# InterPARES 2 Project
## International Research on Permanent Authentic Records in Electronic Systems

**Overview**

**Case Study 18:**
**Computerization of Alsace-Moselle's Land Registry**

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**The Creator Context / Activity**

Creator: "The creator of the records used to be each registry office, since these offices kept the registries they created. However, following the computerization of the system, the creator is the one responsible for maintaining the database system; that is, the GILFAM." (FR 11) GILFAM is an acronym for *Groupement pour l'Informatisation du Livre Foncier D'Alsace-Moselle*.

Creator type: Government focus / Public sphere (provincial/state administration). The Alsace-Moselle region in France is comprised of three administrative departments: Haut-Rhin, Bas-Rhin, and Moselle. GILFAM is a permanent public body.

Juridical context: The registry was established in 1891 under German law (the region fell under German jurisdiction 1871-1918). It was recognized under French law in 1924 (limited sovereignty). The area was controlled again by Germany between 1940 and 1945. The registry is organized following a mixture of German and French principles and procedures.

Specific legislation that applies: Rapport no. 109, Sénat, 4 décembre 2001; Rapport no. 3597, Assemblée Nationale, 13 février 2002; Loi 2002-3006; "Loi du 13 mars 2000 relative à l'adaptation du droit de la preuve aux technologies de l'information et à la signature électronique"; Journal Officiel de la République Française; "Instructions du 21 décembre 1972 relatives à la tenue du livre foncier", (n.d.); Archive law of January 3 1979; The Alsace-Moselle regional Code of Juridical Organization; Law of June 1st, 1924; Decree of 18th November, 1924; Decree of 14 January, 1927.

Although all laws applicable to the paper land registry apply to the digital entity, of particular importance is the *Loi du 13 mars 2000 relative à l'adaptation du droit de la preuve aux technologies de l'information et à la signature électronique* and the amended Alsace-Moselle registry law (2002). These laws have enabled the land register to be digitized, with digital signatures.

Activity: Creation and maintenance of an electronic land registry (database). In 1994, the GILFAM was formed to oversee the computerization of the existing paper registry, creating a database called AMALFI (*Alsace-Moselle Application pour le Livre Foncier Informatisé*). AMALFI will eventually allow the activities currently conducted in the paper-based environment to be carried out using the database. It will initially comprise the transcriptions of 40,000 existing paper registries (10 linear km distributed between 46 sites (31 in Alsace, 15 in Moselle). Each new database entry will be individually signed by a judge, using a public key infrastructure combining biometric access and digital signatures. This is similar to the old paper system, in which the judges authored the ordinances and signed the inscriptions (*feuillets*), which were then transcribed into the registry by the clerks.

Specific activities of the creator include:
- Administration
- Making property rights public
- Finalizing real estate transactions
- Legal verification of inscriptions in the registry

The activity under study in this case study is a traditional administrative activity undertaken by a government, although carried out in a new way with electronic records. In this way, it may be seen as a nascent business practice. Although the activity itself is not new, the way it is performed or presented is. "The fundamental characteristic of the land registry is not the uniqueness of the information it contains, but rather, the capabilities it offers for organizing and accessing this information. That is, as a record, the land registry cannot be understood outside of its dynamic and interactive capabilities." (FR 27) IBM even featured this project in its 2003 annual report "as one exemplifying its spirit of innovation." (FR 5)

**Nature of Partnership**
The land registry system, encompassing the 150 clerks and 36 judges, etc., may be seen as being the 'creator' of the original records (ordinances, inscriptions, etc.). Since 1994, the GILFAM has been responsible for the creation and maintenance of the AMALFI database. It is stated in the final report that the GILFAM is "overseeing" the creator's activities. Its mandate is to ensure, "either directly or through sub-contracting, the operation and maintenance of the computing infrastructure necessary to the functioning of the computerized land registry" and to ensure "that the operation and maintenance of the infrastructure is done in conformance with article 1316-1 of the Civil Code." (FR 11)

With regards to the actual conception and implementation of the database, GILFAM awarded a 60 million Euro contract to IBM and Parker Williborg to computerize the land registry.

**Bureaucratic/Organizational Structure**
Land registry management and operation fall under the authority of the Ministry of Justice, according to French real estate law. The registry is operated by 36 land registry judges and 150 clerks. GILFAM is funded by a special tax levied on all real estate transactions.

**Digital Entities Studied**
The main digital entity is the Oracle database, AMALFI, comprised of the digitized paper records of the creator. Within this database are three digital components:
1. The <u>ordinances</u> take the form of XML files, defined through a DTD.
2. The <u>inscription</u> (*feuillet*) sections are the base tables of a relational database, which allows querying and listing of information.
3. The <u>scanned images</u> of the 40,000 registers take the form of TIFF files. They are stored on optical media and can be accessed through the database.

It should be noted that electronic transactions are known as "dematerialized" transactions in the language of French jurists. Following the 1999 European Directive, French law stipulated that cryptography-based digital signatures have a special and advantageous evidential status, through a presumption of trustworthiness automatically met by such signatures.

**Documentary Practices Observed**
Given the legal nature of the records created and preserved in the system, there are extensive records management requirements. The land registry is required by law to maintain records within a records management framework and an archives program. The computerized land registry will manage all of the digital entities discussed in this case study.

Records Creation and Maintenance
Web-based applications enable the creation and management of the ordinances and access to the content of the land registry. The **process** of creation is fixed and documented. Ordinances are initially created when a user initiates a "request for inscription." The request is filled using an XML form called a RIN *Requête d'Inscription Normalisée*). This form contains fields relative to the parties in the transaction and characteristics of the land parcel. The information is either pulled from the registry itself or added by notary, as needed. The RIN is forwarded to the land registry office, where a clerk uses it to prepare a "*projet d'ordonnance*," also an XML form. If the judge approves the *projet d'ordonnance*, he signs it, which creates the final signed ordinance and either updates or creates the relevant fields of the database. "The procedures for accessing the entities necessary to successfully complete a new inscription in the registry are embedded within the interface of the database front-end." (FR 19)

The *juges du livre foncier* (land registry judges) have sole competence for the creation of ordinances and thus for inscriptions within the registry. Land registry clerks are competent and responsible for the reception and time stamping of inscription requests and for preparing the *projets d'ordonnance* that the judge will verify. There are formalized **guidelines** for this process. "A resource manual has been compiled so that all unusual inscriptions can be taken into account and correctly transcribed into the database." (FR 21)

No **metadata** schema or standards are used, and metadata are not discussed in the final report.

Every inscription in the database is numbered with a persistent, **unique identifier** and dated and there are **naming conventions** for the other entities. Ordinances are also numbered and dated. Each scanned image of the registers is numbered according to the system already in place for

numbering individual pages of the registers. Each inscription in the land registry is also connected to a physical file, the annex, by means of a reference number.

The system regularly **captures** digital entities. Both ordinances and inscriptions are captured through custom applications. If the judge approves a *projet d'ordonnance*, he signs it, which automatically creates the final signed ordinance and updates or creates the relevant fields of the database.

The database **aggregates** the data according to the main categories: parcels, persons, rights and obligations. The database has been **organized** following a data model closely mapped on the organization of a single inscription (*feuillet*) within the paper register. That is, the main entity is the inscription, of which there is one for each landowner. Each inscription may hold multiple land parcels and multiple inscriptions within the administrative scope of a land registry office. That is, a single inscription contains information relative to all the properties of a single person within a given administrative territory (usually a commune, or part of one).

The system keeps track of **changes** to the digital records. The relevant fields of the database are updated with the information contained in the ordinance once the latter is signed by a judge. Also, since each land parcel listed in the registry also references an entry in the cadastral survey, any change to the cadastral survey must first be reflected in the land registry. However, scanned images of the paper registry and digitally signed ordinances are never modified. The system includes extensive login capabilities for recording all actions and transactions taking place in the system.

Recordkeeping and Preservation
GILFAM is responsible for the **preservation** of records in the land registry. The archive law of January 3, 1979 prescribes that records must eventually be given to the *Archives de France*, after a certain amount of time (depending on agreement). "The computerization of the land registry has forced the GILFAM to specify the length of time it intends to preserve records in the land registry, and the method by which it will transfer those records to a relevant archival institution." (FR 6)

In terms of preservation **strategies**, the GILFAM and *Archives de France* must agree on a retention period and method "whereby relevant data may be transferred to the Archives *while retaining its functionality*." (FR 6, emphasis in original text) CONSTANCE, a branch of the *Archives de France*, is responsible for the preservation of government databases, mainly those produced for the processing of censuses. The census databases can be maintained by extracting data as ASCII character flat files, along with some associated metadata. However, this preservation approach is impossible for the Alsace-Moselle land registry. Due to complexity and high cost, is it also impossible for the *Archives de France* to operate its own database management system, populated with inactive records of the land registry. As a result, two possible preservation strategies are discussed in the final report: (1) With permission of the *Archives de France*, GILFAM acts as custodian and must transfer inactive records to an archival database that it maintains; and (2) An XML schema would be defined to import inactive records into a relational database sufficient to fulfill the needs of researchers (a less complex model).

All records within the land registry database must be kept according to law. With regards to **storage**, the digital entities are kept within a relational database system (an Oracle database), of which two copies are maintained. Data relative to the inscriptions are kept within tables, linked through relationships. The ordinances and digital signatures are kept as separate files, linked to the relevant inscriptions. The scanned images of the old paper registers are kept on optical media and are also linked to the relevant inscriptions.

Digital signature and biometric identification technologies provide **access** control and signature capabilities for the judges. "Within the database itself, data is protected from malicious modifications only through the access control mechanisms in place, and protected from accidental modification only through the general soundness of the software architecture." (FR 21) To enforce **security**, only one copy of the database is accessible to users via the Internet. The two copies of the database are synchronized at the end of each day. Security for external access is secured through SSL technology, thus guaranteeing that the information cannot be modified in transit between the user's workstation and the server.

The questions of **obsolescence** and technological **dependence** have not been adequately addressed. Although the GILFAM has the legal responsibility to provide continued access to the land registry in a fashion which preserves its evidential value regardless of technological change (in conformance with Article 1316-1 of the Civil Code), "it has not considered the problem of maintaining the digital entities, except through the mechanisms afforded by system vendors when upgrading the database management system. In addition, it has not considered the problem of maintaining the evidential value of digital signatures through technological evolution." (FR 26-27)

The creator acknowledges that "the data within the land registry database will most likely be modified through eventual system **migration**—for example, textual data may be migrated from an ASCII encoding to UNICODE. While such migration will not alter the conceptual integrity of the data, it will inevitably alter its bitwise integrity. Using a comparison mechanism between the inscriptions and the signed ordonnances provides the necessary flexibility for system evolution, while retaining the high integrity standard of digital signature." (FR 22)

**Accuracy, Authenticity and Reliability**
"The computerization of the land registry has thus involved considerable consideration of the ways in which computerization may affect the reliability, accuracy, and authenticity of the land registry." (FR 28) There are several levels on which these issues are addressed. "The design team has sought to address the quality, reliability, and authenticity of the data on the legal, professional, and perceptual levels, in addition to implementing a complete set of technical solutions." (FR 19)

Although there are legal and professional issues relating to accuracy, authenticity and reliability, to a large degree, "the reliability and authenticity of the land registry are also functions of the *perception* of the users that it so." As a result, "the GILFAM has conducted the design and implementation of the computerized land registry in a way that projects confidence and competence…In general, the GILFAM is perceived as one of the most competent digitization and computerization projects in all of France." (FR 20)

<u>Accuracy</u>
The system was designed to produce and provide access to accurate, reliable and authentic information. "Notaries, bankers and bailiffs need effective access to up-to-date and accurate information to, respectively, prepare real estate contracts, authorize loans, and recover property." (FR 4)

In this case study, accuracy seems to be equated with quality. There is "an elaborate process of quality control in order to ensure the accuracy of the data." (FR 16) Regarding the accuracy of individual records of transactions, "The judge verifies and confirms the accuracy of the transcription by signing it." (FR 12) "Once the judge signs the ordonnance, he engages his personal responsibility that the information is correct. He then further attests that the information has been correctly transcribed into the paper registers, by signing each inscription." (FR 19)

The quality or accuracy of the data must be maintained throughout the creation process. As can be expected, the process of converting the paper-based registry to an electronic-based one "has required tremendous effort, technological innovation and financial expense, because of the need to maintain the high quality of the data contained in the paper registry. While the transcription of the registries from paper to electronic media does not as such 'create' new records, it does alter their status as evidence." (FR 15) This evidential weight will be discussed in the following section.

<u>Authenticity</u>
The *Loi du 13 mars 2000 relative à l'adaptation du droit de la preuve aux technologies de l'information et à la signature électronique* enacted the principle of "electronic authentic acts," while leaving the precise definition of the form and requirements of such acts to a later decree, which has yet to be enacted. The digital signature of the ordinance by the judge creates a signed XML document, the ordinance, which is "authentic" in the sense of the above law. With regards to the authenticity of individual records in the registry, "the judge must establish that the acts are authentic (in the civil law sense), when such a requirement applies." (FR 12)

The ordinances can be used as evidence in a court of law. "Because it is written and signed by the *juge du livre foncier*, the ordonnance is considered to be *authentic* documentary evidence within French evidence law; that is, its accuracy is superior to all other written and oral evidence." (FR 4) The authenticity of the electronic records is equal to that of the (previous) paper records. "Because the computerized land registry continues to rely on the same legal professionals—the *juges du livre foncier*—and because French evidence law as already been reformed to account for the evidential value of electronic information, the computerized land registry will continue to hold information admissible in court as evidence." (FR 19-20)

To ensure that the digital entities are not tampered with or corrupted, the system's designers have provided two software mechanisms to ensure that the content of the database remains in accordance with the signed ordinances that are at the procedural and legal origin of the inscription process:
- A top-down procedure sequentially traverses all of the ordinances stored on the system, verifying each digital signature and comparing the ordinance to the inscription, to determine that the inscription linked to the ordinance has not been modified.
- A bottom-up procedure performs a similar process, but proceeds from the inscriptions.

"These mechanisms, performed at regular intervals, ensure that any modification to the content of the database, whether malicious or intentional, can be detected early…Rather than expecting digital signatures to perform a one-time service of demonstrating the authenticity of the ordonnance in a court of law, [this approach] uses the digital signatures to provide continuous authentication services, that is, regularly performed declarations of the integrity and origin of the data." (FR 22)

In comparison to the paper-based registry, "iven that the GILFAM has put in place elaborate technical and procedural measures…directed at ensuring the integrity and authorship of the land registry data, it has no reasons to believe that the authenticity of the information it provides will prove more questionable than that provided by the paper-based registry." (FR 23)

Reliability
The existing paper registry is seen as reliable: "For more than 100 years, the paper version of the land registry has provided a highly reliable mechanism for citizens, interested parties, and real estate professionals to access accurate and authentic information." (FR 19) The creator seeks the same degree of reliability in the electronic system. Since the reliability of the (previous) land registry resulted from the intimate familiarity of the clerks and judges with the paper system, the GILFAM has involved these same professionals in the design process of the computerized land registry, with the aim of maintaining the same level of familiarity and reliability. "There are high hopes that the computerization process will maintain the standard of efficiency and reliability of the paper-based land registry, while taking advantage of the possibility for remote and distributed access afforded by electronic information." (FR 4)

However, computerization of the land registry may do more than just *maintain* the standards of reliability. "The computerization process may even improve in certain aspects the reliability of the land registry, by eliminating the need for transcription of complex real estate information." (FR 23)

As stated above, perception is a large part of the notion of reliability. If the system is perceived as reliable, it is accepted as such. "The GILFAM, through public relations, user training, and a participatory design process, has ensured that relevant users and actors perceive the computerized land registry as effectively providing highly reliable information." (FR 23) As a result, "because of its effectiveness, overall low cost and high reliability (in comparison to the system of *conservation des hypothèques* used in the rest of France), the land registry is a local law institution strongly associated with the Alsace-Mosellan regional identity." (FR 4)