Evolving registration - how do established Registrars embrace change?

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Key words: Registration, Data Model, LADM, Country Profile, Evolution, Change

SUMMARY

Land Administration is no longer immune from the inevitable progress of change and citizen expectations. Traditional approaches of big-bang solution delivery are failing to keep pace. Data volumes are ever increasing and considerable time effort and cost is spent on migrating information to the next “new system”. However, it is also true that a large proportion of land information changes infrequently – many titles/parcels will not materially change across the lifetime of one or more systems. This paper will present an alternative approach of accepting change and variability in data enabling sustainable fit-for-future solutions.

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1 A changing world and its impact on the Land Authority

There is a growing imperative for the land authority to recognise its role within a world that is facing change at an ever-increasing pace. This is underpinned by three key areas of change that we categorise as follows:

1.1 Megatrends

Factors such as the digital transformation, growing urbanisation, increasing globalisation, and the impact of climate change all affect the way that land is used, owned and lived on. These factors challenge the land authorities – in terms of organisation, technology, data etc. to remain relevant and trustworthy.

1.2 User Expectations

User expectations are driven by the elegant experience they have when interacting with platforms such as Facebook and TikTok, and the transparency, ease and speed that platforms such as Amazon provide for the carrying out of transactions. Users expect clear and transparent access to data, and the ability to make decisions for themselves.

1.3 Growth Aspirations

In creating economic growth and providing security for citizens, governments are looking to support more complex decision-making processes, utilise new technologies such as AI and BIM, and to link up the key datasets that are used to manage a country – citizens, companies, addresses and so on.

Governments expect their land authorities to provide better and more efficient land markets – creating more inclusive and widespread registration of rights to support both citizen aspirations to borrow against property as part of innovating new businesses and growing the economy, and to support more effective and clearer taxation. Governments further frequently hope that these improved land markets will encourage and support foreign investment and increased market liquidity.

2 Avoiding the change

Traditionally, it has been clear that there is a tendency in land authorities to avoid change, particularly in the technology space: constraining what new services they are able to offer. Systems have grown organically over long periods of time, with system update only taking

place when the imperative to change has become so strong that it can no longer be resisted. System life-cycles of fifteen or twenty years or more are not uncommon.

This should not be a surprise: the traditional approach to change to support new services or government requirements is one of high risk, high cost projects that prior to delivering any business value involve long implementation cycles and massive data transformation activities before a huge, big-bang upgrades takes place.

The failure rate of these projects is unacceptably high: total failure is not uncommon and partial failure or limited business value delivery is normal. Even successful projects typically move the land authority from one fixed state to another, and often to a fixed state that is obsolete before it goes live.

3 Taking a different approach

We believe a new approach to this problem is needed, where the support of change is regarded as not only inevitable, but a valuable and necessary thing that should be enabled – not constrained and avoided.

We see this as a critical shift in mindset. As the need to support the changing needs of government and of citizens becomes ever stronger, the land authority should consider enabling new services and supporting new data structures as social and technological needs evolve. Change becomes "business as usual" not a large high risk project that is to be feared and avoided for as long as possible. We have coined the term "change as usual" to reflect this.

Taking this viewpoint suggests a fundamental shift in thinking around land administration technology – requiring that support for change has to be architected in right from the start.

4 The fundamental problem of the data model

Sitting at the heart of all land administration technology systems is the data model that is used to represent the rights that are registered over land. The Land Administration Domain Model provides clarity on how the data model should be defined – but that definition is enshrined in a country-specific – and point-in-time specific – country profile. This creates two key problems that we shall address:

- The problem of migrating current data to the new data model on system implementation

- The problem of changing that data model when it proves unfit for purpose in the future

The former of these is a critical problem for land administration technology implementation. Building such a mission-critical system itself is a significant but well understood challenge. Migration of the current, live and in-use, data to the new system in a such a way that

registration can continue in parallel and without incurring immense cost, risk and effort is a much less well-understood challenge that is, in the author's opinion, poorly addressed.

4.1 Migrating from the current data

The state of current data is frequently not well-suited to migration to a new "pure and clean" LADM type model where all data is neatly codified – legal representation of rights is commonly articulated in verbose text, which itself is often held in paper documents (or at least, scans of those paper documents).

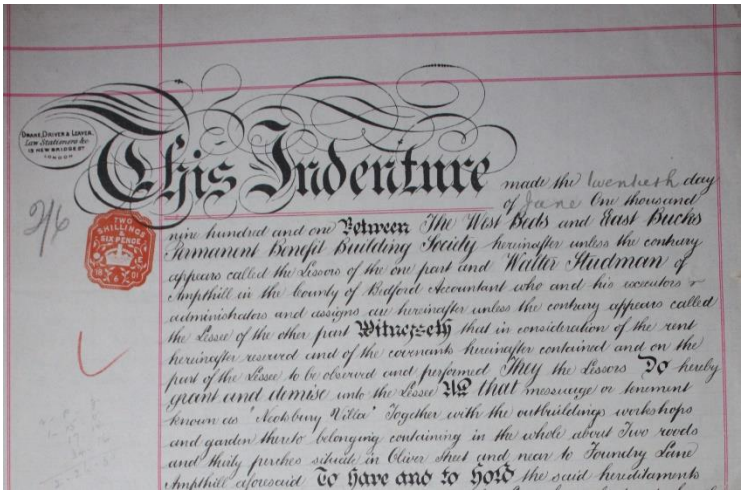


Image 1: Scan of an indenture creating a number of registered rights on a property

Geometry describing the parcel of land is often similarly shown as scans of paper maps, or will be surveyed to old standards and co-ordinate reference systems and cannot be relied on to provide accurate geometry for the parcel.

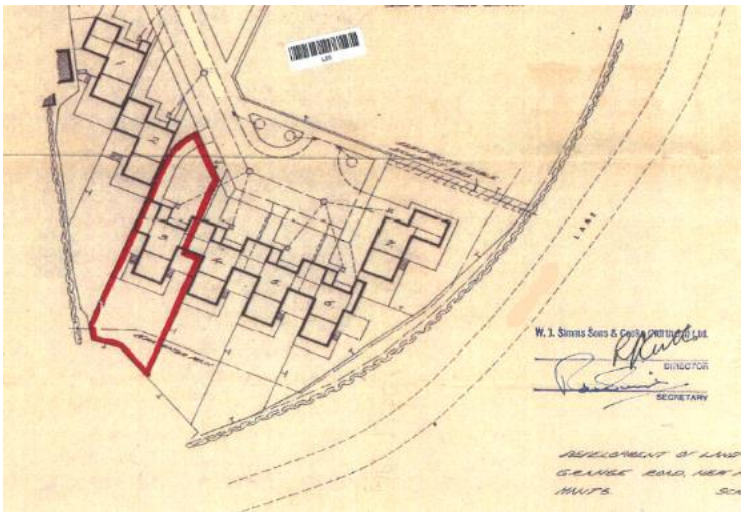


Image 2: Scan of paper map showing boundary

Enforcing an approach of migration of this data to a new "clean" data model where resurvey of parcel geometries and analysis, clean up and rekey of all registered rights is required places a successful adoption of the new land administration platform at significant risk for a number of reasons:

- The adoption of the platform is costly – the data migration and transformation effort is vast
- The adoption of the platform is risky – the process of migrating the data presents risk that part of the transformation will be incorrect, and a legal problem with many titles may lie undetected for years.
- The adoption of the platform is slow – the ability to "go-live" in an area is reliant on the data for that area having been transformed and migrated – a process which, as well as being costly and risky, is very slow.

An aspiration of creating business value early in the implementation cycle suggests that an "en masse" transformation of data is neither desirable nor realistic.

4.2 Evolution of the data model

Definition of an LADM country-profile is a difficult and time-consuming exercise that without exception results in a model that reflects the position at a point in time. Though extension of code-lists can be used to evolve the model to some extent, there is no doubt that eventually the country profile will need to be revisited and a new profile created that enables new services and automations to take place.

These changes take place in various parts of the model. Changes the legislation can create new tenure types and rights relationships between titles that are impossible to model with the old country profile; and changes to the way land is surveyed can create new models of property that do not fit the existing data model.

It is not uncommon to find that so much of the land administration technology platform is tied to the underpinning data model, that changing the model requires dramatic rework of the technology from database, business services and on up to the presentation layer. Such a rework can trigger wholesale replacement of the technology platform itself.

Regardless of whether the entire technology platform is replaced or not, changing the data model is so fundamental to the system that it becomes common, once again, to carry out mass data-transformation.

In this paper we shall represent this change from "old model" to "new model" with these two graphics (old model on the left, new model on the right) – though only dealing with geometry, it can be assumed that there will be similar fundamental changes in the registerable rights.

Image 3: Evolution from an old country profile to a new one

4.3 Frequency of change in title data

The problems described above with transformation of data, both in the initial migration to the land administration platform and with future evolution as the country profile requires changing to remain fit for purpose, also bring up the question of how many of the titles that reside within the land administration system will actually change in some meaningful way over the lifetime of the system.

This question is important as transformation of either the legal or spatial aspects of a title carries with it cost, risk and time; and there is a question of whether it is valuable to carry out that transformation on a title that will not be transacted on before it is transformed once again at a later date, with further cost, risk and time spent in the process.

To answer this, an analysis of publicly available open data from Her Majesty's Land Registry of England and Wales (HMLR) was carried out which determined that many records within the register remain untouched for many years; and suggests that it would be possible to generate some insight into where transformation effort should be focussed.

The aim of this analysis was to generate a reasonable estimate of the percentage of records that a land authority holds that will be transacted on within a given timeframe, with our hypothesis being that many properties would not transact for many years. This number would provide an evidenced view of the value (or lack thereof) of carrying out mass transformation of data from one data model to another.

HMLR publish a large and valuable dataset known as the Price Paid Data. This contains within it the overwhelming majority of residential property sales that have taken place within England and Wales since 1995. Some residential property transactions are omitted from this dataset – they are:

- Sales that have not been lodged with HM Land Registry
- Sales that were not for value
- Transfers, conveyances, assignments or leases at a premium with nominal rent, which are:

    - ‘Right to buy’ sales at a discount
    - Subject to an existing mortgage
    - To effect the sale of a share in a property, for example, a transfer between parties on divorce
    - By way of a gift
    - Under a compulsory purchase order
    - Under a court order
    - To Trustees appointed under Deed of appointment
- Vesting Deeds Transmissions or Assents of more than one property

(from https://www.gov.uk/guidance/about-the-price-paid-data#data-excluded-from-price-paid-data)

The following assumptions have been made about the data:

- The number of transactions has been uplifted by 10% to account for property transactions that are excluded from the Price Paid Data, and to cover other transaction types (such as addition or removal of a mortgage) that may require data transformation. This adjusts towards to the worst case (least supportive of our hypothesis).

- It has been assumed that 92% of residential properties are registered with HMLR. Again, this adjustment is towards the worst case, least supportive of our hypothesis. A source “Property and Trust Law in England and Wales” - Peter Sparkes (2019) - states that "98-99%" of residential properties are registered, so the figure of 92% is a very conservative number.

Using data from the Office of National Statistics, we have used a figure of 21.6M residential properties in England and Wales. Coupled with our second assumption above, that suggests HMLR have a portfolio of just under 20M titles for residential property.

Even having made these adjustments towards a worst-case analysis, we find that against that portfolio, only 40% of the titles were transacted on during a ten-year period.

The full results are shown below in Table 1 below.

4.4 Proportion of the residential property titles transacted on in the last…				
Number of years:	20 years	15 years	10 years	5 years
Number of titles transacted:	13,864,737	11,085,864	7,988,572	4,956,234
%age of total titles:	70%	56%	40%	25%
Residential property titles:	19,872,000 (estimated)			

Table 1: Proportion of the residential property titles transacted on across various numbers of years

This suggests strongly that an "en masse" data transformation exercise – taking all current data from an older data model to a new one – will transform data that will never be transacted on by the new system, simply to be migrated yet again in a later system refresh. This is especially true where more frequent data model change is implemented – assuming a change even every five years (a lifetime in digital transformation terms), a mere 25% of titles would have transacted between data model changes.

Future analysis would be valuable on the types of property that transact frequently – for example, it is expected that small homes in an urban area would be likely to be starter homes, and to transact frequently, but the evidence for this has not yet been generated.

Such evidence would allow the targeting of systematic data transformation at the titles that are expected to transact "soon", leaving behind those that typically have a long life before transacting and needing bringing into line with the latest data model.

5 Adopting a different approach

All of the above indicates that an approach of defining a fixed data model in a system and then:

- enforcing mass transformation of current data to fit the "perfect" model
- resisting the change of that data model strongly
- requiring massive technology rework to support a new (fixed) model when it becomes unavoidable
- requiring mass transformation (again) to the new model

is the wrong approach.

It is the opinion of the authors that moving to a position where multiple data models can be used within the same technology platform has significant advantages:

- The migration of current data can take an approach of adopting current data "as-is"

- The evolution to a new model can take place when it is necessary, and in a manner where migration to the new model is “title by title” rather than “en masse”

5.1 Migration of current data to the new system

Under this new paradigm, it is believed that adopted of current data can take place “as is” into the new system. Migration from paper records can take place with the minimum of work – extracting sufficient indexing and metadata from the original record (e.g. title ID, name and address, a seed point for the location) and then simply attaching the original record as a scanned document (Image 4). Such a data model may be notionally LADM compliant, but should be there to allow data adoption “as is”, not requiring of transformation.

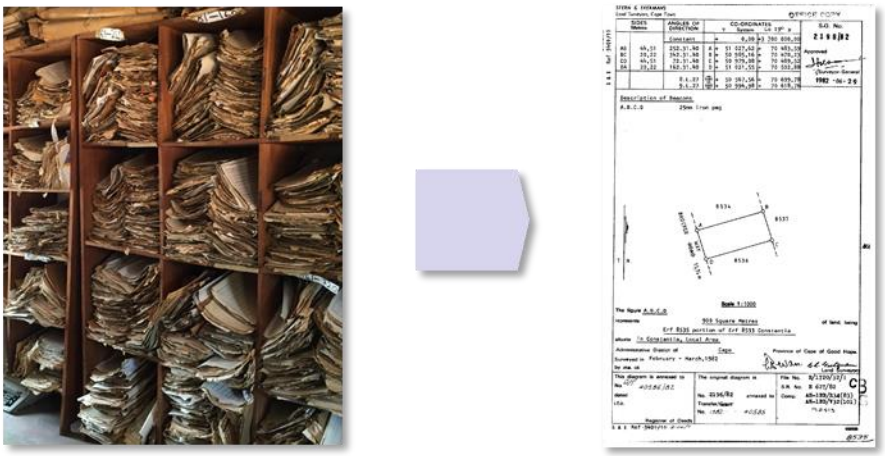


Image 4: Scan, extract metadata and indexing data only, and attach scan of paper document for initial load from paper based systems.

Migration from existing computer systems can also take place by replicating the existing data model in the new system and simply loading the data in without transformation.

It is even possible that the records in the existing computer system could be used directly without loading in – using the existing system as a read-only repository, moving titles into the new system only at the point of a transaction on the record.

All these approaches dramatically reduce the risk, time and cost associated with migration from existing systems to the new technology platform.

5.2 Evolution of the data model

The transformation of the existing data adopted “as is” as above to a better, more fully codified and properly LADM compliant data model can then take place on a title by title basis, at an appropriate point in time such as when the property is transacted on.

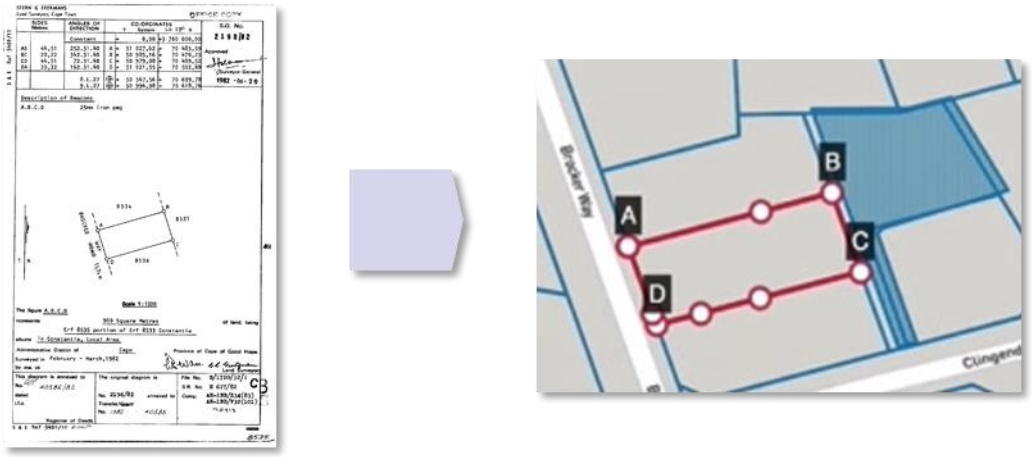


Image 5: Transformation from adopted current data to better data model

Furthermore, when the country profile ceases to be fit for purpose and new one is required, then evolution from the existing model to the new one can again take place title by title, at a suitable point in time such as when the property is transacted on.

Image 6: Evolution from an old country profile to a new one

This approach removes the need for mass transformation of data, and allows the transformation to take place smoothly over time as the titles registered in the system are transacted on.

6 Architectural issues

Making such a valuable approach to management of data models a reality suggests adoption of newer architectures for data management. In particular schemaless, NoSQL Document based databases enable management of data in an arbitrary number of data models possible, and the technology has now matured to a point where data security, transactional consistency and resilience to failure are all sufficient to warrant the technology being adopted as part of a land administration system.

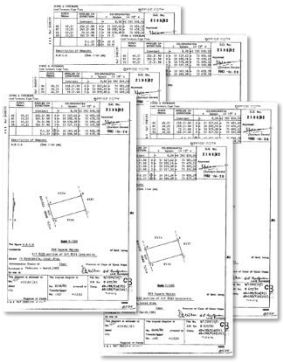
The architecture also needs to provide services that allow visualisation of all data model versions, and the ability to edit the latest version, and to update a record from its data model version to the latest version. Modern service-based architecture are well placed to allow additional services to be added as new data models are adopted allowing “old” data models to be visualised and queried by “old” services with “new” models queried and visualised by “new” services.

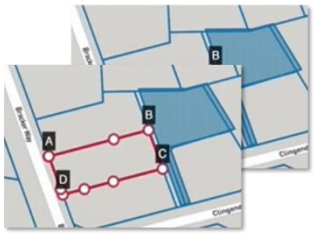
6.1 A sliding window of data model versions

Such a system would present a “sliding window” of data model versions – titles would be lodged in the system in a simple model, utilising the “adopt as-is” model of data migration; and then would be upgraded to a new model as and when was appropriate, such as at the point of transaction.

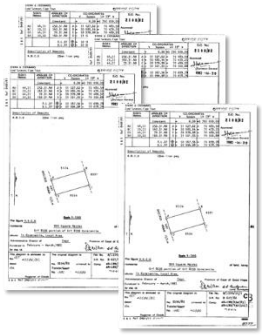
Creation of a new country profile would be done when it became necessary (it is imagined that this might be once or twice in a decade), and again titles would be updated to that new data model at an appropriate point.

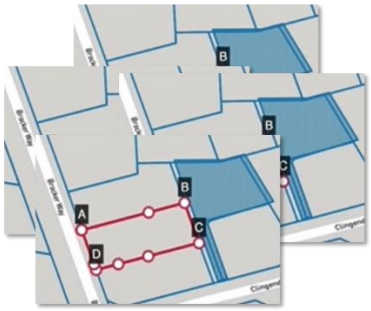
This sliding window of titles may look like this:



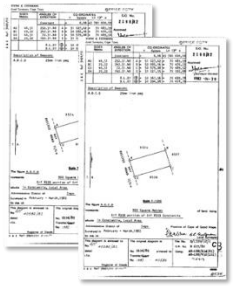


Initially all titles would be in the simplest data model following “adoption as-is” from the existing system, with a small number updated to the target country profile as they transacted





After time more titles would have been updated to the target LADM country profile as more transaction had been processed



At some point a new country profile would be created and titles would start to be updated to that version as they transacted

Image 7: A sliding window of data models

6.2 Harmonisation

For the purposes of presenting a single view of the register, searchable and queryable by all, the register needs to present a single "harmonised" view of the data. This harmonisation presents some challenges as only the data that has been properly codified will be truly queryable – it is unavoidable that data buried in scanned documents will remain inaccessible except by hand.

So saying, there are some well-known techniques for doing automated extraction of data from these documents, which though it may not be sufficiently accurate to be adopted as the legal record would be both a good starting point for update to a later, more codified, model and for management information purposes.

When it comes to the spatial data, the ability to represent all the spatial data, such as it is, on the map is valuable. A harmonisation layer would be implemented within in the architecture that presents all spatial data in a consistent manner, together with appropriate attribution to allow the data to be styled in such a way it becomes obvious which data is at what standard.

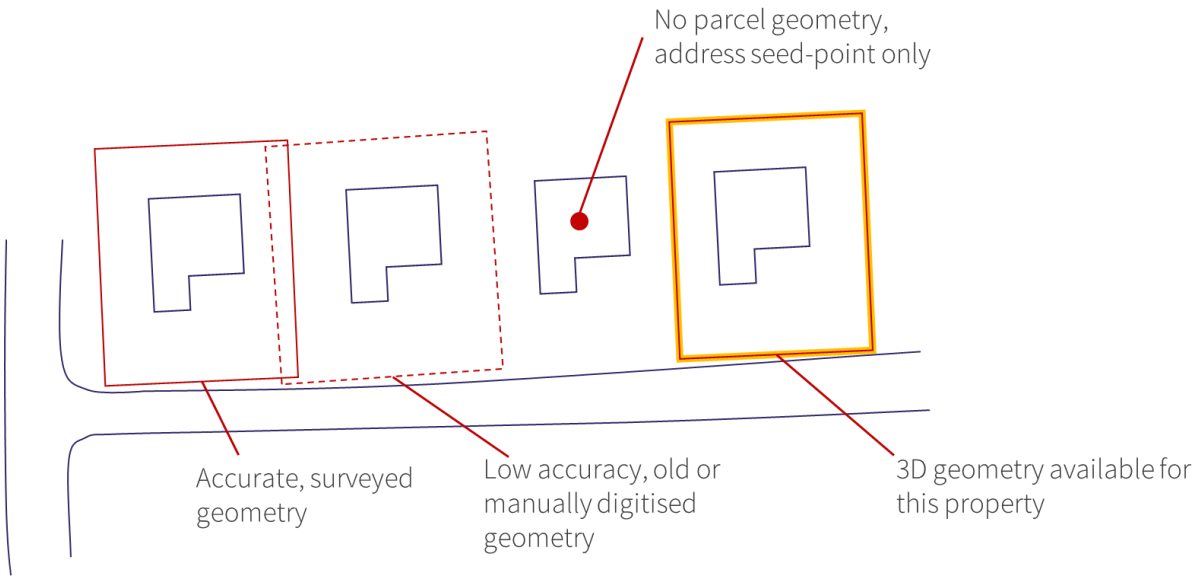


Image 8: Example presentation of different standards for geometry on the same view

7 Conclusion

In conclusion the authors wish to take a perspective of business value. It is clear that business value is not generated by changing underlying technology per se; it is generated when new capabilities are enabled.

The delivery of a new technology platform brings with it new capabilities (else, why upgrade?), but those capabilities only deliver value when they are actually live.

By taking an approach of “transform as needed” the painful data migration task from old system (be it electronic or paper) can be constrained to the minimum possible transformation necessary – the new technology platform should recognise and implement the old platform’s data models (there may be more than one). This enables value from the new system to be delivered much earlier in the development cycle.

Furthermore, to create longevity in the system and to support the changing needs of the world it is unavoidably part of, it is proposed that there is a shift in mindset from “avoiding change at all costs” to one of “change as usual” - where the support of change as part of delivering new value is something that is a natural part of day to day operation of the technology and directly underpinned by it.

The authors are confident that the technology is up to this challenge and are able to demonstrate an implementation that adopts the techniques discussed above.

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