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Digital Street: Exploring the future of land registration through new technologies

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Abstract

Digital Street is the ground-breaking research and development function of Her Majesty's Land Registry in England and Wales, which aims to transform the way HM Land Registry operates and to stimulate the land and property market.

In collaboration with industry innovators and experts we have created a vision of the future; which demonstrates how the use of data and cutting-edge technologies could positively disrupt the land and property market in the future.

This paper describes the approach that HM Land Registry has taken to explore the use of innovative technologies such as blockchain and smart contracts, and how we have engaged with the wider industry to explore and collaborate over problems such as identity verification and the digitisation of data.

Key Words:

Blockchain

Data

ID & Verification

Smart Contracts

Standards



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INTRODUCTION

This paper is based on the experience, expertise and knowledge of digital services of John Abbott, from working for HM Land Registry for England and Wales and from working in its Digital, Data and Technology function. The paper does not represent a formal HM Land Registry view and is a representation of the views of the author.

This paper reviews the benefits of HM Land Registry's Digital Street project in exploring new technologies to improve the land registration system. HM Land Registry has an ambition to become the "world's leading land registry for speed, simplicity and an open approach to data".

Rapid developments in technology are changing the way that people want to interact with us and how we do business as an organisation. HM Land Registry want to be front and centre of that change and drive innovation across the land and property market. In 2016 we created a new research and development project under the banner of 'Digital Street'. Composed of a variety of disciplines, the Digital Street team were given a mandate to explore how new technologies—such as blockchain—can deliver a simpler, faster and cheaper land registration process, and to pass those learnings across HM Land Registry.

The project is providing HM Land Registry with a way to investigate and understand the potential impacts and benefits of new technologies and the ability to explore innovative and interesting business models in a controlled and exciting way.



The Digital Street team



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Our digital aspirations span the entire organisation and are key to the delivery of our Business Strategy¹. We are building foundations including a digital land register and new casework systems that will enable us to automate applications and support the development of future digital services. We have registered the first digital mortgage through our ‘sign your mortgage deed’ service² and are exploring how we can better serve land and property information to our customers. Alongside building new foundations and services we are thinking about the future, not only how we can better prepare ourselves as an organisation for the digital transformation that the property market will face, but how we can be at the forefront of those changes and technologies. Digital Street is our research and development function where that view of the future is being formed, where ground-breaking ideas and technologies are being explored with an overall aim to guide and inform our digital transformation.

WHY ARE WE DOING THIS?

HM Land Registry plays a critical role in supporting the United Kingdom (UK) government’s housing agenda. In February 2017, the Ministry of Housing, Communities & Local Government published a white paper entitled ‘Fixing Our Broken Housing Market’³, which reiterated our commitment to becoming the world’s leading land registry for speed, simplicity and an open approach to data. The paper also set out how HM Land Registry’s modernisation will assist in making land ownership and interests more transparent, helping to identify land that is suitable for housing.

Part of fulfilling that commitment has been to invest in research & development to understand specifically how we can find solutions to key problems in the land and property market, and how HM Land Registry can help drive change across the industry and support the market in becoming more innovative.

THE HOME BUYING AND SELLING PROCESS IS BROKEN

We’ve started by looking at the buying and selling process, as it’s one of the main areas where HM Land Registry interacts with citizens and professionals in the market. Over the course of 2017 and 2018, we researched the process, the market and the users to really understand what was going on, and to identify which areas we could focus on and start exploring potential solutions to some of the most common or acute problems.

1

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/662811/HM_Land_Registry_Business_strategy_2017_to_2022.pdf

2 <https://www.gov.uk/government/publications/hm-land-registry-sign-your-mortgage-deed>

3

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/590464/Fixing_our_broken_housing_market_-_print_ready_version.pdf



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OUR USERS AND THEIR NEEDS

HM Land Registry is unique in the home buying and selling process, as every party involved in the transaction has to interact with us in some way; conveyancers need us to confirm ownership rights, lenders need us to register their charges, citizens need us for property information and to record the changes in ownership once a sale has gone through, HM Revenue & Customs need us to confirm sale of property so they can levy the correct taxes and estate agents need us to provide up-to-date and accurate title details. That makes us a trusted data provider to all parties.

Through our work in understanding our multiple user types and their varied needs, we have surfaced problems that are having significant impact on the overall process.

- **There is a lack of transparency for all parties involved in the process**

From our discussions with citizens involved in buying and selling, their biggest frustration was about not understanding what was happening at any given time. This is caused by a number of factors: use of impenetrable legal terminology that citizens don't understand, conveyancers not always communicating the status of transactions and the overall process being too complex to navigate with confidence. This was confirmed for both buyers and sellers, as well as some conveyancers.

- **The overall process is inefficient, time consuming and complicated**

As part of our research, we documented the entire end-to-end buy/sell process, visualised as a process map to help us spot areas of conflict, bottlenecks, and areas for improvement. This was based on many interviews with HM Land Registry lawyers, caseworkers, citizen users, conveyancers, brokers, lenders and estate agents. What we were able to show is how complex and inefficient the process is; it's based on procedures that have been in existence for over a hundred years, and is largely driven by legislation. It is time consuming for all involved, with the average transaction taking 8 to 12 weeks⁴.

⁴ <https://www.gov.uk/buy-sell-your-home>



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Our process map in use

- **Key information about property is not available early enough in the process**
From speaking to prospective buyers, we found that many felt that they were unable to make the right decisions early in the process due to a lack of the right information. For example, access to information regarding rights and restrictions that might impact the use of a property is not accessible unless a full copy of the property title is obtained, this comes at a cost and many buyers do not know they can get that information in the first place.
- **Data is out of date, inaccessible and not machine readable**
As a result of our heritage as an organisation founded more than 150 years ago, we hold a large amount of data in formats that are not easily accessed: such as documents stored as scanned images. It's hard to extract data from those formats in a way that it can be compared or used alongside other data. This means manual intervention is often necessary, adding to the time it takes to process transactions. Quite often the data we have is out of date; proprietors may have died, moved house or changed name making it hard to work out who owns what.
- **Identity is checked and verified multiple times by different parties throughout the process, and checks are inconsistent**
Currently, as citizens pass through the end-to-end process, the industry requires that they prove who they are, the source of their funds and their ownership rights again and again, often in very detailed ways. These checks may not always be to the level of assurance or quality that is required. Overall the current process can cause delays, can be costly for the citizen, and citizens often have no understanding of why they are repeatedly asked to prove who they are, and why their proof cannot be passed and shared throughout the process.



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- **Trust and liability is a key concern for a number of parties**

In the event of something going wrong, or there is an instance of property fraud, there is a need to ensure that people are protected throughout the process.

The current model requires conveyancers to bear the burden of a sale as they are the ones who verify identities and the source of funds. HM Land Registry need to protect the integrity of the land register. Where multiple organisations are involved in one transaction the level of trust between those parties is limited, leading to a duplication of effort in the process to avoid any liability concerns.

These problems all point to real opportunity for transformation. The buy/sell process is largely driven by legislation that is predicated on paper-based systems; in those cases where conveyancers will only deal with physical contracts, this is literally true.

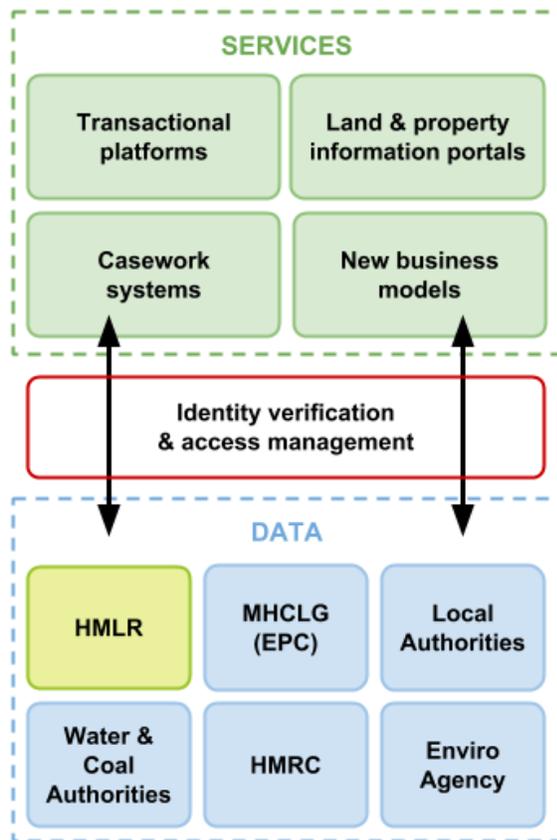
A VISION OF THE FUTURE

Alongside researching our users and their needs, the Digital Street team have worked with industry innovators and experts to create a vision of how the land and property industry might be in the future. As we identified specific needs and pain points for our users, we were able to design potential solutions into the overall vision. It has enabled us to investigate how technologies like blockchain, smart contracts and artificial intelligence could be a positive disruptive force.



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This diagram lays out a way we see the land and property industry in the future: driven by data, accessed via clean and simple means, enabling useful and usable services and experiences to be built.

The cornerstone of the model is the availability of data - lots of it. Described and delivered to a set of co-created standards, we imagine data being provided by a number of trusted sources, typically the ones that currently provide information in land and property transactions - the Coal Authority, the Water Authority, the Environmental Agency, HM Revenue & Customs, etc. All providing access to high quality, consistent, reliable data via Application Programme Interfaces (APIs).

Access to the data would be controlled via an identity verification and access management (IDAM) system, meaning the right users could access and interact with just the right data, at just the right time.

This would then allow all sorts of meaningful and interesting services and products to be built, such as contracts platforms that might allow users to transact directly, better case management systems allowing conveyancers to better serve their customers, property ‘log books’ that could act as a single place for owners to access up to date and historic property information and insights platforms that would be useful to developers looking to build the next the next superstore or out of town shopping centre.

And when you overlay other datasets like socio-demographic, electoral, geospatial or open banking, the possibilities become fascinating and could really enable more innovation in the market.

We haven’t yet reached a conclusion as to which services (if any) HM Land Registry might look to develop - this will become clearer as we continue to progress with Digital Street - but we do see ourselves as an enabler for these components to be developed by the industry.

OUR HYPOTHESES

With users and their needs firmly understood, we created a set of hypotheses that we could explore and test over the course of 2018.



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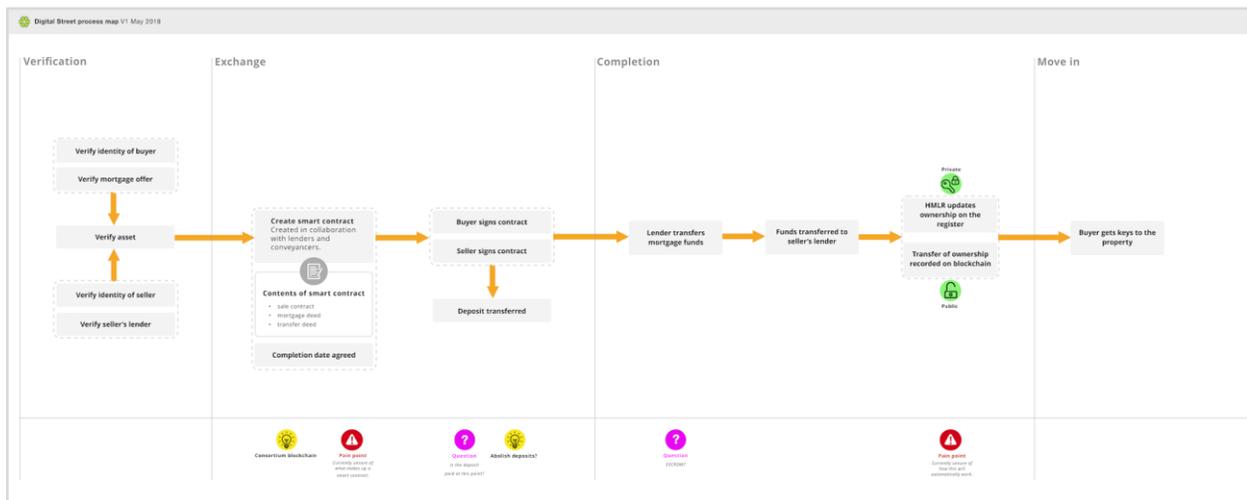


1. We believe that making HM Land Registry data accessible and digital-by-default will make transacting quicker.
2. We believe that using blockchain technologies will allow us to simplify the way users interact with our data.
3. We believe that using smart contracts will help to speed up property transactions
4. We believe that HM Land Registry has a role to play in developing and defining standards to support innovation and add value across the industry.

These hypotheses were designed specifically to allow us to explore the enablers to transformation and innovation: better data, new technologies and standards.

THE CONCEPT

With our users and their needs established, and our testable hypotheses in place, we started to investigate smart contracts and blockchain and how it might support us in completing a fully digital transfer of a property between two parties.



We set out to build a proof-of-concept that made use of ‘smart contracts’ a computer protocol that turn business rules e.g. regulatory and legal restrictions, into executable code. Today participants involved in a transaction need to check certain conditions before a contract can be executed, for example a conveyancer might need to check that a property developer has given permission for the purchase to go ahead and a HM Land Registry caseworker would then need to check that the conveyancer received that consent from the property developer before we could register the new ownership. This manual process can be time consuming and prone to error. Smart contracts would enable us to translate these conditions to business logic and write this business logic as code. The contract would then only execute and update once all conditions had been met, removing the need for the manual processing of transactions.



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We wanted to explore recording the transaction on a blockchain. Our thinking was that this automation of what is currently a very manual, paper-based process would be quicker and more transparent. We used the open source distributed ledger platform Corda⁵ to demonstrate how industry might use this technology and wider blockchain platforms.

The concept works by each participant in the transaction (HM Land Registry, conveyancers, lenders and money settlement organisations) running their own 'node' on the blockchain, which is a full representation of the transfer application, the necessary data and business logic. As this is using a blockchain, each participant in the transaction has the same view as it progresses through the business logic that has been defined; increasing the security and visibility of the transaction. Once all terms of the smart contract have been met, the transaction is triggered: funds are moved and the Register is automatically updated to reflect the new ownership.

We have developed the concept in collaboration with organisations from our community, and we have made all of our documentation and code available to them⁶.

WHAT HAVE WE LEARNT?

We believe that there is a real opportunity to radically improve the buy and sell process through better access to data, more consistent and robust ID solutions and by making use of technology that enables us to automate land and property transactions.

Data & Standards

If we can make land and property data more accessible and more intelligent, we will not only make the process better but would unlock opportunities for new and innovative services. At HM Land Registry we have already committed to creating a new digital register and make more of our data accessible to all in order to increase both the transparency and efficiency of the property market. We believe that this is a big step towards a transformed HM Land Registry and industry.

We also identified that HM Land Registry and other government organisations could play a lead role in developing and enabling data standards for the entire industry. This would allow us to create a solid foundation of robust, trustable data that can be accessed simply and easily through APIs, creating a single source of truth for all parties. Our data would then be far easier to cross reference with other government-held data sets, greatly expanding the value of our data and opportunities for new services across the property market. We are uniquely placed to do this by bringing together the various data providers who currently feed in to the process through open and regular engagement.

⁵ <https://www.corda.net/>

⁶ <https://github.com/LandRegistry/digital-street-community-dev-env>



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Alongside data standards, there is also a need for a more robust and consistent approach towards ID Verification across the property market. The issues surrounding identity could also be solved by industry wide standards. Standards could enable the use of many ID solutions providing those solutions met the standard that was set encouraging healthy competition between ID providers in the market. Solving the ID issue is fundamental and a key enabler for the industry adopting new technologies and digital property transactions in the future.

Technology

We are investigating the potential use of blockchain in the conveyancing and land registration process. Over the last two years we have developed a number of concepts using different blockchain platforms to understand how we might utilise the technology in the future.

So far we have learned that:

- The technology provides a more collaborative, central platform for communicating between members of a business network i.e. lenders, conveyancers, HM Revenue & Customs and HM Land Registry
- Changes to the processes will require a level of coordination between participants in the network
- The technology provides the ability to verify data is valid and check its history
- The process improves transparency, as all parties have visibility of the smart contract code and data
- The process becomes more streamlined, as smart contracts remove the need for manual intervention as they automatically execute
- The technology offers a degree of resilience; for example, power outages on one node of the network does not stop other parties progressing a transaction
- The resiliency of the network is gained at the expense of additional complication in setting up all the lines of communication, much like any distributed system
- Solutions for issues such as identity verification and legal liability need to mature in order to enable wider adoption of the technology
- The standards are still emerging for cross-network communication, which allow data to be exchanged regardless of the type of blockchain used.

Overall, we have found that the technology would provide more transparent data and has the ability to speed up, and increase the security of, land and property transactions. However the current model and process is not really taking advantage of the full benefits that blockchains can bring: being tamper-proof, verifiable, time-stamped, and shared which means transactions are only agreed by consensus. HM Land Registry can already provide most of these things, and by virtue of the state-backed guarantee, we also offer a high degree of trust and confidence

We believe there is potential to realise a much wider range of benefits from the technology if we rethink how both land registration and conveyancing work today. We hope to further our thinking on this over the next 12 months.



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THE DIGITAL STREET COMMUNITY

One of the major success stories for Digital Street has been our engagement with the land and property industry, and the support we've received as we've been on our journey.

Digital Street has become a catalyst for innovation in the UK property market. We have given the market a clear sign of our ambition, encouraging their involvement with our ongoing exploration of how the latest technology can improve all aspects of the property buying and selling process.

As previously mentioned, HM Land Registry occupies a unique position in the market, and we are part of HM Government. This has given us the ability to bring together large and small companies from every part of the land and property market.



Participants at the first hackathon

We now have an active and engaged community made up of over a hundred organisations and experts who represent all parts of the market including; regulatory bodies, conveyancing firms, lenders, search data providers, and cutting-edge proptech innovators.

Throughout 2018, we held a series of engagement events. This was a mix of workshops, roundtables, coding events and showcases, placing the Digital Street initiative firmly in the hands of our peers. You can read more about our community events on the Land Registry blog⁷.

⁷ <https://hmlandregistry.blog.gov.uk/2018/11/30/community-engagement-and-collaboration-on-digital-street/>



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We also ran two cross-industry hackathons to explore specific areas that we had identified as either; pain points for users (duplication of identity) or areas of high interest (distributed ledgers and smart contracts) to rapidly prototype potential solutions.

Hackathon 1: identity and verification

The first hack was focused on proving and verifying identity of parties, specifically to explore how the industry could remove the duplication of ID checks in the buy and sell process. We set eight hack teams the challenge of exploring how the identity of a buyer or a seller could be verified once, and then securely shared between parties involved in the transaction, such as lenders and conveyancers. The teams presented back different solutions and models, including federated ID and self-sovereign models. Insights from the hack have been shared with our internal team who are exploring ID and will help to inform our thinking on this subject going forward.

Hackathon 2: blockchain & distributed ledger technology

The second hack was to propose and explore potential use cases for blockchain/distributed ledger technology in the context of the land and property market. The hack teams produced many uses for the technology including mortgage fraud prevention, fractionalised ownership and property tokenisation. This hackathon has provided us with a good foundation to explore some of these ideas further in our third year of research and development.

Open working

One of the principles of Digital Street is that we have worked in the open, regularly publishing our code, insights and outcomes as we have progressed over the last year.

Our engagement with the Digital Street community has provided us with a greater understanding of our role in a broader context, particularly how we can enable innovation for the market. We have a clear view of the problems that the industry face and have given them a voice and a way to feed into government agenda.

WHAT DOES DIGITAL STREET YEAR 3 HOLD?

The next year for us is about consolidating our learnings to date, increasing the speed in which we show the value of research and development to HM Land Registry, and being broader with our thinking. All while being as bold and ambitious as possible in our thinking to drive toward the future.



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Ways of working

We will be changing our ways of working to so that the team can be more autonomous and in charge of the velocity of their projects. We are moving to quarterly themes, under which can sit a number of different projects or investigations that might cover policy, legislation, process, or systems as well as technology.

We will be reducing the core team and bring in subject matter experts as and when we need them. This will help us stay nimble and reduce the overhead cost to HM Land Registry. The subject matter experts might be economists to help us explore new business models and impact on the British economy, or they might be technical lawyers who can help us to navigate the complex legal system.

The team will have the space to change direction to explore different avenues and options as they are encountered, to question and challenge ideas and presumptions.

Governance will be provided in the form of a forum, composed of people drawn from across both HM Land Registry and potentially wider government, such as the Ministry of Housing, Communities and Local Government and HM Revenue & Customs. Their brief will be to pitch and assess ideas for the Digital Street team to look at within the next themed quarter.

Crucially, we're asking for big, bold, challenging ideas that will transform not only the workings of HM Land Registry, but potentially the land and property industry as well.

Potential themes for year 3

In the new financial year, we will build on previous findings to create a shortlist of work on themes that are broad enough to support investigation across three areas;

- Technology - exploring the opportunities and risks presented by new, cutting-edge technologies
- Policy - how can we innovate policy and legislation in order to benefit the industry and our users?
- Process - what can we do to transform the way HM Land Registry works, our case management systems, processes and services?

AN INVITATION

We are looking forward to starting our third year of research and development, and would welcome conversations with other forward-thinking registries, globally. The best way for us to move our thinking forward around blockchain and other technologies, is by coming together as a network of registries, and exploring the opportunities in this space.

The stated ambition of HM Land Registry is to become the *world's leading land registry for speed, simplicity and an open approach to data*, so we see this as very much a global discussion; we can't—and shouldn't—do this alone.



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As we start to dedicate another twelve months to Digital Street, we will look to further our understanding on the ramifications and opportunities it presents both domestically and globally.

So to that end, we invite interested parties to contact Lauren Tombs at

lauren.tombs@landregistry.gov.uk