



InterPARES 2 Project

International Research on Permanent Authentic Records in Electronic Systems

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Computerization of Alsace-Moselle's Land
Registry

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Section A: Overview

This case study investigated the creation of a computerized land registry in the Alsace-Moselle, a French regional administrative entity. The electronic registry will initially comprise the transcription of 40,000 existing paper registries (10 linear kms); each new database entry will be individually signed by a judge (“*magistrat*”), using a PKI infrastructure combining biometric access and digital signatures. The case study focuses on the long-term preservation of digital signatures within an electronic information system designed to improve the efficiency of government-citizen relations, in the context of the French civil law evidence system.

Description

The Alsace-Moselle region comprises three administrative departments: Haut-Rhin, Bas-Rhin, and Moselle. Because the region fell under German jurisdiction between 1871 and 1918, its land registry system (“*livre foncier*”) is organized following a mixture of French civil law principles and German procedures and institutions. The registry was established in 1891 under German jurisdiction and recognized by French law in 1924, under the limited sovereignty (“*jurisdiction gracieuse*”), which the French state grants to the region.

The registry is required by the French real estate law, as the means to fulfill the requirement of *publicité foncière*, which dictates that the juridical status of property (including the various forms of mortgages on the property) must be made publicly available to interested third parties by means of transcription within a land registry. Once a legal document modifying the juridical status of a property is made public through the mechanism of the land registry, it becomes *opposable* to any third party; that is, no third party may claim to be ignorant of the document and its legal effect.¹

The functions of the registry are hence primarily legal, and its operation and management thus fall under the authority of the Ministry of Justice. Because the transcription of a legal document into the registry finalizes real estate transactions, a request for inscription in the registry must be verified by a “*juge du livre foncier*,” an officer of the French State, who establishes the validity of the transaction, verify the identity of all parties, that all formal requirements relative to the inscription have been met, and that no other rights on the property conflict with the new one.

The successful verification of an inscription results in the production of two distinct kinds of records:

¹ *Publicité foncière*: “ensemble des règles destinées à faire connaître aux tiers intéressés la situation juridique des immeubles par le moyen d’un fichier immobilier et la publicité des privilèges, des hypothèques, et des autres droits portant sur ces immeubles.” (Vocabulaire Juridique Cornu p. 713); *Publicité*: “accomplissement d’une formalité légale de publicité (e.g., inscription sur un registre) destiné à prévenir les tiers, à leur rendre opposable l’acte ainsi publié.” (Vocabulaire Juridique Cornu p. 713); *Opposable*: “dont la valeur comme élément de l’ordre juridique ne peut être méconnue par les tiers, lesquels, n’étant pas directement obligés par ce qui leur est opposable, n’en sont pas moins tenus d’en reconnaître et d’en respecter l’existence et même d’en subir les effets.” (Vocabulaire Juridique Cornu p. 612).

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Feuillet 7131

Schultz Louis, onvrier des postes et télégraphes à Colmar.
Schultz Louis, onvrier des postes et télégraphes, son épouse Jeanne

Georgenthum Camille, sa veuve Helphanie née Zimmerlin, sans profession à Colmar, pour moitié et copropriétaires. Fait 1961 (Ann. 990). conting

Section I: Propriété.										Section II: Charges et restrictions		
N° Feuil.	CADASTRE Feuil. N°	LIEU DIT.	CONTE- NANCE. ha. a. ca.	NATURE de CULTURE.	Revenu net. Valeur d'usage.		du feuillet.	INSCRIPTIONS.	OBSERVATIONS.	N° Feuil.	Im- meuble grévé.	INSCRIPTIONS.
					4	5						
1	1010	Mittelhart Kochbuhl entre Edmond Schmitt et Jean Auguste Thiel	0 11 00 0 11 38	vigne			209		26.10.12. Mutation transf. au profit de 283000-232 (Ann. 991) <u>giron</u> - 28.10.15. Transf. au profit de 283000-5 (Ann. 1289)	1	-4-	Fait 1961. Usufruit au profit de Helphanie née Zimmerlin, sans profes- sion à Colmar, veuve de Camille Georgenthum (Ann. 991). <u>conting</u>
2	1211 1216 1217 67	Mittelhart entre de Bastien Kunzbaum et agnace Schuel.	0 04 30 0 04 00 0 12 34 0 08 20	vigne			209	18 février 1916. Acte de 283000-5 (Ann. 991) <u>giron</u> - 28.10.15. Rec. conf. au cadastre nouveau. (Ann. 1151). <u>conting</u> 20.2.1950. Transf. à 9501 et 9. (Ann. 304). <u>giron</u>	2		5 février 1961. Usufruit au profit de Helphanie née Zimmerlin, sans profes- sion à Colmar, veuve de Camille Georgenthum (Ann. 991). <u>conting</u>	
										3		5 février 1961. Usufruit au profit de Helphanie née Zimmerlin, sans profes- sion à Colmar, veuve de Camille Georgenthum (Ann. 991). <u>conting</u>
												Fait 1961. Echange. (Ann. 990). <u>conting</u>
												Fait 1961. Partage d'ascendant successif, donation et licitation. (Ann. 991). <u>conting</u>
3	277 72 DO	Rue des Papeteries	0 00 07 0 00 06	sol			693		21.5.1950. C.C.C. - art. 277 et 279 - fait au profit de échange et de Helphanie Zimmerlin née Zimmerlin (Ann. 991) <u>giron</u>	4	345	20 juillet 1959. Usufruit au profit de Georgenthum Charles, né le 20 novembre 1912 à Colmar, invalide à Colmar et de son épouse Charlotte née Weber, née le 20 septembre 1916 à Colmar ainsi qu'au profit de ses enfants d'avec, en partie au rang avec le droit n° 5. (Ann. 1290) <u>giron</u>
4	277 12 DO	Rue des Papeteries n° 4	0 00 02	sol maison			693		Fait 1961. Pour les 3 et 4. Partage d'ascendant successif, donation et licita- tion. (Ann. 991). <u>conting</u>			
5	277 27 DO	Rue de l'Église	0 00 32	sol					21 juin 1961. Echange. (Ann. 991) <u>giron</u>	5	345	30 juillet 1984. Radiation au droit de disposer de- pendant d'une interdiction d'aliéner et d'hypothéquer au profit de Georgenthum
<p>20 juillet 1984. donation contrat de mariage. (Ann. 1290) <u>giron</u></p> <p>Les copropriétaires sont:</p> <p>1. Georgenthum Antoine Charles onvrier d'usine, à Colmar pour un quart</p> <p>2. Charlotte Adolphe, femme Helphanie née Georgenthum, sans profession à Colmar, pour un quart. Fait 1961 (Ann. 990) <u>conting</u></p>												

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par moitié,
née Schramm à Colmar, par moitié.

Georgenthum Antoine Charles, ouvrier d'usine, à Colmar, décédé 1961. (Ann. 991) *scindé*
 GEORGENTHUM Pierre, né le 20 mars 1943 à COLMAR, installateur sanitaire à COLMAR,
 et son épouse Hannelore née SCHERER en communauté de biens 210 juillet 1964 (ann. 1289) *CB*

du droit de disposer. Section III: Hypothèques, dettes foncières, rentes foncières

OBSERVATIONS	N° Fol.	IMMEUBLE GREVÉ	INSCRIPTIONS	SOMME		OBSERVATIONS
				N.F. n°	c.	
13.	14.	15.	16.	17.	18.	19.
1 2 3 voir section III net.	1.	- 2, 3, 4 -	5 Février 1962. Hypothèque conventionnelle pour servir à la somme principale de vingt mille nouveaux francs, montant d'un prêt. Les intérêts à six et demi, en cas de retard à sept et demi pour cent par an à partir du 4 mai 1962 et les prestations accessoires évaluées à trois mille nouveaux francs, au profit de la caisse Mutuelle de Diefols et de Diefols à Colmar, association coopérative inscrite à responsabilité limitée à Colmar conformément à l'acte d'obligation du 4 mai 1962. L'hypothèque a priorité de rang sur l'emprunt n° 2 et 1. (Ann. 1209) <i>scindé</i>	23.000		Rad. part. n° 423, 4 - Rad. vain N° 6
voir section III net.	2.	- 2, 3, 4 -	5 Février 1962. Hypothèque conventionnelle pour servir à la somme principale de cinq mille nouveaux francs, montant d'un prêt. Les intérêts à six et demi, en cas de retard à sept et demi pour cent par an à partir du 4 octobre 1962 et les prestations accessoires évaluées à sept cent cinquante nouveaux francs, au profit de la caisse Mutuelle de Diefols et de Diefols à Colmar, association coopérative inscrite à responsabilité limitée à Colmar conformément à l'acte d'obligation du 4 octobre 1962. L'hypothèque a priorité de rang sur l'emprunt n° 1. (Ann. 1296) <i>scindé</i>	5.750 2.909,89		Rad. part. n° 423, 4 - Renouvelée v. N° 5. Rad. vain v. N° 7
	3.		26 février 1966. Les hypothèques conventionnelles n° 1 et 2 sont radiées en ce qui concerne l'immeuble n° 3. (Ann. 1263) <i>scindé</i>			
	4.		31 juin 1966. Les hypothèques conventionnelles n° 4 et 5 sont radiées en ce qui concerne la partie de l'immeuble n° 3 et inscrites à titre foncier. (Ann. 903) <i>scindé</i>			
	5.		14 Décembre 1962. L'hypothèque conventionnelle n° 3 est renouvelée pour une somme principale de deux mille cinq cent trente francs, 34, des intérêts à six, cinquante pour cent l'an, en cas de retard à sept, cinquante pour cent, ainsi que pour une somme évaluée à trois cent soixante dix neuf francs, 55 pour frais et accessoires, au profit de la CHDP "Bantbold" à Colmar, conformément à la requête déposée le 4 décembre 1962 (Ann. 1932) <i>scindé</i>			v. n° 7.
	6.		14 Décembre 1962. L'hypothèque conventionnelle n° 1 du 5 décembre 1962 est radiée d'office. (Ann. 1932) <i>scindé</i>			

- An *ordonnance of inscription*, dictating the information to be transcribed within the register; 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;
- The inscription within the register itself (see image above), transcribed by a specialized land registry clerk, and individually signed by the judge. The inscription is presumed to be valid until proof of the contrary—that is, interested parties may rely on its validity during the ordinary course of their business; it may, however, be contradicted by appropriate documentary evidence.

The rationale for the production of these two types of record follows from the need to provide an effective mechanism to interested professions for fast access to the information relative to more than 4.5 million parcels of land and 2 million land owners, with approximately 175,000 new inscriptions added annually. 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. Operated by 36 land registry judges and 150 clerks, contained in 40,000 A2 format (40 x 60 cm) registers, comprising 2.5 million sheets (approx. 10 linear kilometers of archives), the registry is a formidable paper-based information management system enabling access to the essential facts regarding land parcels, and the rights and obligations attached to these parcels. 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.

Discussed since the 1980s, the computerization of the registry began in earnest in 1994 with the creation of a specifically dedicated administrative body, the GILFAM (Groupement pour l'Informatisation du Livre Foncier d'Alsace-Moselle). Its charter specifies that the goal of computerization of the land registry is to “facilitate and speed up the process of requests for new inscriptions, automate information exchange between the registry and the cadastre, optimize information storage and enable remote consultation of the register.”

The GILFAM has mandated a series of preparatory studies relative to this complex process, yielding information on, among other things, the difference between data held in the registry and in the cadastre, and the actual holdings of the registry. In 2002, it awarded IBM and Parker Williborg, a consulting firm, a 60 million Euros contract to oversee and implement the computerization of the registry, as a database system called “AMALFI” (*Alsace-Moselle Application pour un Livre Foncier Informatisé*). In phase one of the project, IBM consultants will clean up and transfer the 40,000 registers to a computer database: because French law prohibits the registers from leaving the region, the registers will be digitized, the resulting image files transferred to Madagascar, where a team of 100 will spend three years transcribing the written records into the database. Phase two of the project will involve the deployment of a region-wide public-key infrastructure (PKI), which will enable judges to digitally sign each new entry into the database. The infrastructure will integrate a number of state-of-the-art security technologies and methodologies, including digital signatures and biometric access. The project is set for completion by 2006.

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. As the IBM press release states,

the move comes amid the European Union's continued push to break down national barriers and instill transparency in markets ranging from everything from cars to financial dealings. It also comes in an era where the complexity and number of land transactions is on the rise. Buyers and sellers throughout Europe and the world will now have real-time access to documents in Alsace and Moselle. In addition, it will no longer be necessary for interested parties to physically make a trip to the regions to conduct land transactions.

IBM featured the project in its 2003 annual report, as one exemplifying its spirit of innovation and its dominating presence in e-government.

Rationale

Digital signatures: This case study offers the opportunity to pursue one of the research questions leftover from the first phase of InterPARES, that of the relationship of a security technology, digital signatures, to authenticity as understood and defined by archivists. The *InterPARES Authenticity Task Force Report* states:

Digital signature technologies have been implemented for the authentication of records across space, but what are the implications of their use for the management of authentic electronic records over the long term? Will their implementation impede the long-term management of authentic electronic records? Can the use of digital signatures be adapted and extended to support the long-term preservation of authentic electronic records. What specific adaptations and extensions would be necessary?²

These questions are especially important in the European context, where a 1999 European Directive has mandated Member States of the Union to reform their respective evidence laws so that they recognize the evidential value of electronic signatures in general, of digital signatures in particular. This case study provides empirical evidence useful to assess the fit between archival requirements and practice, and the regulatory framework offered by the Directive.

Database preservation: The 40,000 volumes of the land registry, together with the persons and parcels indexes, form a large database, the purpose of which is to provide synthetic views of a land parcel's purchase history, or a person's real estate. Although all of the information within the registry is merely transcribed from the ordonnances, it would be a Herculean task to reconstruct the registry from those records. Thus, every single paper register has been preserved since the inception of the system.

² McNeill et al., *Authenticity Task Force Report*, p.33 (http://www.interpares.org/book/interpares_book_d_part1.pdf).

In France, the archive law of January 3, 1979, specifies that public records, beyond a certain period, acquire a secondary (patrimonial) value, in addition to their primary value, which requires their transfer to an archival institution. That is, the records are then judged to be sufficiently old that their patrimonial value takes precedence over their juridical value, and thus, justifies their transfer to an archival institution so that they may become accessible to all citizens of the Nation.

With regard to databases, this logic is enforced by the “Commission Nationale Informatique et Libertés,” a public agency, which requires that all personal information be suppressed past the period for which it is useful the purpose for which it was collected, except when such data is required for historical, scientific, or statistical purposes. In that case, the data must be transferred to an appropriate archival institution.

The period for such transfers varies according to the primary use for which the record is created. It is fixed for certain category of documents (30 years for court decisions, 5 years for records of civil lawsuits, 100 years for records of civil status), or in the absence of such an agreement, it may be fixed through a specific agreement between the record creator and the Direction des Archives de France.

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. Although the preservation of administrative records, inside or outside of databases, as been addressed by InterPARES 1, the preservation of *databases themselves*, as complex, dynamic and interactive computing artefacts, falls within the scope of the research questions of InterPARES 2. This case study documents the efforts of the GILFAM and the Archives de France to agree on a method whereby relevant data may be transferred to the Archives *while retaining its functionality*.

Section B: Statement of Methodology³

Data were gathered through documentary research, site visits, and interviews with key participants in the design, implementation, management and operation of the land registry, both in its paper and computerized version. Key documentation included:

System specifications

- “Programme fonctionnel du projet AMALFI,” GILFAM, April 2001;
- “Cadre général du projet AMALFI,” GILFAM, April 2001;
- “Cahier des Clauses Techniques Particulières du Projet AMALFI (CCTP),” GILFAM, July 2002.

Legislative documents

- 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.).

Marketing/Information material

- Web site of the GILFAM (<http://www.gilfam.fr>);
- “L’informatisation du livre foncier d’Alsace et de Moselle confiée à IBM,” IBM press release, September 2002 (<http://www.ibm.com/news/fr/2002/09/cp1030.html>);
- “GILFAM: Real-Time Real Estate,” IBM Annual Report 2003, pp. 24-25;
- “Le Livre Foncier d’Alsace et de Moselle,” brochure, GILFAM (n.d.);
- “La lettre du GILFAM,” newsletter, no. 9 (septembre 2003), no. 10 (février 2004), no. 11 (juillet 2004);
- “AMALFI: De la plume à la souris, une mutation naturelle,” brochure, IBM (n.d.).

Scholarly and Professional Publications

- Jean-Luc Vallens, “Publicité foncière et vie privée: les enjeux de l’informatisation,” *Le Dalloz*, 2000 n. 24, pp. 375-381;
- Jean-Luc Vallens, “Le Droit Local d’Alsace-Moselle,” *Recueil Dalloz 1998*, 29ième cahier, pp. 275-279;
- Jean-Luc Vallens, “Le publicité foncière en Alsace-Moselle: Une institution séculaire en cours d’informatisation,” *Les Petites Affiches*, no. 248 (14 décembre 1999), pp. 13-15;
- Jean-Luc Vallens, “De la pierre au feuillet: Une brève histoire du livre foncier,” *Les Petites Affiches*, no. 181 (11 septembre 2000), pp. 4-6;
- Jean-Luc Vallens, “Livre foncier d’Alsace et de Moselle: 2 500 000 feuillets,” *Géomètre* no. 6 (juin 2001), pp. 42-43;

³ This case study was issued a Certificate of Approval (#B03-0354) by the University of British Columbia’s Behavioural Research Ethical Board on 10/15/2003.

- Eric Sander, “Le financement de l’informatisation du livre foncier Alsacien-Mosellan: la taxe départementale d’enregistrement est de 0.60%,” *Les Affiches d’Alsace et de Lorraine*, no. 86 (27 octobre 1995), pp. 1-4;
- Pierre France, “Numérisation du Livre foncier: Dernière ligne droite,” *Dernières Nouvelles d’Alsace*, no. 11 (14 janvier 2004).

Site visits

- September 15, 2003: visits to Strasbourg’s and Mulhouse’s *Bureau du Livre Foncier*, participation in meeting with GILFAM and *Direction des Archives de France*;
- January 26 -30 2004: visits to Strasbourg’s and Colmar’s *Bureau du Livre foncier*, the GILFAM office in Colmar, participation in meeting with GILFAM and *Direction des Archives de France*.

Interviews

- Patrick Kerchenmeyer, juge du Livre foncier, Strasbourg, 1/27/04;
- Claude J. Legorgeu, Géomètre, Strasbourg, 1/27/04;
- Pierre Jeannelle, juge du livre foncier, Colmar, 1/28/04;
- Jean-Luc Vallens, President of the GILFAM, Strasbourg, 1/28/04;
- Daniel Winter, Chef de Projet Informatique, Colmar, 1/28/04;
- Daniel Baumann, Greffier, Bureau du Livre foncier de Colmar; 1/28/04;
- Gérard Butscher, responsable technique, Colmar, 1/29/04;
- Franck Soccio, responsable technique, Colmar, 1/29/04;
- Claude Sutter, Notaire, Colmar, 1/29/04;
- Patrick Coillard, consultant, Parker-Williborg, Paris, 2/4/04.

It should be noted that the project is still in its early stages, with an initial, limited roll out of AMALFI planned for the summer of 2005. At this stage, much effort is being spent on the process of transcribing the paper registers into the database, and the implementation of the database itself. Although the functionalities of the system have been extensively specified, the actual interface of the system has yet to be fully mapped out. Similarly, much of the security infrastructure, including biometric identification technologies and digital signature technologies, remains in the planning stages.

Section C: Description of Context

Juridical-Administrative Context

The region of Alsace-Lorraine, located in the North-East of France, was a part of the Holy Roman Empire until 1648. Alsace was added to France by the Treaty of Rijswijck in 1697, while Lorraine was an independent duchy until 1766. In 1871, following the Franco-Prussian war, Alsace (now the French the departments of Bas-Rhin and Haut-Rhin) and the eastern part of Lorraine (now the department of Moselle) were ceded by France to the newly-unified Germany as part of the 1871 Treaty of Frankfurt. The region was returned to France after World War 1 by the 1919 Treaty of Versailles, and controlled again by Germany between 1940 and 1945.

These shifts in political identity have powerfully shaped the legal and administrative history of Alsace-Moselle region, as it is officially known today. Several of the legal and administrative institutions designed by Germany between 1871 and 1919 were maintained when the region return to French sovereignty, under a special legal regime that allows for the continuation of certain local legal institutions. Thus, the Alsace-Moselle region does not enforce the separation of Church and State (long story), and its administrative oversight of real estate is unique in France. In particular, the region operates a *land registry* under the authority of the Ministry of Justice, while in the rest of France, real estate titles are managed by “*conservateurs des hypothèques*,” who operate under the authority of Ministry of Finance.

The system rests on the principle of publicity, which secures respective third party rights on the same estate. The date of an application for inscription in the register fixes the legal effect of the rights, establishing a set order by which the third party rights on a property are recognized.

The rules of operation of the land registry are specified in a number of distinct texts:

- The Alsace-Moselle region's Code of Judicial Organization that defines the rules and applicable competencies relating to the registry system;
- The Law of June 1, 1924, defines the rights of inscription, effects of inscriptions, roles of the real estate judges and clerks, conditions of inscriptions and cancellations and the obligations of the notaries;
- The Decree of November 18, 1924, in addition to the Decree of January 14, 1927, defines the form and content of the pages of the registry, the procedure for inscription and cancellation, the form of the acts, the rules of consultation, the notification of decisions, appeals, accessory registers and the organization of the real estate offices.

Since its recognition in 1924, the Alsace-Moselle land registry has little evolved; that is, until 1994, when the Ministry of Justice created a public body, the Groupement pour l'Informatisation du Livre Foncier D'Alsace et de Moselle (GILFAM), to oversee its computerization. Funded by a special tax levied on all real estate transactions, the GILFAM performed extensive

requirements analysis of the computerized registry, and awarded in 2002 a contract worth 60 million Euros to IBM and partners to begin the realization of the system.

Beginning in the mid-1990s, the French government undertook a major reform of its evidence law regime, motivated in part by the enactment of 1999 European Directive on electronic signatures mandating all Member States to recognize the proof value of electronically signed documents. The process culminated with the enactment of 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.*” The law was meant to establish the broad principles by which the civilist evidence law regime, which France had perfected over the last 500 years would be made applicable to the new reality of electronic (“dematerialized” as French jurists would have it) transactions. In response to the 1999, European Directive, the law awarded to a specific technology of electronic signatures, that of cryptography-based digital signatures, a special and advantageous evidential status, through a presumption of trustworthiness automatically met by such signatures.

The law also sought to deal with a feature specific to civilist law system, that of the reliance on specially-sanctioned representatives of the State to produce high-grade written evidence for especially important transactions. In France, the archetypal example of such “public officers” are the notaries, which enjoy a monopoly of the writing of real estate contracts; public officers also produce the records of civil status, which register the birth, marriage, and death of French citizens, various documents produced by bailiffs, etc. Because the document is produced by a sworn Officer of the State—personally responsible for the proper manufacture of the document and subject to heavy fines and prison terms in case of fraud—it is granted the highest value in the French evidential hierarchy and to prove against such a document, a party must enter a complex procedure and may liable for damages if the procedure fails. The 2000 law enacted the principle of “electronic authentic acts,” while leaving the precise definition of the form and requirements of such acts to a later decree; a decree that, despite four years of efforts by eminent jurists, has yet to be enacted.

The reform of evidence law had a direct impact on the Alsace-Moselle land registry: in March 2002, the Alsace-Moselle registry law was amended to recognize the legal value of the land register held on a data-processing media. Article 36-2 of the law stipulates that the land registry may be held in electronic form according to the conditions prescribed in Article 1316-1 of the French Civil Code, that is:

Electronic written documents may be admitted as evidence in a manner similar to paper-based written documents, with the condition that the author of the document may be duly identified, and that it be manufactured and preserved under conditions which guarantee its integrity.

Furthermore, the “juges du Livre foncier” are Officers of the State, and the ordonnances they sign have the evidential force of “actes authentiques.”

The March 2002 law also appointed the GILFAM as a permanent public body, with the twin responsibility of:

- Insuring, either directly or through sub-contracting, the operation and maintenance of the computing infrastructure necessary to the functioning of the computerized land registry; and
- Insuring that the operation and maintenance of the infrastructure is done in conformance with article 1316-1 of the Civil Code, as quoted above.

Provenancial Context

The paper registries are held in real estate offices distributed among 46 sites (31 in Alsace and 15 in Moselle). Thirty-six land registry judges and 150 clerks operate the registry. One registry exists per “circonscription foncière” (real estate district). Each real estate district corresponds to a community, with larger communities divided into several real estate districts, and smaller communities joined together to form one real estate district.

The computerization of the Alsace-Moselle land registry has created a single database that each real estate registry office can access to process new inscriptions. Individual registry offices will no longer keep separate registries; rather the records will be centrally accessible by each office (as well as by other interested parties such as notaries and bankers). The central database is under the responsibility of the GILFAM.

The author of the ordonnances and the land registry inscriptions is the judge, as he personally signs each such ordinance and inscription. 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.

The mandate of the creating body is to fulfill the obligation of publication regarding real estate transactions by transcribing certain contracts into registers. The functions of the creating body include making property rights public, finalizing real estate transactions and legal verification of inscriptions in the registry

Procedural Context

Under the current paper-based registry system:

1. The process begins with a *request for inscription*. The most common case is a request from a notary, acting on behalf of a client who has purchased property. The request indicates the identity of the parties, the characteristics of the land parcels involved, and the nature of the rights to be transcribed into the registry (mortgage, liens, etc.);
2. Upon receipt of the request, the land registry clerk registers the date and time of its receipt; if a group of requests arrive by mail at the same time, they are given the same time of deposit; the clerk then prepares a *projet d'ordonnance*, a document containing the information to be transcribed into the registry, and forwards the document to the appropriate *juge du livre foncier*;

3. The *juge de livre foncier* is responsible for the verification of four elements of the ordonnance:
 - a. Only the rights listed in articles 38 and 38-1 of the June 1st 1924 law may be transcribed to the register;
 - b. The judge must establish that the acts are authentic (in the civil law sense), when such a requirement applies (for example, the real estate contract provided by the notary, or the records of civil status of the parties);
 - c. The judge verifies the inscription relative to the status of the property under its previous owner; and
 - d. The judge verifies the ability of the parties to enter into contractual agreement, their consent, etc.
4. After modifying, if necessary, the “projet d’ordonnance” so that it fulfills the above requirements, the judge signs it into an actual ordonnance requesting that the relevant rights and/or obligations be transcribed to appropriate register; the judge may reject the ordonnance, or issue an “intermediary” requesting more information before the inscription can be finalized;
5. The clerk then transcribes the requested information from the ordonnance into the register; *the date of the inscription is that of the reception of the request*. This is important insofar as this date determines the order in which creditor’s rights on the property will be considered, in case of default;
6. The judge verifies and confirms the accuracy of the transcription by signing it; and
7. The clerk provides the notary with a confirmation that the request has been accepted and that the requirement of *publicité foncière* pertaining to the transaction has been fulfilled.

Under the computerized system:

1. Requests for inscription are accepted either in paper or in electronic form for a certain period; electronic requests for inscription (RIN) are created using custom software, which connects to the land registry to retrieve the information relative to the parties or parcels, as most of them are already registered within the registry;
2. Once the request is received at the land registry office, it is immediately dated; The system does not allow for a date anterior to the last date and time of entry; it is not possible to modify the date and time once it has been assigned to the request;
3. For each request, an electronic file is created containing all of the associated documents (contract, cadastre, etc.), as scanned image files;
4. A “projet d’ordonnance” is prepared, using the information contained in the RIN, if it was used. Inscriptions are created directly in the database, but are not visible to outside users of the database until a judge has signed them; the projet is transferred to the judge’s “in box” in the form of an XML document;

5. The judge is responsible for the same verifications as before; however, the custom software developed for the land registry provides him with a “before” and “after” view of the inscription; that is, of the changes to the registry that the inscription will effect in the database;
6. After identifying himself through biometric (fingerprint scan) and inserting a smartcard containing his private signature key, the judge signs the “projet d’ordonnance.” At that moment, in a single step, the ordonnance is created and signed, and the relevant fields of the database are updated;

Documentary Context

The paper-based land registry system is centered around two principal types of documents—(1) the ordonnance and (2) the “*Feuille*,” a form printed on two pages and bound into registries, see image).

(1) The ordonnance is an administrative document that lists the information to be transcribed to the land registry, including that relative to the land parcel, the parties to the transaction, and the nature of the transaction. It is authored by the judge, who dates and signs it.

(2) The *feuille* is an administrative form composed of several elements. On the top of each *feuille*, one finds:

- An individual reference number (each volume of the registry is also assigned an individual reference number); and
- The identification of the land owner, including name, maiden name, date and place of birth, and occupation; each land owner is assigned one or several *feuilles*; card indexes for both land owners and land parcels enable direct access to the relevant *feuilles*.

The body of the *feuille* is composed of three main sections: *Propriété*, *Charges et restrictions au droit de disposer*, and *Privilèges, Hypothèques, Séparation des Patrimoines*.

- *Propriété*: registers the cadastre reference of the property, its address, its nature (e.g., land, housing), the reference to the previous owner’s *feuille*, the reference to the ordonnance that transferred the property to the present owner, and the nature of the transfer (e.g., sale, donation);
- *Charges et restrictions au droit de disposer*: for each property listed in the first section, restrictions may be listed if relevant (e.g., right of passage, *usufruit*);
- *Hypothèques, Séparation des Patrimoines*: for each property listed in the first section, mortgages and liens may be listed if relevant;

Each entry in a section of the *feuille* is the result of a separate ordonnance by a judge, is individually signed, and contains the reference number of the annex containing the ordonnance.

Several other documents are involved in the process of inscription, e.g., real estate contracts, provided by the notaries, cadastre plans provided by land surveyors. These documents are preserved as an annex to the inscription; the first document of the annex is the ordonnance itself; the annexes are kept at each relevant land registry office (see image).

In the computerized version of the land registry, the ordonnance remains largely identical in form and function, with the exception that the information is delineated in fields, using XML tags, and may thus be readily processed.

The *feuille*'s sections become the base tables of a relational database; that is, one table records the characteristics of land owners, another of land parcels, another of the *charges*, another of the mortgages; links between the tables (using primary/foreign key mechanisms) establish relationships between relevant entries. It is now possible to query and list the information in the database based on any relevant (or irrelevant) criteria. The two most important views offered by the computerized land registry will be (a) the ownership history of a given land parcel and (b) the set of land parcels owned by a particular individual.

Technological Context

The technological infrastructure supporting the land registry is composed of several elements:

- An Oracle database, containing the land registry data; to improve security, two copies of the database are maintained, one accessible for consultation by authorized users through the Internet, the other is only accessible for modification by land registry offices. At the end of each day, the databases are synchronized;
- Personal (Windows) computers, for registry clerks, running web-based applications for consulting the registry and managing the inscription process;
- Plugs-ins for commercial notarial software for integration with the land registry; communication with the land registry is secured through SSL technology included in Web browsers;
- Personal computers, for land registry judges, running web-based applications for consulting the registry and for finalizing inscriptions to the registry; in addition, those computers are equipped with biometric identification peripherals, and digital signature software; and
- A PKI infrastructure, linking together all land registry offices and the central database, so that judges may sign ordonnances and add inscriptions to the registry.

Section D: Narrative Answers to the 23 Core Research Questions

1. What activities of the creator have you investigated?

This case study has investigated the process of inscription of real estate rights in the computerized Alsace-Moselle land registry database. This process includes a number of activities necessary to give the inscriptions legal value. Such activities include filling out a request for an inscription into the registry, preparing an ordonnance, and updating the registry based on the content of the ordonnance.

In addition, the case study has investigated the transcription of 40,000 paper registers into a computerized database. This process 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. Although the transcription of the registries from paper to electronic media does not as such “create” new records, it does alter their status as evidence.

2. Which of these activities generate the digital entities that are the objects of your case study?

The process of inscribing real estate transactions into the land registry generates the digital entities that are the objects of this case study. This process follows these steps:

- Professional users of the registry, such as notaries and bailiffs, create a “request for inscription,” an XML document that contains information relative to the real estate transaction. Most of this information—identity of parties, characteristic of the land parcels—is pulled out from the registry itself, or if necessary, added by the notary;
- This request is submitted to the appropriate land registry office, where the time of its submission is recorded by a clerk. Based on this request, the clerk created a “projet d’ordonnance,” another XML document, for verification by a “juge du livre foncier”;
- The judge verifies all the information relative to the ordonnance, including the identity of all parties concerned, the characteristics of the land parcel, and the validity of the transaction. If the “projet d’ordonnance” is sound, the judge signs it, using his/her digital signature. The signature of the ordonnance by the judge has two distinct effects:
- It creates a signed XML document, the ordonnance; this document is “authentic” in the sense of the French March 2000 law on electronic signatures; and
- It updates the relevant fields of the database with the information contained in the ordonnance.

These processes correspond to the day-to-day update of the database. At the onset however, it was necessary to transcribe the contents of 40,000 paper registers, (2.5 million sheets) to

populate the database. Only *active* entries were transcribed; that is, entries relative to rights over property still extant. This process involved the cleaning of the registers, their digitization and transfer by satellite to Madagascar, their transcription by data entry operators, and an elaborate process of quality control to ensure the accuracy of the data.

3. For what purpose(s) are the digital entities examined created?

The two main digital entities examined in this case study—the ordonnance and the registry—are created for two overlapping, yet distinct purposes:

- The ordonnances provide high grade evidence (“authentic acts”) that can be used in a court of law to support or contest the information that exists in the real estate registry; and
- The registry provides a means to fulfill the requirement for “publicité foncière,” which finalizes real estate transactions in France. The registry provides a convenient and efficient means for professionals and other citizens to determine the rights and obligations associated with land parcels. It administers the precedence of creditor rights over real estate property;

The third kind of digital entity—the scanned images of the content of the 40,000 registers—was created for two different purposes:

- as a tool for the transcription of the active entries of the paper registries into the database, as the paper registries, by law, cannot leave French territory, and transcription is taking place in Madagascar, for economic purposes; and
- for accessing the *inactive* entries of the registers; because transcription of the registers is extremely expensive, only active entries were transcribed; if a user needs to view an inactive entry, the system provides the scanned image of the page of the entry.

4. What form do these digital entities take? (e.g., e-mail, CAD, database)

4a. What are the key formal elements, attributes, and behaviour (if any) of the digital entities?

4b. What are the digital components of which they consist and their specifications?

The ordonnances take the form of XML files, containing tagged information relative to landowners, land parcels, and rights/obligations relative to the property. Associated with the ordonnance is a digital signature of the judge authoring the ordonnance. The structure of the ordonnance is defined through a DTD.

The land registry takes the form of an Oracle relational database, which is itself constituted of a collection of tables containing the data relative to property owners, land parcels, mortgages, etc., relationships between these tables, and queries and forms enabling the display of related information in tables.

The scanned images of the register take the form of TIFF files. The images containing inactive entries are stored on optical media and accessed through the database.

4c. What is the relationship between the intellectual aspects and the technical components?

The intellectual and technical components of the system are closely matched; all data in the database is organized according to the activities necessary for the successful inscription of real estate rights into the registry.

4d. How are the digital entities identified (e.g., is there a [persistent] unique identifier)?

Every inscription in the database is numbered with a persistent, unique identifier and dated. Ordonnances 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.

4e. In the organization of the digital entities, what kind of aggregation levels exist, if any?

The database aggregates the data according to the main categories parcels, persons, rights, and obligations. The presentation of data is organized in the same way as the paper register; that is, a single *feuille* contains information relative to all the properties of a person within a given administrative territory (usually, a commune, or part of).

4f. What determines the way in which the digital entities are organized?

The date and time of receipt of a request for inscription will determine the order of the property rights, relative to other rights on the same property. This determines the order in which creditors may be repaid, in case of default on a mortgage for example.

5. How are those digital entities created?

5a. What is the nature of the system(s) with which they are created? (e.g., functionality, software, hardware, peripherals, etc.)

5b. Does the system manage the complete range of digital entities created in the identified activity or activities for the organization (or part of it) in which they operate?

Ordonnances are initially created when a user initiates a "request for inscription." The request is filled using an XML form called a "RIN," a "Requête d'Inscription Normalisée." The form contains fields relative to the parties to 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 (a) creates the final signed ordonnance, and (b) updates and/or creates the relevant fields of the database.

The land registry has been initially populated by the transcription of the 40,000 paper registry. Prior to digitization, the registers were carefully cleaned up, and active entries were clearly distinguished from inactive entries.

Each page of the registry is scanned as a TIFF file. A special page-turning scanner has been developed for that purpose, capable of digitizing large volumes at speed up to 1500 pages per hour.

Files containing live entries are then transmitted via satellite to a contractor in Madagascar, due to the lower cost of data entry services in this country. Transcription is effected through image-processing software that highlights text to be transcribed in the image, and presents the data-entry operator with the relevant category for entry. Entries are recorded within an XML structure for direct importation into the land registry database. For data-quality purposes, two data-entry operators transcribe each page of the register, and each discrepancy is automatically highlighted for assessment.

The computerized land registry will manage all of the digital entities discussed in this case study. Web-based applications enable the creation and management of the ordonnances and access to the content of the land registry; digital signature and biometric identification technologies provide access control and signature capabilities for the judges; scanned images of the registers are stored within the database and available for reference to inactive entries.

6. From what precise process(es) or procedure(s), or part thereof, do the digital entities result?

See questions 2 and 5.

7. To what other digital or non-digital entities are they connected in either a conceptual or a technical way? Is such a connection documented or captured?

In the land registry database, each inscription is directly connected to the ordonnance that created it.

Each inscription in the land registry is also connected to a physical (paper) file, the annex, by means of a reference number. To create the ordonnance, the judge may have consulted and verified a number of other related documents, including notarized real estate contracts, cadastre documents from land surveyors, records of civil status establishing the identities of the parties, etc. Although none of the documents are originals, they are all filed in the annex to the inscription. Annexes are kept on the premises of the relevant land registry office.

Each land parcel listed in the registry also references an entry in the cadastre. Any change to the cadastre must first be reflected in the land registry.

8. What are the documentary and technological processes or procedures that the creator follows to identify, retrieve, and access the digital entities?

All of the entities are accessible through the database. The creator accesses the entities through queries. Queries may be based on any number of criteria, including reference number of land parcels, name of landowners, etc. 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.

9. Are those processes and procedures documented? How? In what form?

The documentary and technological processes are currently documented in extensive requirements analysis prepared by the GILFAM. Once the software has been completed, online and paper documentation will document the procedures necessary for successful operation of the software.

The software itself is based on procedures conforming to the laws and regulations that regulate the operation of the land registry (see juridical-administrative context).

10. What measures does the creator take to ensure the quality, reliability and authenticity of the digital entities and their documentation?

The land registry is an information system designed to provide access to accurate, reliable, and authentic information regarding the legal status of real estate in Alsace-Moselle. For that reason, the registry is organized around the professional attributions of the *juge du livre foncier*. The judge, an Officer of the State, personally verifies the validity of the transaction, the identity and capacity of the parties, characteristics of the land parcel, and that all documents provided to document the transaction have the required form. 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.

Thus, for more than 100 years, the paper version of the land registry has provided a highly reliable mechanism for citizens, interest parties, and real estate professionals to access accurate and authentic information. It was not however a system designed to meet the increased complexity of urban real estate contracts, and the increase rates at which property is exchanged.

The GILFAM has thus put considerable effort and thought into the design of a computerized version of land registry that would offer the same level of reliability, while taking advantage of the benefits of information technology. To fulfill this objective, 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:

- *Legal*: the inscriptions within the land registry have a specific evidential value (presumption of correctness), while the ordonnances they are based on have the status of “authentic” acts. 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;

- *Professional*: the reliability of the land registry results from the intimate familiarity of the clerks and judges with the paper system. The GILFAM has involved those professionals into the design process of the computerized land registry, and has put tremendous effort into what it calls the “management of change,” to insure that future operators and users of the system will be maximally comfortable with its new configuration;
- *Perceptual*: the reliability and authenticity of the land registry are also functions of the *perception* of the users that it so. The GILFAM has conducted the design and implementation of the computerized land registry in a way that projects confidence and competence. It has put up a Web site, and published newsletters that aim to inform land registry users and professionals of the progress and status of the project. In general, the GILFAM is perceived as one of the most competent digitization and computerization projects in all of France.

Technically, the GILFAM has addressed the quality, reliability and authenticity of the computerized land registry by putting in place the following measures:

Scanned images

The integrity of the scanned images of the registers is insured by verifying a hash of the image. This insures that the images stored on the server cannot be modified without detection.

Ordonnances

The computerized land registry includes a public-key infrastructure, for the deployment of authentication and signature services for the judges. Each judge workstation is equipped with the necessary software to digitally sign ordonnances. To secure access to the judge's private key, the system uses a three-part authentication process:

- The judges must have in their possession a smartcard holding their private signature key; the card is introduced in a card reader connected to the judge's workstation;
- After entering the card, the judges must provide biometric identification using a fingerprint scanner; and
- Judges must also provide a password to finally gain access to their signing key.

The strength of the digital signature algorithms and the length of the signature keys have been chosen so that signatures remain unforgeable (using direct cryptologic attacks) for a least 30 years.

Inscriptions

The information contained in the computerized land registry is obtained from two distinct sources: (1) the transcription of all live entries of the 40,000 paper registers; (2) new inscriptions resulting from the signature of an electronic ordonnance by a judge. The reliability and authenticity of these two kinds of inscription is insured by different means:

Transcribed inscriptions

The transcription of the active entries of the 40,000 registers represents a formidable technical and organizational challenge. One challenge to the process is that, by law, the paper registers cannot leave the Alsace-Moselle region, and, furthermore, they are continuously being updated, and thus, cannot be taken away for the land registry offices for extended period of times. For these reasons, all 2.5 million *feuilles* of the land registry have been scanned, using a specially designed high-speed page-turning scanner.

Before scanning, each register has been individually cleaned up, so as to maximally improve the legibility of the inscriptions. In addition, active entries have been clearly distinguished from inactive entries, as only the former will be transcribed into the database. In addition, extensive analysis of the registers was performed by the GILFAM to identify all potential non-standard inscriptions. A resource manual has been compiled so that all unusual inscriptions can be taken into account and correctly transcribed into the database.

The scanned registers, now TIFF files, are sent via satellite to a Madagascar contractor for transcription (low-cost of data entry operators is a definite factor in this choice). Using specialized imaging software, data entry operators are presented on one side of their screen with the highlighted information to be transcribed, and on the other side, with the correct category for entering the information. Each scanned page is transcribed by two different data entry operators, and the any divergence between the two is evaluated by a supervisor. The data is entered into an appropriately structured XML file, which can be readily imported into the land registry database back at the ranch.

The GILFAM has conducted a number of preliminary studies to ascertain the error rates resulting from the transcription process. It expects to control these rates to below 0.1% for the digitization process, and below 0.5% for the transcription.

New inscriptions

In the computerized land registry, there is no transcription of the ordonnances into the register: the transfer of the information is affected automatically at the very moment the judge signs the ordonnance. However, contrary to the paper-based system, the inscription itself is *not* signed by the judge—in part because an inscription is not a single bitstring, but is constituted from data stored in different fields of a database record. Thus, 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.

The systems designers have provided two software mechanisms that ensure that the content of the database remains in accord with the signed ordonnances at the procedural and legal origin of the inscription process:

- A top-down procedure traverses sequentially all of the ordonnances stored on the system, verifying each digital signature and comparing the ordonnance to the inscription, determine that the inscription linked to the ordonnance has not been modified; and

- A bottom-up procedure performs a similar process, but proceeds from the inscriptions;

These mechanisms, performed at regular intervals, insure that any modification to the content of the database, whether malicious or intentional, can be detected early (rather than at the moment the inscription is accessed in the context of real estate transactions, potentially decades later. This approach is conceptually innovative on two levels:

- Rather than expecting digital signatures to perform a one-time service of demonstrating the authenticity of the ordonnance in a court of law, it uses the digital signatures to provide continuous authentication services—that is, regularly performed declarations of the integrity and origin of the data; and
- Digital signatures provide an extreme assessment of the integrity of data: if even a single bit of the signed data is modified, the signature fails. However, 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. Although 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.

As a last note, outside users access the computerized land registry using SSL-secured communication, thus guaranteeing that the information cannot be modified in transit between their workstation and the server.

11. Does the creator think that the authenticity of his digital entities is assured, and if so, why?

The GILFAM is legally mandated by law to ensure the continuing operation and access to the computerized land registry, in conditions that respect article 1316-1 of the Civil Code, which stipulates that:

Electronic written documents may be admitted as evidence in a manner similar to paper-based written documents, with the condition that the author of the document may be duly identified, and that it be created and preserved under conditions which guarantee its integrity.

Insofar as the GILFAM is able to demonstrate that the ordonnances and the inscriptions are created and preserved under such conditions, it fulfills its legal mandate. Given that the GILFAM has put in place elaborate technical and procedural measures (see question 10, above) 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. 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.

In addition, 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.

12. How does the creator use the digital entities under examination?

The digital entities will be used by the creator to fulfill its legal obligations for provision of an electronic land registry, following applicable laws as described above. The system will completely replace the paper-based system within the next few years. To accommodate all users, paper-based requests for inscription will continue to be accepted on par with electronic ones.

13. How are the changes to the digital entities made and recorded?

Scanned images of the registers are never modified. Digitally signed ordonnances are never modified. The database itself is constantly updated, as new inscriptions register the sale of property from one owner to another, the creation or extinction of obligations (mortgages taken/repaid). Each inscription is directly linked to the ordonnance that effected the inscription, so that the time and the identity of the judge authorizing the inscription are clearly visible.

In addition, all previous inscriptions are accessible within the database. That is, the land registry keeps track of *active* relationships between land owners, rights, and land parcels, but also registers all *past* relationships, even those rights are now extinct. In this manner, a user may establish, for example, the entire ownership history of a land parcel.

14. Do external users have access to the digital entities in question? If so, how, and what kind of uses do they make of the entities?

The purpose of the land registry is to make public certain information regarding real estate, so it is by essence a publicly accessible information resource. However, different categories of users enjoy different access rights to the content of the registry. The law recognizes three categories of users:

1. Professionals, such as notaries and bailiffs, who have a legitimate need to consult the registry to accomplish their business. For example, a notary will want to verify that a party is indeed the owner of a land parcel before selling it!;
2. Parties with a “legitimate interest,” for example, the prospective buyer of a property may wish to verify the status of a parcel; and
3. General public.

Data within the registry are classified as either “private,” “protected,” or “public”:

1. Private data refers to place of birth, information relative to civil status, and SSN (in France, INSEE), as well as the value of any of the properties owned by a person. Private data is accessible only by relevant land registry employees, professionals, and the person

to which the information relate;

2. Protected data refers to the address of persons, information relatives to easements in section II of the *feuille*, and scanned images of the registers. Protected data is accessible only by relevant land registry employees, professionals, the person to which the information relate, and parties justifying a legitimate interest; and
3. Public data refers to all of the information in section I, whether an inscription relative to a parcel is currently “in process,” and the existence or absence of mortgages (section III of the *feuille*). Public data is available to anyone for public consultation.

15. Are there specific job competencies (or responsibilities) with respect to the creation, maintenance, and/or use of the digital entities? If yes, what are they?

16. Are the access rights (to object and/or systems) connected to the job competence of the responsible person? If yes, what are they?

The GILFAM is responsible for the maintenance of the computerized land registry. In particular, it is responsible for making sure that it fulfills the requirement of article 1316-1 of the Civil Code, which stipulates the condition under which electronic information may serve as evidence in a French court of law. The GILFAM has contracted the realization of the computerized land registry to IBM and is responsible for ensuring that the company delivers a product meeting all of the legal and regulatory requirements associated with the land registry process. Relevant employees of the GILFAM have access to the digital entities within the land registry, as necessary to ensure continued access.

The *juges du livre foncier* have sole competence for the creation and signature of ordonnances, and thus, for inscriptions within the registry.

Land registry clerks are competent and responsible for the reception and time stamping of requests for inscriptions, and for preparing the *projet d'ordonnances*, which the judge will verify.

The access rights of external users are specified above in question 14.

17. Among its digital entities, which ones does the creator consider to be records and why?

Under the paper-based system, the creator considered the ordonnances as well as the bound registers to be records. Registers are kept on the premises of each land registry office, ordonnances are kept as the first element of the annex referenced by the inscription, together with the rest of the supporting documentation, such as notarized real estate contracts, land surveyors reports, etc.

In a sense, the ordonnances are the only original records produced by the land registry office, as the inscriptions are merely transcriptions of the ordonnances into the registers. They are also endowed with the evidential value of authentic acts, while the inscriptions are only presumed correct until proof of the contrary. *That is, although the registries are constantly being relied upon during the ordinary course of business, they are not the documents that would be used as*

evidence in the case of litigation. Thus, in his business dealings, a real estate professional may not rely on the land registry if he is presented with evidence contradicting its contents. The contradiction must be resolved by reliance on the ordonnance transcribed in the registry. Yet, the ordonnances are never relied on in the ordinary course of business, simply because they do not provide, as the registers do, an efficient information management system that could be used when attempting to determine, for example, the entire set of the various mortgages and liens associated with a particular parcel.

Thus, for the GILFAM, the ordonnances, the inscriptions, as well as the scanned images of the registers are all records.

18. Does the creator keep the digital entities that are currently being examined? That is, are these digital entities part of a record keeping system? If so, what are its features?

The creator is mandated to preserve all of the digital entities under examination. The digital entities are kept within a relational database system. Data relative to the inscriptions are kept within tables, linked together through relationships. The ordonnances and their signatures are kept as stand-alone files, and linked to the relevant inscriptions. The scanned images of the registers are kept on optical media, and are also linked to the relevant inscriptions.

18a. Do the recordkeeping system(s) (or processes) routinely capture all the digital entities within the scope of the activity it covers?

Yes.

18b. From what applications do the recordkeeping system(s) inherit or capture the digital entities and the related metadata (e.g., e-mail, tracking systems, workflow systems, office systems, databases, etc.)?

Both ordonnances and inscriptions are captured through custom applications. The scanned images of the register were captured once at the onset of the computerization process.

18c. Are the digital entities organized in a way that reflects the creation processes? What is the schema, if any, for organizing digital entities?

Each inscription in the database can be traced back to the ordonnance that mandated its registration in the database.

The database has been organized following a data model closely mapped on the organization of a single *feuillet* within a paper register. That is, the main entity is the *feuillet*, one for each land owner; each *feuillet* may hold multiple land parcels, and multiple inscriptions, within the administrative scope of a land registry office.

Scanned images of the register are linked to the relevant inscriptions.

18d. Does the recordkeeping system provide ready access to all relevant digital entities and related metadata.

Yes, as relevant for each category of user, as described in questions 14 and 16.

18e. Does the recordkeeping system document all actions/transactions that take place in the system re: the digital entities? If so, what are the metadata captured?

The system includes extensive login capabilities for recording all actions and transactions taking place in the system. Logs may be used for two distinct purposes:

- Providing statistics for performance and audit (performance is monitored on a yearly basis by the Ministry of Justice, and audits are performed on a regular basis by an *Inspecteur du livre foncier*; and
- Alerting security staff to unusual or suspicious behaviour.

19. How does the creator maintain its digital entities through technological change?

The GILFAM has the legal responsibility to provide continued access to the land registry in a fashion that preserves its evidential value, in conformance with Article 1316-1 of the Civil Code, regardless of technological change. 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.

19a. What preservation strategies and/or methods are implemented and how?**19b. Are these strategies or methods determined by the type of digital entities (in a technical sense) or by other criteria? If the latter, what criteria?**

The computerization process has forced the GILFAM to discuss with the Direction des Archives de France an appropriate retention period for the ordonnances and the inscriptions. Because the GILFAM is a public body, inscriptions and ordonnances will not be eliminated at the end of the retention period, but rather, will be transferred to a relevant public archival institution.

Although the transfer of the ordonnances, as stand-alone documents, poses no particular problems, the transfer of the inscriptions does. There is no interest in producing printouts of a single inscription, as all of the information contained in an inscription is already present in the ordonnance. Thus, 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.

A branch of the Direction des Archives de France, CONSTANCE, is responsible for the preservation of the government databases, chiefly those produced by the INSEE (the statistical office of the French government) for the processing of censuses. Because of the simple structure of census data, it is simply extracted as ASCII character flat files, along with some associated metadata. Such an approach is useless with regard to the Alsace-Moselle land registry. Neither is it possible for the Direction des Archives de France to operate its own database management system, populated with inactive records of the land registry, for the complexity and cost of such a system.

Two possible solutions have been discussed. The first one implies the definition of an XML schema that may serve as a translation device between the complex data model used by the land registry, and a less complex model, to be defined, sufficient to satisfy the needs of future researchers. Inscriptions could then be exported to a file according to the XML schema and imported into relational database sufficiently simple to be maintained by an archival institution (e.g., Microsoft Access). This is in fact very similar to the general digital preservation mechanism proposed by Raymond Lorie.

The other solution is for the Direction des Archives de France to grant to the GILFAM the permission to act as the custodian of the land registry. Under such an agreement, the GILFAM would be mandated to transfer its inactive records to an archival database and, using the same software infrastructure, provide access to the records as determined by the Direction des Archives de France. Under such a model, the full dynamic and interactive capabilities of the preserved land registry would remain; that is, as long as the land registry itself remains in operation.

20. To what extent do policies, procedures, and standards currently control records creation, maintenance, preservation and use in the context of the creator's activity? Do these policies, procedures, and standards need to be modified or augmented?

The creation, maintenance, preservation and use of the digital entities considered in this case study are entirely controlled by laws and regulations, as outlined in the juridical-administrative context section. The policies have already been amended to take into account the computerization process and its reliance on electronic evidence. An agreement has yet to be reached between the creator and the Direction des Archives de France over a procedure by which inscriptions within the land registry may be transferred to an archival institution, while retaining its functionalities.

21. What legal, moral (e.g., control over artistic expression) or ethical obligations, concerns or issues exist regarding the creation, maintenance, preservation and use of the records in the context of the creator's activity?

The land registry's entire *raison d'être* is to fulfill the legal obligation of *publicité foncière*. Its management and maintenance must fulfill the requirements of the various laws and regulations governing it (see above section on juridical-administrative context). 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.

In addition, the computerization of the land registry has involved consultation with the CNIL over the retention periods that must be associated with inscriptions within the registry (see question 17, above).

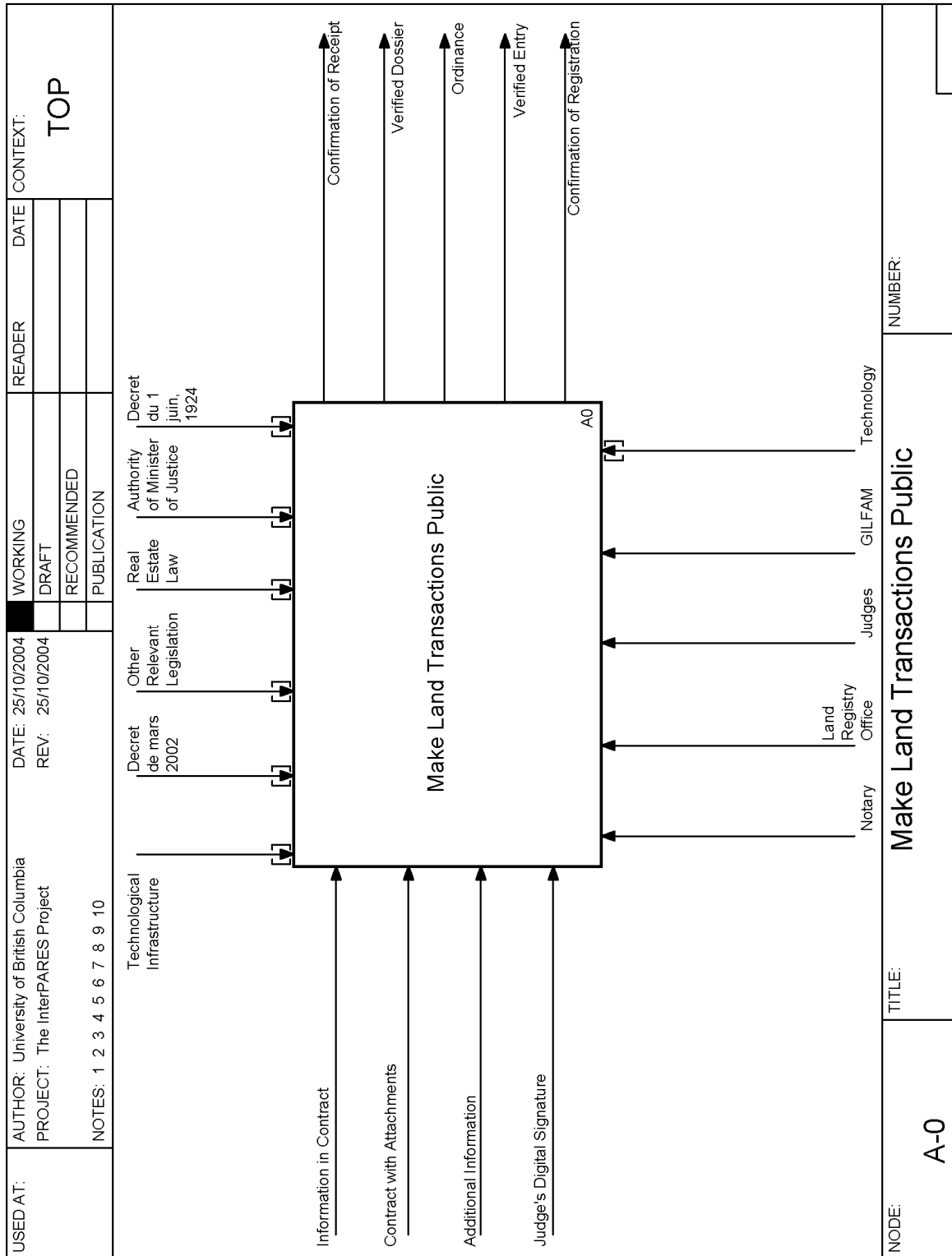
22. What descriptive or other metadata schema or standards are currently being used in the creation, maintenance, use and preservation of the recordkeeping system or environment being studied?

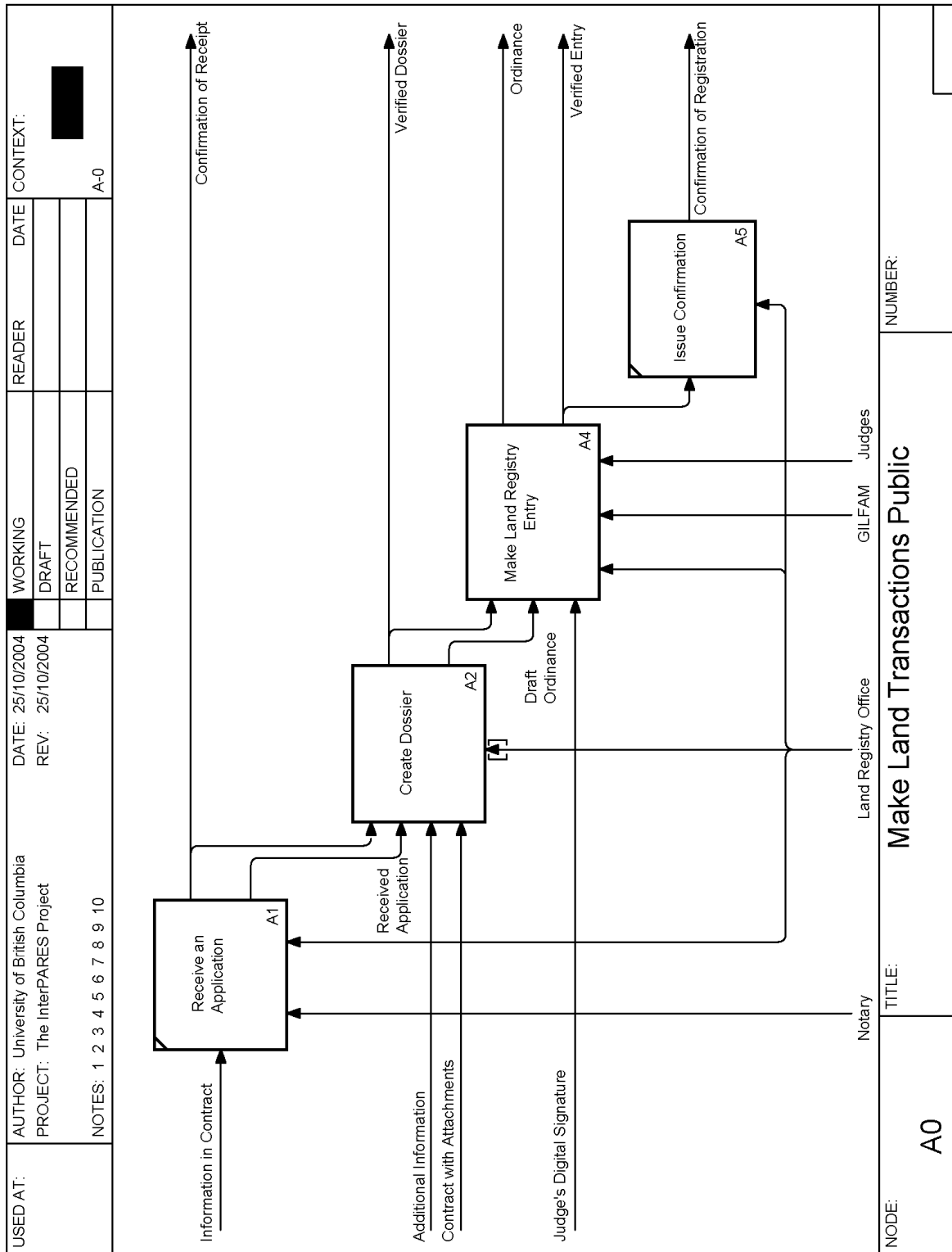
None.

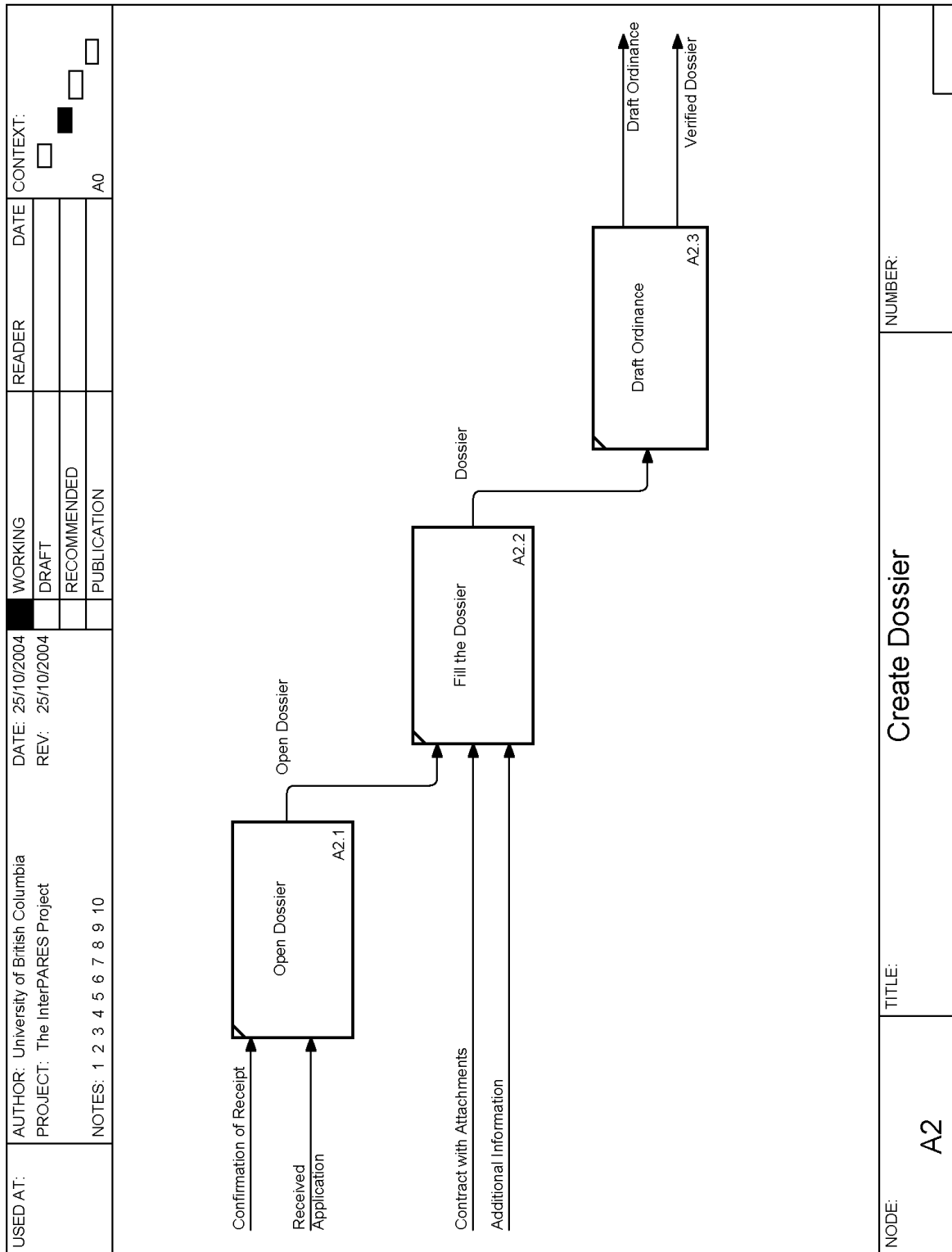
23. What is the source of these descriptive or other metadata schema or standards (institutional convention, professional body, international standard, individual practice, etc.)?

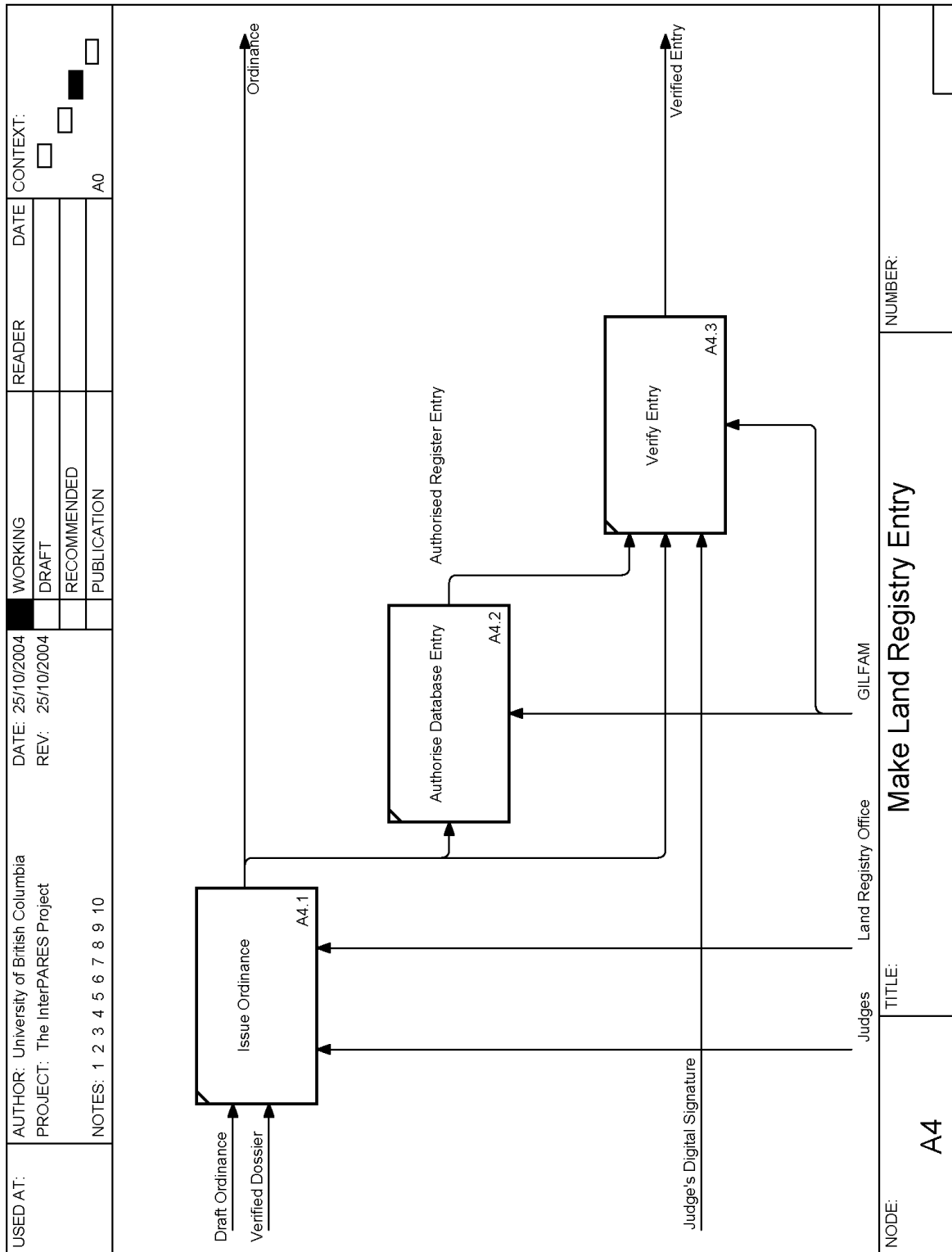
None.

Section E: IDEF0 Activity Model









USED AT:	AUTHOR: University of British Columbia PROJECT: The InterPARES Project	DATE: 25/10/2004 REV: 25/10/2004	WORKING DRAFT RECOMMENDED PUBLICATION	READER	DATE	CONTEXT: TOP
NOTES: 1 2 3 4 5 6 7 8 9 10						
<pre> graph TD A0[Make Land Transactions Public A0] --> A1[Receive an Application A1] A0 --> A2[Create Dossier A2] A1 --> A21[Open Dossier A2.1] A2 --> A22[Fill the Dossier A2.2] A2 --> A23[Draft Ordinance A2.3] A21 --> A22 A22 --> A41[Issue Ordinance A4.1] A23 --> A41 A41 --> A42[Authorise Database Entry A4.2] A5[Issue Confirmation A5] --> A43[Verify Entry A4.3] A42 --> A43 </pre>						
NODE:	Make Land Transactions Public					NUMBER:
A0						

Case Study 18: Alsace-Moselle's Land Registry IDEF0 Model: Activity Definitions			
Activity Name	Activity No.	Activity Definition	Activity Note
Make Land Transactions Public	A0	Enter in the regional public land register, a description of the relationships between properties and persons.	
Receive an Application	A1		
Create Dossier	A2		
Open Dossier	A2.1		
Fill the Dossier	A2.2		Contains a copy of the contract, attachments and additional information
Draft Ordinance	A2.3	Verify that the dossier contains all the relevant information in the right form and draft the ordinance for the register entry.	
Make Land Registry Entry	A4		
Issue Ordinance	A4.1		
Authorise Database Entry	A4.2	Allows for the publication in the database of the registry entry.	
Verify Entry	A4.3	Compare the judge's digital signature with the digital signature on the ordinance.	This is a two step process. Two separate programs are in place, one works from the bottom up and one works from the top down (traversing the system to ensure the information in the ordonnances corresponds to the associated inscriptions and vice versa). The goal of each is to ensure that the inscriptions (data in the database used for everyday business affairs) conform to the ordonnances. It is the principal security measure to ensure the integrity of the data. The two step process is a security measure built into the system and is automated

Case Study 18: Alsace-Moselle's Land Registry IDEF0 Model: Activity Definitions			
Activity Name	Activity No.	Activity Definition	Activity Note
Issue Confirmation	A5	To issue a statement to the notary that confirms and notifies the registration of the property in the land registry.	The person who makes a request for inscription in the register can follow within the database the state of advancement of their application through a number assigned to the request. The system automatically generates a notification of the type of ordonnance issued (b/c could be rejected, intermediary/requiring more info. - these are also called ordonnances, there are simply different kinds. It is just that only an ordonnance of validation actually results in a change/addition to the register)

Case Study 18: Alsace-Moselle's Land Registry IDEF0 Model: Arrow Definitions		
Arrow Name	Arrow Definition	Arrow Note
Additional Information	Pre-existing information about the same property.	
Authorised Register Entry	The land registration made public.	
Authority of Minister of Justice		
Confirmation of Receipt	Document issued to the notary confirming that the application has been received by the land registry office.	
Confirmation of Registration	Document issued by the RLO to the notary to confirm that a verified entry has been successfully registered.	(automatically generated by the system)
Contract with Attachments	The deed of property with attachments.	
Dossier	The case file filled with copies of the contracts and its attachments, and other relevant information.	
Draft Ordinance	It is the ordinance as drafted by the RLO on the basis of the application for approval by the judge.	
GILFAM	Groupement pour l'Informatisation du Livre Foncier D'Alsace et de Moselle.	
Information in Contract	The data in the contract that uniquely identifies the deed of property and which are entered in the application for registration.	
Judges		
Judge's Digital Signature	Digital signature of the judge as recorded by the certifying authority.	
Land Registry Office		
Law of 1 juin, 1924	Defines rights of inscriptions, effects of inscriptions, roles of real estate judges and clerks, conditions of inscriptions and cancellations and obligations of the notaries.	
Mars 2002 - Amendment to the Alsace-Moselle registry law	Recognizes the legal value of the land register held on a data-processing media.	The land registry may be held in electronic form according to the conditions prescribed in Article 1316-1 of the French Civil Code (electronic

Case Study 18: Alsace-Moselle's Land Registry IDEF0 Model: Arrow Definitions		
Arrow Name	Arrow Definition	Arrow Note
		documents may be admitted as evidence in a manner similar to paper documents with the condition that the author may be duly identified and that the document has been created and maintained under conditions that guarantee its integrity).
Notary		
Open Dossier	The case file opened by assigning to it an identifier linked to the application.	
Ordinance	The order issued by a judge to make a register entry for the specific property.	
Other Relevant Legislation	<ol style="list-style-type: none"> 1. 1999 European Directive on Electronic signatures mandating that all member states recognize the proof value of electronically signed documents. 2. Law of March 13: Establishes the broad principles by which the civil evidence law in France would be made applicable to the new reality of electronic transactions. The law awarded to cryptographic electronic signatures a special and advantageous evidential status, through a presumption of trustworthiness automatically met by such signatures (AM final report). 	
Real Estate Law		(Region has its own real estate law 91924 law described above)
Received Application	The application for the registration of a property title that is captured by the database and confirmed by the RLO.	
Technological Infrastructure		
Technology		
Verified Dossier	A dossier that has been verified for completeness.	
Verified Entry	The entry as verified by the system administrator.	