate is to be registered without a written consent signed by the proprietor for the time being of the Charge dated 16 May 2014 in favour of Piggy Bank PLC referred to in the Charges Register.

C: Charges Register

This register contains any charges and other matters that affect the land.

- 1 A Conveyance of the land in this title dated 24 November 1879 made between (1) The Long Combe Park Estate Limited (Vendors) (2) and Joseph Bates (Purchaser) contains the following covenants:-

"The Purchaser for himself his heirs executors administrators and assigns (in order as far as practicable to bind the said hereditaments and premises hereby granted or released in the hands of all future owners and occupiers thereof but not so as to render himself his heirs executors administrators and assigns personally or otherwise liable in regard thereto except whilst actually owning or holding the same) hereby covenants with the Vendors their successors and assigns that he or they will immediately fence in the said hereditaments and premises with a brick wall or suitable oak fence and that he will not erect or build more than one private house with the requisite outbuildings and stables in connection therewith on the said hereditaments and premises hereby conveyed And that the same shall be built and finished in accordance with plans elevations and sections to be approved of by the Surveyor to the Vendors and shall not be of less cost when completely finished fit for habitation than five hundred pounds and shall not be used for any other purpose than as a private dwellinghouse."
- 2 A conveyance of the land in this title and other land dated made between (1) London Coal Corporation and (2) George Butcher contains restrictive covenants.
- 3 (11.06.2014) REGISTERED CHARGE dated 16 May 2014.
 (11.06.2014) Proprietor: PIGGY BANK BANK PLC (Co. Regn. No. 867662) of Greenacre, Church Street, Ambridge, AM3 7TY
- 4 (14.08.2017) Option to purchase Blackacre dated 3 July 2017 in favour of Elizabeth Windsor.
 NOTE: Copy filed

End of Register

Appendix 2: international conveyancing comparisons

Scotland

There is a perception that the Scottish buying process is very different from the English system. There are some differences in terminology, but the major difference is that (while negotiations to purchase can take place verbally with the seller or their agent,) the formal offer to purchase must be submitted on behalf of the buyer by a Scottish solicitor. It is this offer that forms the basis of the contract, in the same way that it would in England and Wales. Under the Scottish system it is the responsibility of the buyer's solicitor to ensure that the buyer has the financial means to purchase the property. Contrary to popular belief, this offer is not contractually binding; the offer is seen as a basis on the start of a contract and a moral understanding (supported by the involvement of legal professionals rather than estate agents) that the purchaser is committed to buy (unless there is a real problem with the subsequent legal, survey or finance conditions.)

This point in time when the buyer is contractually bound to purchase and the seller to sell is called 'Exchange of Contracts' in England and Wales and 'Conclusion of Missives' in Scotland. Completion is called 'Date of Entry' in Scotland.

In 2009, Scottish Home Report Surveys and Valuations (or Home Reports) were introduced. Paid for by the seller, they provide potential buyers with a basic home buyers condition survey, an Energy Efficiency Rating (EPC) certificate and, importantly, a valuation of the property. This valuation is carried out shortly before the property is put to the market and is the professional opinion of a Chartered Valuation Surveyor. This valuation – which can be relied upon for mortgage purposes – is valid from 12 weeks of the date of survey.

Europe

Traditionally there are four main categories of conveyancing systems within Europe:

1. *The traditional, highly regulated, Latin notary system*

This reflects the public office characterisation of notarial activities. This model may be found in the vast majority of continental European countries including Spain, Portugal, France, Italy, Luxembourg, Belgium, Germany, Poland, Slovenia and Austria. The Latin notary model is characterised by mandatory involvement of notaries, even though the scope of notary involvement varies widely. Other important features include *numerus clausus* (a limit on the number) of professionals, fixed fees and strict regulations of market conduct.

2. *The deregulated Dutch notary system*

This reflects a more modern vision of the notary as a private entrepreneur fulfilling public tasks. Under this model, no *numerus clausus* exists, fees are negotiable and market structure and conduct regulation is less strict.

3. *The lawyer system*

This system is characterised by the quality control of professionals via licensing and professional exams or self-regulation, negotiable fees and lower levels of government. Existing in the UK and Ireland, the Czech Republic and Slovakia, a hybrid system may also be found in Hungary where in typical transactions lawyers take care of conveyancing while notaries are usually involved in setting up mortgages.

4. *The Scandinavian licensed real estate agent system*

Under this system real estate agents provide legal services. This model is characterised by the quality control of professionals through professional exams and licensing, negotiable fees and lower levels of regulation regarding market structure and conduct. This system can be found in Sweden, Finland and Denmark with local variations.

A study by Schmid, Sebastian and Lee (2007) found convincing evidence that deregulated conveyancing systems produce better outcomes for consumers in terms of price and choice. It also concludes that there is no evidence to support claims that higher levels of regulation and higher prices lead to higher levels of service quality.

The study raised broader questions over whether conveyancing should continue to be reserved for certain professions only. It seems strange that lawyers are barred from performing conveyancing services in Latin notary countries, as they are entitled to deal with substantially much more complex issues, but why not allow complete de-regulation and a free market? As in England and Sweden, other suitable qualified and licensed professionals (e.g. licensed conveyancers and licensed real estate agents) can also provide good quality services. This can promote competition to the benefit of consumers as shown in England and Wales where the introduction of licensed conveyancers helped reduce the price of conveyancing.

In countries such as Austria and Sweden it is possible for consumers to handle standard contracts and procedures themselves by using pre-formulated forms and by applying for registration personally. In Denmark work is underway to examine how to support private parties in handling real estate transactions themselves as part of the Government's efforts to lower the costs associated with buying real estate.

Outside Europe

Variations in land registration and conveyancing depend largely on colonial history. There is no uniform system in the USA: each state has its own recording system. Most states operate deed recording systems backed by title insurance with a few exceptions. The exceptions are largely confined to the original 13 colonies which still operate title systems. Some states link land taxation to their systems, in effect creating a cadastre but again this is not uniform in nature. The law upon which the systems are based also differ from state to state depending upon the origins. For example, most states which are Spanish or French in origin will have civil law as the basis of registration. Those which are of British origin will have common law.

In Australia, the 6 territories all operate separate systems, based on the Torrens system. They have modern, digital systems by and large; and some operate e-conveyancing (the PEXA system: see Chapter 3).

In Asia, former parts of the British Empire (e.g. India and Singapore) have legal systems derived from the common law of the United Kingdom.

In 2009 Belarus's digitised registry was able to cope with the addition of 1.2 million new units over 3 years. Georgia's new electronic registry managed 68,000 sales in 2007, twice as many as in 2003. FYR Macedonia's electronic registry expanded coverage to twice that of 2006, while cutting the time to register property by 40 days. For the 177,000 people buying property in Macedonia in 2009, that meant being able to use or mortgage their property 40 days earlier, leading to twice as many properties being sold in 2009 as in 2007, despite the financial crisis (World Bank, 2010).

A single system or interconnected portal ensures that all agencies are automatically updated once an application is processed, as is the case in Panama, for example. Colombia, Italy and Peru have also all developed portals that connect the notary to the land registry and the ministry of finance (World Bank, 2016).

In the Netherlands and New Zealand, customers file their application through the land registry's web portal, while in the United Arab Emirates a mobile application has been developed to help customers complete a property transfer using their mobile phone (World Bank, 2016).

Appendix 3: the commercial transaction process using corporate structures and debt

Stamp Duty Land Tax is payable by the buyer of a property in England and Wales and is calculated on a percentage basis of the purchase price. Sometimes it can be more tax efficient for a buyer to buy the shares in the company that owns a property, rather than buying the property itself. This is known as a share purchase sale.

Most purchases, whether of shares or the asset itself, will be funded by debt. The lender will instruct its own valuer and lawyers, in order to confirm that the risk profile is one with which it is comfortable. The internal process for approving the lender's facility will vary in complexity depending on the amount required. Larger loans will need to be approved by the lender's credit committee, after a careful consideration of the terms of the proposed sale and purchase, and the warranties that the seller is prepared to give.

The buyer's solicitors will be required to prepare a certificate on title to the lender confirming that the property has a good and marketable title.

When debt is provided to part-finance the acquisition, the lender will run additional KYC (know your customer) checks and will need proof of address and identity in person, signed in wet ink at the lender's branch. The banks will also need to undertake an official valuation. This can take 5-6 weeks. This decision is often automated for loans of between £200k-1m, but larger loans will always require a human decision process, usually with referral to the lender's credit committee. A new report has to be compiled for the banks, focusing a lot more on the risk characteristics of the property transaction. This will often require updated or renewed searches, so a duplication of processes is likely.

The banks will undertake an independent valuation, requiring a separate building survey before they will write an offer of finance and sign off on the facility agreement.

Whenever a company is acquired, identifying the company's liabilities or potential liabilities is the key issue in the financial due diligence. Completion can precede the formal reconciliation of the balance sheet and a later balancing payment can be made to account for this.

Potential liabilities will include deferred or contingent (on later sale) capital gains tax. This process can become complicated when the property has been re-developed or refurbished and often brings with it the need to consult a tax specialist and possibly additional tax lawyers.

Debt does not typically slow a deal down, but a corporate structure will inevitably do so as there is more due diligence. Advisors are, however, both motivated and monitored to ensure they stick to the predicted timeline.

Appendix 4: international land registration comparisons

Depending upon the adopted system in any particular jurisdiction, proof of title can be established either by a land registration system focussed on the stock of land, or by a deed offering proof of the transfer of title. The deed system, based on flow rather than stock, does not require title registration, just as the purchase of any commodity requires only a receipt to establish ownership.

A deed registration system means that the deed itself, a document which describes an isolated transaction, is registered. This deed is evidence that a particular transaction took place but is not in itself proof of the legal rights of the involved parties and, consequently, it is not evidence of legality. Thus, before any dealing can be safely effected, the declared owner must trace his ownership back to a good root of title. Deed registration is usually applied in countries which are based on Roman law (in Europe: France, Spain, Italy, Belgium, Netherlands) and also in countries whose legal systems were influenced by European colonialism in earlier times (South America, parts of North America, some African and Asian countries).

A common law title registration system, as used in the UK, does not record transfer of the right of ownership as with a deed registration system, but instead records the legal consequence of that transaction, the ownership of right itself. The right to the land, together with the name of the rightful claimant and the object of that right, along with its restrictions and charges, are registered. With this registration the title (or right) is created.

The very similar Torrens title system operates on the principle of 'title by registration', under which the state guarantees title and is usually supported by a compensation scheme for those who lose their title due to private fraud or error. Originating in Australia and predating the UK common law title registration system, the Torrens title system has since been adopted by Canada, New Zealand, much of the USA and parts of Asia, as well as other commonwealth countries.

The main difference between a common law title and a Torrens title is that in the latter case a member of the general community, acting in good faith, can rely on the information on the land register as to the rights and interests of parties recorded there, and act on the basis of that information. A prospective purchaser, for example, is not required to look beyond that record. This contrasts with a UK common law title, which is based on the principle that the seller's title is as good as the weakest link of the chain of title. Accordingly, if a vendor's common law title is defective in any way, so would be the purchaser's title. Hence, it is incumbent on the purchaser to ensure that the vendor's title is beyond question. This may involve both inquiries and an examination of the chain of title, which can be a protracted and costly exercise each time there is a transfer of property.

All land registries operate upon the same four basic set of principles (Henssen, 1995):

- The booking principle implies that a change in the rights to an immovable property, especially by transfer, is not legally effected until the change or the expected right is booked or registered in the land register.

- The consent principle implies that the entitled person who is booked as such in the register must give his consent for a change of the inscription in the land register.
- The principle of publicity implies that the legal registers are open for public inspection, and also that the published facts can be upheld as being more or less correct by third parties in good faith, so that they can be protected by law.
- The principle of specialty implies that in land registration, and consequently in the documents submitted for registration, the concerned subject (person) and object (real property) must be unambiguously identified.

The system of establishing title by registration was first introduced in South Australia by its prime minister, Sir Robert Torrens. There are subtle differences between the English registration system and that of South Australia and other countries who copied it, such as Singapore and most of Canada. Both title registration systems uphold three additional principles. These are:

- the mirror principle, which means that the register is indefeasible proof of ownership, fraud excepted;
- the curtain principle, which means that no further (historical) investigation beyond the register is necessary (except in England and Wales, insofar as overriding interests are involved);
- the insurance or guarantee principle, which means that the state guarantees the accuracy of that at title, and in limited circumstances will compensate a party who has suffered loss because of the inaccuracy of the register.

The World Bank bases an economy's overall quality of land registration upon indicators of reliability, transparency, coverage and dispute resolution. A reliable land administration system provides clear information on the ownership of property, supports security of tenure and facilitates the development of a land market. It also inhibits fraudulent actions such as using false documents to conduct land transactions or selling properties multiple times without the knowledge of the true owners. Key to fulfilling these functions is to have in place the infrastructure needed to maintain land information, supported by an appropriate institutional framework and adequate capacity (World Bank, 2014).

Inefficiencies in global land registration processes

The World Bank's *Doing Business* reports have annually recorded the procedures necessary for a business to purchase a commercial property from another business and to formally transfer the property title to the buyer's name in over 190 economies worldwide since 2005. The process starts with obtaining the necessary documents, such as a copy of the seller's title, and ends when the buyer is registered as the new owner of the property. Every procedure required by law or necessary in practice is included, whether it is the responsibility of the seller or the buyer or a third party.

They break the global property registration process down into 5 main types of procedure. These are:

- Due diligence procedures to obtain the necessary guarantees regarding the security of the transaction.
- Legalization procedures to make the sale agreement legally binding.
- Tax requirement procedures to comply with tax regulations related to the transfer of a property, including inspections or surveys of the property to determine its value and thus the taxes to be paid.
- Registration procedures to register the property in the name of the new owner and pay the associated transfer taxes.
- Publication procedures to give public notice of the intention to transfer a property so as to allow any interested third parties to object.

Within each of these five main registration procedures they record the number of processes required, the overall time taken, and the cost of a property transaction as a proportion of total property value across all 190 global economies surveyed. The results of this data averaged across groupings based on the overall quality of an individual economy's land administration are shown on the bar charts featured in Figure 5.

Poor practice economies are the five lowest ranked economies on the ease of registering property index, excluding 'no practice economies'. The second column represents the five economies ranked from 140-144 on the ease of registering property index. The third column represents economies ranked 93-97 and the fourth column shows the economies ranked 45-49. Good practice economies are the top five ranked economies.

In nearly all of the economies, the two biggest factors contributing to an increased number of procedures and a longer overall time taken to register a commercial property are the due diligence and registration processes. The major cause for an increase in the cost of registering property seems to be associated with higher registration and legislation fees.

In countries where notaries are responsible for the entire registration process, costs average 33% more than in countries that do not require notaries (World Bank, 2005). It is recommended that documents are standardised, enabling the public to perform much of the process.

Implementing a digital registry

Implementing a fully digitised system takes several years and requires a step-by-step approach, best highlighted through studying the reforms of the Danish Land Registry between 2009-2011 (World Bank, 2013).

Historically the Danish property registration system was time-consuming, with government employees maintaining an archive of 80 million paper documents. Information was kept by local district courts that were not connected. As a preliminary step, all the information stored in local courts was

centralised and a unified land registry was set up in the city of Hobro. After this initial mechanical task, in 2009 the Danish government was able to begin modernising its land registry by digitising property registration.

However, out of date practices had to be streamlined and re-organized before the centralised land registry records were able to be progressively digitised. Then, once digitisation was complete, the land registry introduced electronic lodgement of property transfers. By 2011, property transfer applications were only accepted online, and the system started screening applications in a fast and efficient way. As a result, the time to register a commercial property was slashed from 42 days to 4.

The Danish system was designed to respond to the needs of a variety of stakeholders, from citizens to financial institutions. With online access to a single source of land registry information, citizens and businesses could transfer property on their own with no third-party involvement and get information on any property. In addition, the Danish financial sector created a central hub for sharing land registration data between banks and the land registry, thereby facilitating access to information and credit.

A key lesson to be learnt from this successful Danish reform is that a necessary first step before digitisation is to review current laws and regulations relating to land registration. Out-of-date legislation can be an impediment. New regulations may be needed to support computerized systems.

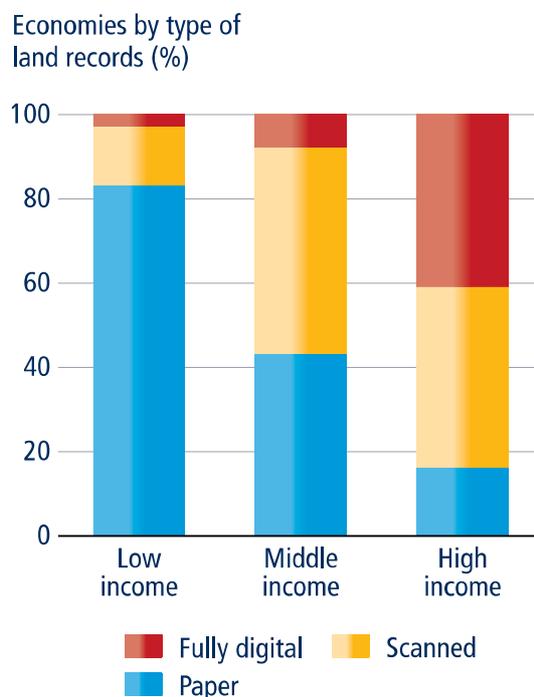


Figure 26: The digitalisation of land records varies widely across economic income groups
Source: World Bank, 2016

The current level of technological advancement used in land registries around the world is very varied and highly correlated with the level of economic development: those with higher gross national incomes are able to deliver greater efficiencies in registration.

Appendix 5: a brief history of the English and Welsh land title system

Before English society was literate, the sale of land was accomplished by the delivery of a turf from the land to the purchaser in return for the purchase price, in the presence of witnesses. New tenants were required to kneel in front of their lords and swear an oath of loyalty.

Under the Land Registration Act 2002, the legal title to land is only transferred when the Land Registrar enters the name of the proprietor on the register. Other interests in land also have to be registered to be enforceable, although there are some exceptions. Equitable rights, that is, rights under a trust, are not registerable, although appropriate noting on the title may protect beneficiaries.

The Land Registration Act 2002 is “the culmination of a legislative process that began with the Land Registry Act 1862” (Harpum, 2002). The Law of Property Act 1925 and the Land Registration Act 1925 were part of bigger land law and conveyancing reform initiated by Lord Birkenhead after the Great War.

Before the late nineteenth and early twentieth century reforms, all conveyancing was carried by a time-consuming process of investigating the title to land on sale, “so as to make sure that the purchaser really does become owner and does not find [herself or himself] burdened with unsuspected liabilities”. This brings out “the central dilemma of land law” (Cooke et al., 2019, p257): how to reconcile security of title with ease of transfer.

The tension between security of title and ease of transfer is not confined to England and Wales, and different legal systems have solved the problem in different ways. However, the state (whether in the person of a monarch or otherwise) has itself been an early driver for establishing accurate accounts of land within its boundaries, so as to enable taxation based on the worth of the land. The Domesday book of William the Conqueror, based on his Anglo-Saxon predecessors, is an early and egregious example of a cadastral survey.

Comprehensive and accurate identification of exactly which rights are recognized over what land is the challenge for conveyancers. While the state (whether in the guise of sovereign, conqueror or democratically elected government) has been keen to categorise and tax property holdings, the process of buyer and seller getting what they have contracted for is another layer of complexity.

Between 1535 and 1925, a conveyance was allowed to take place by deed. Deeds were required to be held somewhere public, and indeed, there were deed registries in England and Wales in some places from 1663. However, deeds registries only report what has happened at a particular point of time. Land is fundamentally dynamic and, as the law of England and Wales allows alterations in rights without the requirement of deeds or writing, a buyer could never be clear that the deed was the definitive last word on the land in question.

It is said that the idea of title registration – registration of individual parcels of land – was derived from the practice of registering ships. Or at least, that is what Sir Robert Torrens, Prime Minister of South Australia and the first person to introduce land registration said. Whatever the truth, the idea of a particular piece of land having a publicly available record was an attractive one. The Land Registry Act 1862 created Her Majesty's Land Registry, followed by the Land Transfer Act 1975. However, take up of this voluntary service was lukewarm, and lawyers were fiercely resistant. Registration became compulsory in London in 1897, and over the next hundred years more and more counties become compulsory areas, with the last areas coming in to compulsory registration in December 1990. Subsequently the number of dealings, which triggered registration, has increased.

It is worth remembering that an open register of property interests was not publicly available until 1990. Hitherto, it was considered that only Her Majesty's Land Registry and the proprietor should have access to such information. To the horror of traditionalists, in 2008, information about the value of any mortgages and the price paid for the property was also made publicly available.

HMLR is a statutory body and must therefore act only according to its statutorily created functions. One of the purposes of the Land Registration Act 2002 was to enable the process of digitisation and e-conveyancing to take place. However, despite two aborted attempts at e-conveyancing, HMLR has not achieved this aim, although there has been some progress for mortgages. In 2018, the Law Commission in its report *Updating the Land Registration Act 2002*, took a much more cautious and incremental approach towards the introduction of e-conveyancing, than it had in earlier reports.