

# **Digital Land Administration: Principles, Visions and Reality**

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**Key words:** Cadastre, Land Administration, Digitalization

## **SUMMARY**

Digitalization of Public Administration, as well as Land Administration is a trend everywhere in the world nowadays. But there are a lot of opened issues in this process. How the traditional principles of land registration can be modelled in a digital environment? Should we have to change these principles, introduce new ones, or leave unchanged? There are many visions in the utilization of ICT in Land Administration as well. Do these ideas have any relation to the reality? Land Administration systems today are based on human activities (aided by computers). Are these human functions can be mapped in algorithms (artificial intelligence)? The paper deals with the mentioned issues, showing examples.

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## 1. INTRODUCTION

Land Administration (LA) is a process. LA is the process of determination, recording and dissemination of information on the relationship between the land and people. LA is not only one process, it is better to speak about a set of processes, which provide reliable, and secure land tenure.

Digital Land Administration (DLA) is not only a LA with digital format data, and their relationships (e.g. constrains, connections). In DLA the above mentioned processes are also digitalized anyway, and IT environment is able to help the operation of the whole DLA. That is for sure, DLA is the future of Land Administration. But the usage of these digital solutions raises many questions, issues, problems, which should be solved, before the implementation of DLA. The paper tries to deal with these propositions, and answer some questions.

## 2. LAND REGISTRATION PRINCIPLES

Land registration principles are based on the experiences, traditions and culture of a society. The goal of land registration is to provide a secure tenure on lands for citizens. There are four basic principles of land registration systems, which are generally recognized in countries (Henssen, 1995):

- **Booking principle**, which implies that a change in real rights on an immovable property, especially by transfer, is not legally effectuated until the change of expected right is booked or registered in land registry.
- **Consent principle**, which implies that the real entitled person who is booked as such in land registry must give his consent for a change of the inscription in the land registry.
- **Principle of publicity**, which 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.
- **Principle of speciality**, which implies that in land registry, and consequently in the documents submitted to land registry, the concerned subject (man) and object (i.e. property) must be unambiguously defined.

These four principles in DLA can be relatively easily implemented, because e.g. the speciality principle easily be implemented in databases, the consent principle can be modeled by electronic signatures etc.

In the case of title registries (like in Hungary) three other principles are upheld (Henssen, 1995) :

- **Mirror principle**, which means that the registry is supposed to reflect the correct legal situation,
- **Curtain principle**, which means that no further (historical) investigation beyond the registry is necessary, except overriding interest,
- **Guarantee principle**, which means that the state guarantees that what is registered is true for third parties in good faith and that a bona fide rightful claimant who is contradicted by registry is reimbursed from an insurance fund of the state.

There are countries (like Hungary), which has some additional principles in land registry. For example in Hungary, the following additional principles are used as well:

- **Application, principle**, which means that anyone wants to change or register anything in Land Registry, he/she must make an Application for it,
- **Principle of rank**, which means all transactions in Land Registry should be carried out based on the time of registering Application of them,
- **Principle of deed**, which means any right or fact, which should be registered in Land Registry, must be based on a Deed.

Implementation of DLA in deed registries looks like much more easier than in the case of title registries. The deed does not itself prove a title, it is just a record of an isolated transaction (Zavenbergen et al., 2019). Therefore in the case of deed registries the digitalization of LA seems easier than in title registries. For example in the Netherlands there are many, reliable digital solutions for land registry (e.g. automatic processing of documents).

Digitalization of processes of title registries is more complicated issue. In the case of title registration not the deed itself, but the legal consequence of the transaction, described in deed, is registered. Therefore an investigation of the deed is required before the registration of the title. As it was written by Henssen (Henssen 2019): “Sometimes a deed registration system is indicated as to synonymous with a negative or a passive system and a title registration system with a positive or active system. Usually in a deed registration system recording does not automatically guarantee the concerned right. Such a system is negative and as a consequence passive in analyzing documents. A title registration guarantees the title, gives positive legal force, and as a consequence the state has to be active in analyzing the documents in order to avoid damages and compensations. The more guarantee by the state there is, the more investigation has to be done by the state, or, in other words: the more positive system is, the more state activity is required.”

Digitalization of title systems’ processes, by keeping its principles, could be a real difficult work. Analysis of deeds, extracting titles from them, in a reliable way, without mistakes, errors is a huge challenge. For example in Hungary, properties are the main elements of assets of citizens. Only 200 000 households has more financial wealth than immovable wealth. The other 4 100 000 households’ property wealths are higher than financial ones (Boldizsár et. al, 2016). Therefore digitalization, independently from deed or title registry, should provide all the principles and geuratees in a DLA system.

There is another issue, if DLA would generate new principles in Land Registry, or modify, cancel any old one? It is an open question. Implementation of different DLAs will answer it, but it is sure, that the existing principles provide reliable, stable solutions, which should be kept as long as needed.

### **3. ALGORITHMS OR ARTIFICIAL INTELLIGENCE**

If anyone is speaking about digitalization of Public Administration processes (including Land Administration), the issue of algorithms or artificial intelligence (AI) is arisen. The reason of this question is that, the algorithms and AI are not the same.

An algorithm is a set of instructions — a preset, rigid, coded recipe that gets executed when it encounters a trigger. AI on the other hand — which is an extremely broad term covering a myriad of AI specializations and subsets — is a group of algorithms that can modify its algorithms and create new algorithms in response to learned inputs and data as opposed to relying solely on the inputs it was designed to recognize as triggers. (Ismail, 2018).

Therefore in the digitalization of LA processes this great difference between the two solutions must be taken into account.

One simple LA process can be modeled as an algorithm, which can solve the whole process, if everything (related to this process) is formularized for this algorithm (the algorithm can not modify itself). But in LA system, mainly in title registries, a set special process is required. As an example, the investigation of deeds, for extracting the titles, which should be registered. It is an open question that an algorithm is able to make all investigation on a deed, which is required for registration. But it is sure, that a high degree of formalization and formularization is required for the usage of algorithms in DLA, including both the documentation and legal processes as well.

The usage of AI nowadays has a wider and wider range. AI is used for many scientific analysis, diagnosis etc.. But there is a very important issue in the usage of AI, generally AI , helps the decision of a human (e.g. a doctor in setting up a diagnosis), but AI does not decide on it alone.

AI is really useful in the extraction and classification of features from images, therefore in the determination of geometric part of land registries (cadastral objects) is almost indispensable, for example in the case of fit-for-purpose land registration systems.

In the case of a title registry AI could strongly help the investigation of deeds, extracting titles etc., but the decision must be made by a human, on the present stage of AI. The future usage of AI in LA system is not clear now, it is possible, that wider range of utilization of AI will be arisen.

In Ismail's paper (Ismail, 2018) the best use cases in the utilization of algorithms or AI concerned the following criterias:

Usage of AI criterias:

1. Cost of slow decisions is high (i.e. decision-making scenarios where speed is critical)
2. Cost of wrong decisions is low
3. Data size is too big for manual analysis or traditional algorithms
4. Prediction accuracy is more important than explainability
5. Regulatory requirements are less

Usage of algorithms criterias:

1. Cost of slow decisions is not high
2. Cost of wrong decisions is high
3. Data size is small, or at least not too big
4. Explainability is critical
5. Industry environment is highly regulated

If these criterias are checked, the answer is unambiguous. Algorithms, on this stage of AI, are better solutions for DLA systems than AI. In LA systems the cost of slow decision is not high (not always), the cost of wrong decisions is really high, the data size is not so big, but the explainability is critical.

#### **4. FORMALIZATION AND FORMULARIZATION**

From section before it is clear, that in the implementation of DLA systems the algorithms are better solutions than AI. But it is mentioned that a highly regulated legal and technical environment is required for the utilization of algorithms.

LA core processes can be classified into five procedures (Williamson et. al., 2010):

- Formally titling land,
- Transferring land by agreements (buying, selling, mortgaging, and leasing),
- Transferring land by social events (death, birth, marriage, divorce, and exclusion and inclusion among the managing groups)
- Forming new interest in the cadastre, generally new land parcels and properties (subdivision and consolidation)
- Determining boundaries.

Only the core processes show, that a wide range of procedures must be modeled by algorithms in a DLA system, including all the interdependence of the processes.

The requirement of highly regulated legal and technical environment leads to a high degree formalization in the documentation of LA systems (deeds, other documents), and high degree of formularization of the legal procedures, because the algorithms would not be able to handle the procedures without them.

For example in the case of a title LA system, if the deeds must be investigated by algorithm(s) a huge formalization of the deed is required. And anyone knows, who has ever coded an algorithms, exeptions are always there. Exeption handling is a critical point in the usage of algorithms in any DLA system.

If a DLA system is using algorithms in its procedures, the formularization of these (generally legal) processes are required, because the algorithm would not be coded.

Another issue is the handling of possible errors, or fails of the algorithms. When and where human interactions are needed in these procedures?

Such a high degree of formalization and formularization of legal procedures in the usage of algorithm in DLA systems, raises the question: Is there any need for legal actor (e.g. notary, lawyer) in DLA transactions?

## **5. DECISIONS AND RESPONSIBILITIES**

In the case of title LA systems, a decision is made for the registering of titles, derived from the investigation of deed. Generally today this decision is made by a human, a land registrar. And this registrar carries the can, the responsibility on his/her decision.

As it was discussed, AI can strogly help this decision, but the judgement is made by human. In the case of an algorithms-based DLA system, where algorithms automatically make a decision (an output), the issue is arised: Who carries the responsibility on decision, the algorithm, the coder, the registrar who ran the algorithm, the institution itself?

It is a real important issue in the implementation of any title DLA system. Our opinion is that, the algorithms (including exeption handling) is really helpful and important in the development of future DLA systems, but the decisions and responsibilities must be kept in human hands.

## **6. CONCLUSIONS**

The implementation of DLA systems is discussed in the paper. Digitalization is a very important in Public Administration, since it provides new, faster, more objective tools for public procedures. It is stated, that the traditional principles of LA systems must be kept in new DLA systems as well, because digitalization is only an instrument to make easier LA activities, but does not replace the human being.

It is also mentioned, that AI is a good tool for decision-making preparation, but the real solution for DLA is the introduction of algorithms into the procedures. Algorithms implementation in DLA systems requires a high degree formalization in documentation and formularization in legal procedures.

The critical issue is the decision making and its consequences. It was declared that the decision should be made by humans, than algorithms.

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## BIOGRAPHICAL NOTES

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