

# INTEROPERABILITY AND GLOBALIZATION OF INFORMATION MODELS

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## Abstract

*A need for a uniform policy on the data used in information systems, including geographic information systems, requires standardization of both registers and records associated with these areas. The above applies to legal issues pertaining these areas of data, as well as IT solutions applicable in given EU Member States. Achieving a full interoperability is perhaps a matter of a distant future, but the preparatory work on this should be carried on from now. The first step is to construct a suitable model for information that is to constitute grounds for a further work. Acquiring a required homogeneous system is possible on a data level model (for example with a standardization of a database scheme) with a development of a specialized metamodel of data and a use of data exploration methods (especially, in so-called thematic data warehouses - data marts), or by designing and building a dedicated, specialized system from a scratch.*

**Key words:** *Globalization, Database Systems, Data Sources, Interoperability.*

## Introduction

The scope of IT content analysis of IT resources was limited to specific areas. A comparison of registers and records maintained in selected EU Member States is presented in the first part. The comparison refers to basic records of data related to natural persons, entities conducting business activity, real estates and basic mileage logbooks (vehicles, aircrafts and ships). In case of some of the discussed countries, the information concerning specific registers and records was omitted due to unavailability of such information or ambiguity of the available information. The presented characteristics of the selected data resources and EU Member States obviously do not exhaust the subject matter of the entire issue. It should be noticed that the scope of data, the manner of their storage, and the manner of access thereto are diversified. The above mainly depend on the level of IT data development (time of starting data collection, manner of data processing) as well as legal conditions relevant in a given country. Poland does not differ in that respect from other EU Member States. The second part includes a suggestion as to the selected elements of a general data model, which is related to the scope of data processed in the aforesaid registers and records and which covers all the discussed countries. The integration of such huge volumes of data resources seems to be a complex undertaking, however, it also seems justified to create at least logical and integrated data model, which may constitute basis for further analysis.

**Table 1.** Acronyms/Abbreviations

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CEK – Central Driver Register
CEP – Central Vehicle Register
CEPIK – Central Vehicle and Driver Register (CEP + CEK)
KRS – National Court Register
NIP – Tax Identification Number
PESEL No. - Personal Identification Number
PESEL – Universal Electronic System for Registration of the Population
REGON - National Business Register
ZUS - Social Insurance Company

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## Registers and records in selected EU Member States

Due to complex issues of integration and broad scope of data available for use, the presented solutions shall include specific types and kinds of IT resources. It should be also noticed that a possibility of access to specific information changes with time. It is mainly due to technological changes and the fact that different persons and organizations are becoming more and more interested in the broader scope of data.

Quick development of ICT technologies and changing interest towards the searching for various data by different organizations, which "follows" such development, make it necessary to apply a comprehensive approach to the proposed solutions. These are the solutions for not only the analysts and designers who create IT systems, but also future users who shall use them. One of the key roles in such solutions also play bodies and authorities responsible for creating and modifying legal systems, both at national and international and EU level.

The presented characteristics refer to basic, publicly available resources (registers, records, databases), whose integration not only on the national, but also European level seems possible in the nearest future. For instance, the activities connected with the integration of population register have been conducted at the EU level (e.g. STARK - the project related to electronic ID of all citizens of EU Member States). Table 2 includes the comparison of registers and records maintained in the selected EU Member States: the Czech Republic, France, Spain, the Netherlands, Lithuania, Germany, Hungary, Great Britain and Italy. The function and content of data resources were characterized based on the registers and records kept in Poland. It is possible to compare some of the aforesaid data resources thanks to the necessity of compliance of the individual countries with the international standards and agreements. Such standards and agreements define fundamental parameters related to the scope of the processed data made available. Particular countries use their national solutions, which may be applied based on the aforementioned international standards.

**Table 2.** Comparison of registers and records in selected EU Member States.

REGISTERS, RECORDS, DATA RESOURCES	PO	CZ	FR	SP	NE	LI	GE	UK	IT
Population register	x	x	x	x	x	x	x	n/a	x
Records of entrepreneurs, businesses	x	x	x	x	x	x	x	x	x
Tax records	x	x	x	x	x	x	x	n/a	x
Property register (cadaster)	x	x	x	x	x	x	x	x	x
Vehicle register	x	x	x	x	x	x	x	n/a	x
Aircraft register	x	x	n/a	x	n/a	x	x	n/a	x
Ship register	x	n/a	n/a	x	n/a	x	x	n/a	n/a

Key: PO Poland, CZ Czech Republic, FR France, SP Spain, NE the Netherlands, LI Lithuania, GE Germany, HU Hungary, UK the United Kingdom, IT Italy. n/a – Data not available.

Resource: Own study.

The short descriptive characteristics of the aforementioned registers and records with respect to the solutions used in Poland were presented in the further part of the study (Table 3). Direct comparison or reference is not possible for all data resources. In some countries certain data are not collected, whereas in other a much broader scope of data is gathered and processed. It is due to different legal conditions applicable in such countries. Additionally, the issues of access to certain registers and records are regulated by each country in a diversified manner. The described resources are often called public resources, which do not have to mean that the access thereto is unlimited. In a number of cases, it is essential to show the so-called "legal interest", on the basis of which such access is requested. Another issue is the access to resources available for such institutions as courts, prosecutor's offices or special forces. The aforesaid issues are in most cases regulated in separate provisions of national law.

**Table 3.** Detailed characteristics of the registers and records

<b>Czech Republic</b>	<p>Citizen Register - data of all citizens. Available to everyone (but only to their own data) and justice units, prosecutor's office, police and other investing bodies. In Poland - PESEL data collection, similar rules of access.</p> <p>Address Register - a list of all addresses in the Czech Republic. Public access, on-line. In Poland - population register, address data collection and land and building register.</p> <p>Enterprise and institution register It includes: name, status and number of register, ICO number (like Polish REGON), address of registered office, object of business activity, share capital, information on bankruptcy, data of founding body, number of shares, data of shareholders. The information is not binding. In Poland - the data partially included in REGON and the National Court Register (not all entities). Useless property register – real estates and objects put up for auction, also archive data. No such register in Poland.</p> <p>Commercial unit register (ARES) – electronic public records including all commercial units (since 1998). Available to public. Data: register number, name, address of registered office, tax office, status of business, business code (NACE). It includes a list of registers, in which the unit is registered. ARES data are for the informational purpose, they are not a document. In Poland - no commercial units distinguished. Data partially in REGON, KRS.</p> <p>VAT Payer Register - in electronic format. The data of VAT payers include: name, identification number (DIC), address, registration date, history. In Poland - no electronic VAT register, but</p>
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	<p>taxpayer register. VAT payers are registered in Tax Offices (NIP number).</p> <p>Cadaster – information about real estates (identification number, area, geographical coordinates, owner's details, possibly maps). Access by viewing document scans. Paper extract. In Poland - available on-line, public access, unlimited. Data also in the land and building register (scattered data).</p> <p>Vehicle Register – public records including all vehicles with Czech license plates (license plate, VIN, motor number, make and model, type, owner's details, address, technical data, other official information). In Poland - identical or even more extensive data in the Central Vehicle Register.</p> <p>Driving License Register – kept since May 1, 2004 (a driving license is considered an ID document). In Poland - identical or even more extensive data in the Central Driver Register.</p> <p>Aircraft Register – kept by the Civil Aviation Agency, contains records of all aircrafts (including balloons). Public and electronic access. Similarly to Poland, the Czech Republic is a member of the International Civil Aviation Organization (ICAO).</p>
<b>France</b>	<p>National identification repertory of natural persons (RNIPP). Data of natural persons: name and last name, place and date of birth, date of death, marital status, identification number. Available for social security office, tax authorities. In Poland, such data are in the PESEL data collection, with similar rules of access.</p> <p>National Enterprise and Company Register (RNCS), central business register. Information about establishment, status of business, management board, shareholders, assets, including real estates. General information is provided free of charge. Detailed information is provided for a payment. Available to public (subject to personal details) via web service. Similar data are contained in REGON and KRS systems in Poland.</p> <p>National vehicle register. It includes the following information: technical, owners, claims and encumbrances, reviews. Available for the police, military police, Ministry of Transport and Industry, and insurance companies (individual permits). Available on-line. In Poland the identical data are contained in the Central Vehicle Register and Central Driver Register.</p> <p>Cadaster - public records of lands and buildings and their owners, also maintained for tax purposes. It includes the information about lands (location, borders, area, type and class), buildings and structures (location, purpose, utility functions and technical data) and information about owners and possessors. Unlimited access. Personal details are made available only to public officers and to other persons within a limited scope. In Poland - similar scope of data in Land and Mortgage Registers. Data also in the land and building register (scattered data are not available centrally).</p>
<b>Spain</b>	<p>Vital Records and Civil Register (<i>Ley sobre de Registro Civil 1957</i>) - the information about population registers in the Kingdom of Spain includes the dates of birth, death, residence details, marital status. Unavailable to public. System similar to the Polish population register.</p> <p>Property Register (<i>Registro de la Propiedad</i>), information about real estates and changes in their legal status. The entries are of constitutive nature. Similar to the Polish Land and Mortgage Register.</p> <p>Personal property register – (<i>Registro de la Bienes Muebles</i>) - information about legal and court actions concerning the movables. It includes subsets with the information about ships, aircrafts, cars and other vehicles, machines and devices, intellectual property, firearms, works of art. In Poland, such data in a sequence of registers managed by different institutions.</p> <p>Commercial register (<i>Registro Mercantile</i>) – information about entities conducting business activity, entrepreneurs, commercial law companies, their assets, partners, bodies, management boards. Data as in Polish KRS and REGON.</p> <p>Commercial ship register (<i>Registro de buscada</i>) - public records including technical data, information about the owner, ship-owner, captain. Unavailable on-line. In Poland, such data contained in the Ship Register kept by the Maritime Chamber.</p> <p>Aircraft Register (<i>Registro de Matrícula de Aeronaves</i>) - public records containing data allowing to identify an aircraft, technical data, owner's details, ship-owner and crew. Available to public in paper format. Identical to the Polish register maintained by the President of the Civil Aviation Office.</p>
<b>The Netherlands</b>	<p>Municipal Personal Records Database (GBA) – public records kept by local authorities. It includes personal records and residence details. Equivalent of the Polish population register. Electronic format.</p> <p>Register of the Department of Immigration and Naturalization of the Ministry of Justice (<i>Immigratieen Naturalisatiedienst - IND</i>) – public records unavailable to public. The details of persons applying for the permanent stay or Dutch citizenship and aliens staying in the Netherlands. In Poland such data are kept in the Ministry of International Affairs, but not in a form of a register.</p> <p>Tax Administration Register (<i>Belastingdienst</i>) – public records of taxpayers paying taxes in the Netherlands. It includes the information about all taxpayers. Similar to the Polish Taxpayer Register (NIP).</p> <p>Register of the Department of Social Benefits of Tax Administration (<i>Toeslagen</i>) – public records. The register includes personal details (name, last name, identification number, address, date,</p>

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	<p>place of birth, citizenship) and information about benefits (benefit amount, title, duration, granting authority). No adequate system in Poland. Data partially in ZUS.</p> <p>Customs Records (<i>Douane</i>) – data related to tax and customs issues. The records include entities conducting export and import activities. They include data since 1970. No such register in Poland. Electronic and paper data only in Customs Offices.</p> <p>Register of the Dutch Chamber of Commerce (<i>Kamer van Koophandel</i>) – public records. The data include: names, address, register number, filing date, type of business, management board, owner, number of employees, capital. Available to public. The register includes work records according to selected professions. In Poland some data are in KRS and REGON databases, and some in professional registers.</p> <p>Cadaster (<i>Kadaster</i>) – public records kept by a commercial company, available to public on-line. Data as in the Polish Land and Mortgage Registers and land and building register.</p> <p>Vehicle Register – (<i>Rijksdienst voor het Wegverkeer - RDW</i>) – public records, available on-line, containing data of all vehicles registered in the Netherlands. The register comparable to the Polish Central Vehicle Register.</p>
<b>Lithuania</b>	<p>State Enterprise - Register Center - includes information about legal persons - data identifying shareholders; real estates - information about lots, buildings, owners, turnover, property rights and information about address and places of residence. The database of the State Tax Inspection includes the information about VAT payers and legal persons, whose owners and drivers do not conclude tax settlements.</p> <p>Resident Register of the Republic of Lithuania - reserved public records kept in both paper and electronic formats. The scope of data as in Polish PESEL.</p> <p>Taxpayer Register - reserved public records kept in both paper and electronic formats. Identical to the Polish tax identification system (NIP).</p> <p>Payer Register - public records kept in paper format, and electronic as of March 20, 2008. It includes all payers of public and law receivables from all over the country. No such register in Poland.</p> <p>Driver Register - reserved public records kept in both paper and electronic formats. Identical to the Polish Central Driver Register.</p> <p>Cadaster - reserved public records kept in both paper and electronic formats, covering all country. Polish Land and Mortgage Registers have similar scope of data and serve a similar purpose.</p> <p>Road Vehicle Register of the Republic of Lithuania - reserved public records kept in both paper and electronic formats. Identical scope of information and manner of access thereto to the Polish Central Vehicle Register.</p> <p>Ship Register of the Republic of Lithuania - reserved public records kept in both paper and electronic formats. It contains the information about the ships that are designed, built or under construction, and whose owners are the citizens of Lithuania or legal persons registered therein. In Poland, such data contained in the Ship Register kept by the Maritime Chamber.</p> <p>Civil Aircraft Register - public records in paper format, including all aircrafts and details of the owner and aircraft. Identical to the Polish register maintained by the President of the Civil Aviation Office.</p>
<b>Germany</b>	<p>Population register system. In Germany the registers of persons living in the country are kept by the districts. Registers in electronic format. Data similar to the Polish population register system. No identification number, the data do not constitute any national system comparable to PESEL register.</p> <p>BaFin - Federal Financial Supervisory Authority. The information about bank account holders, fixed-term deposits or persons investing within the territory of Germany as well as data concerning money transfers outside the territory of Germany. In Poland, the banks have such databases, but they are not used as a process due to the regulations on banking secrecy.</p> <p>Office for Real Estates – (<i>Liegenschaftsamt</i>). Information about real estates in the province. It refers to the owner, size and satellite images of real estates. Electronic database. In Poland such data are included in the land and building register as well as in the Land and Mortgage Registers. Departments of land and mortgage registers and commercial registers of the magistrates. German commercial registers, similarly to the Polish National Court Register, include, among other things, the information about business activity, addresses, owners, attorneys, procurators, capital, non-cash contributions, registered offices. On the other hand, land and mortgage registers include the data corresponding to the entries in the Polish Land and Mortgage Registers.</p> <p>ZEVIS – (<i>Zentrales Verkehrs-Informationssystem</i>) – vehicle and owner register. It includes the details of all vehicles registered and deregistered in Germany and their owners. Data as in the Polish Central Vehicle Register.</p> <p>FADA – (<i>Fahrzeugdatendatai</i>) – catalog of vehicle details. Database of private German car producers, also including the information from the authorized services. No such database in Poland.</p> <p>Federal Automotive Office in Flensburg. Information about all vehicles registered in Germany,</p>

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	<p>temporarily deregistered and finally deregistered or banned, including vehicle history. Similar to the Polish Central Vehicle Register.</p> <p>Databases of ships. Twenty German Offices of Waters and Navigation keep their registers of ships, including the information on the type, class, owners, individual numbers of the ships. In Poland, such data are in the Ship Register kept by the two Polish Maritime Chambers.</p> <p>Aircrafts. The Federal Air Navigation Office keeps an aircraft register and a database of pilots. In Poland, the aircraft register is maintained by the President of the Civil Aviation Office, however, no pilot register is available.</p>
<b>Hungary</b>	<p>Central Administration Office and Electronic Public Services - collects personal details of the citizens of Hungary. In terms of organization, no such data collection is available in Poland (the data are in different registers).</p> <p>Register of Persons Qualified for Health Insurance - public records in electronic format, covering all citizens. It includes personal details of employees, period of employment, social numbers, name of enterprise, identification number, code of Professional Classification, time of work, registered pension plan. In Poland, the data are in the established IT system of ZUS.</p> <p>Register of Individual Qualification for Social Insurance - public records in electronic format, covering all citizens and aliens staying within the territory of the Republic of Hungary. It includes personal details, information about marital status and individual identification of the system of insurance.</p> <p>Central Register of Individual Entrepreneurs with Permission to Conduct Business Activity - public records in both electronic and paper formats. It includes personal details of the owner, information about the type and scope of the business activity, registry office, tax and permit number, address, number of employees, place and date of issue, authority issuing the permit, amendments to the permit, periods of company vacation, suspension of the permit. Central register, electronic. Equivalent of REGON.</p> <p>Court Register - public records, equivalent of the Polish National Court Register. The data concern enterprises (name, address, type of ownership, representatives). Central register, electronic. Access analogous as to KRS.</p> <p>Tax Records (Tax Payer Register) - reserved public records, kept in the form of an electronic database. Equivalent of the Polish Tax Payer Register.</p> <p>Enterprise Register - central, public records kept in electronic format. It includes the details of enterprises (name, registered office, type of ownership, legal representatives). Data as in Polish KRS.</p> <p>Cadaster – land and building register, electronic, covering all real estates in Hungary. Central register. Data as in the databases of the Polish Land and Mortgage Registers and land and building register. Property Register - central, public records kept in electronic format. It includes address and identification details of all real estates. Data as in the databases of the land and building register.</p> <p>Central Vehicle Register - central, public records kept in electronic format. Information about all vehicles in the Republic of Hungary. It includes license plates, VINs, motor numbers, producer's codes, type, color, owner's details. Similar to the Polish Central Vehicle Register.</p> <p>Central Driving License Register (Drivers) - public records kept in both electronic and paper formats. It includes all holders of Hungarian driving licenses. It includes: number of a driving license, category, restrictions and owner's details. Data and organization as in the Polish Central Driver Register.</p> <p>Central Aircraft Register - public records containing all details of aircrafts (type, date of production, load-bearing capacity, owner's details). Available to public, possible electronic access. Identical to the Polish register maintained by the President of the Civil Aviation Office.</p> <p>Central Ship Register - public records containing all details of ships (type, characteristics, load-bearing capacity, engine, owner's details). Available to public, possible electronic access. In Poland, such data contained in the Ship Register kept by the Maritime Chamber.</p>
<b>The United Kingdom</b>	<p>No central population records analogous to those in any of the EU Member State. Tracesmart - person search engine. It is a commercial database of addresses of private individuals. Available to public via website. No such service in Poland.</p> <p>Companies House Register – commercial database containing the information about establishment, transformation and dissolution of companies in Great Britain and Scotland. Comparable to Polish KRS and REGON.</p> <p>British Land Registry - commercial database containing the information about real estate transactions in Great Britain, including address details, property rights, geodetic plans. It registers real estate transactions and activities related thereto. The database is available to public. In Poland, such data are in the Land and Mortgage Registers and land and building registers.</p> <p>UKLRS (LandSearch.net) provides commercial access to the information on property rights, geodetic maps, border disputes, environmental issues, e.g. land utilization plans, flood risk areas. Public access, the ordered documents are provided in electronic format.</p>

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<b>Italy</b>	<p>Central Directorate for Demographic Affairs (<i>Direzione Centrale per i Servizi Demografici</i>). It issues electronic ID cards, keeps the alien register and supervises the maintenance of the population registers by districts. In Poland, the Ministry of Internal Affairs and Administration exercise a similar function.</p> <p>Electronic ID Card (<i>La carta d' identità elettronica – CIE</i>) – instrument for identifying persons. It includes all citizens of the Republic of Italy. Its identifying and authenticating function entitles the holder to public services. The card includes a microprocessor with personal details, fiscal code, information about the place of staying, nationality, code of issue, date of issue, signature and photograph of the owner. In Poland, such data are contained in PESEL and NIP register.</p> <p>Register of Italian Population Living Abroad (<i>Anagrafe Della Popolazione Italiana Residente All'estero – AIRE</i>). The details of Italian citizens living outside Italy are provided by district registers. In Poland no such register exists, some data may be extracted from PESEL system.</p> <p>Tax records (<i>Anagrafe Tributaria</i>). Information about taxpayers. It includes data similar to Polish: PESEL or NIP, however, no central database exists.</p> <p>Company register (<i>Registro Delle Imprese</i>). Register of partnerships and limited liability companies operating in Italy, exclusively kept by the Chambers of Commerce (<i>Camera di Commercio</i>) regionally competent for the registered office of a given company. Similar to the Polish National Court Register, however, in Poland, the data are not scattered.</p> <p>Enterprise register. Public and available on-line register of all enterprises operating within the territory of Italy (companies, business activity). It includes the data similar to Polish KRS and REGON.</p> <p>Economic and administrative register (repertory) (<i>Repertorio Economico Amministrativo – REA</i>). Register of businesses operating in Italy. Comparable to KRS and REGON databases, including statistical data.</p> <p>Cadaster. The equivalent of the data content constitute the data concerning real estates, similarly to the Polish system of Land and Mortgage Registers.</p> <p>Public Vehicle Register (<i>Pubblico Registro Automobilistico – PRA</i>). Legal and property events concerning registered vehicles. Similar to the Polish Central Vehicle Register. In Italy, the vehicle registers available to public on-line are maintained by regionally competent <i>Automobile Club d'Italia</i>. The registers contain data as in Polish Central Vehicle Register.</p> <p>Aircraft Register. National Civil Aviation Organization (ENAC) keeps, among other things, the aircraft register and database of licenses and pilots. In Poland, the aircraft register is maintained by the President of the Civil Aviation Office, however, no pilot register exists.</p>
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### Detailed characteristics of registers concerning real estates

This part contains a detailed description of registers and records concerning real estates. In most of the analyzed countries, the register is called "Cadaster" (Table 4). It is due to the assumption that the register, apart from the data related to the description and parameters characterizing a real estate, also stores the information about the value of the real estate (carrying/market value). The data may be used to define the amount of real estate tax, i.e. cadastral tax.

**Table 4.** Detailed characteristics of registers concerning real estates.

<b>Czech Republic</b>	<p>Cadaster (<i>Czech Office For Surveying, Mapping And Cadastre – COSMC</i>) – public records administered by the Czech Land and Cadastral Office. The data stored in the register include the information about real estates (identification numbers, area, geographic coordinates, owner's details, in some cases, also maps). The access to the data in the register is by viewing the scanned pages of the documents concerning real estates. Legal basis: Law no. 265/1992 on the entry of ownership and other titles to real estates, Law no. 344/1992 on the real estate cadaster of the Czech Republic (Cadastral Act), Law no. 359/1992 on surveying, mapping and cadaster, Act no. 200/1994, Decree no. 31/1995 on the Cadaster Office to Act no. 200/1994, Governmental Decision no. 116/1995 of April 19, 1995 on the Cadaster System, Law no. 106/1999 on free access to information, Law no. 71/1967 on administrative procedure.</p>
<b>France</b>	<p>Cadaster (<i>Cadastre</i>). Cadaster means public records containing the information about lands and buildings and their owners and proprietors (cadaster entities). It is a collection of information and documents maintained by tax administration and used for real estate tax purposes. It includes geographic data concerning: lands (location, borders, area, type of usable lands and soil classes), buildings and structures (location, purpose, utility functions and technical data) and personal details of real estate owners and proprietors. Unlimited access to geographic data. On the other hand, the access to personal details is reserved for public service officers and members of land and housing communities, but only as regards the data concerning other members of a given community.</p>
<b>Spain</b>	<p>Real Estate Register (<i>Registro de la Propiedad</i>). The legal basis for these registers is the Law on Mortgage of 1946 (<i>Ley Hipotecaria 2/1946</i>). All allowances for real estates constituting a separate object of ownership and any changes in the legal status of such real estates are</p>

	recorded in such registers. Any entry to the real estate register is constitutive in nature, which means that it establishes legal status. The owner of the real estate and other persons, whose rights thereto are subject to an entry may not effectively demand non-disclosure of their personal details to any person viewing the data from the register. The regional jurisdiction of the registrar (responsible for making the entries) is determined by the location of the real estate.
<b>The Netherlands</b>	Cadaster ( <i>Kadaster</i> ) – public records active since 1832 - in paper format. Since 1994, it has been an independent body, acquired by a commercial company - Kadaster International. The register is available in Dutch - some parts of the website referring to the data content are in English. The access thereto is public and free of charge. The data stored in the register concern all types of real estates (houses, apartments, buildings and other structured erected on ground) and their location - maps. They include a description of a real estate and details of its owner. The access is possible for both natural persons and legal persons.
<b>Lithuania</b>	Cadaster ( <i>Katastre registras</i> , ; the English name <i>Real Estate Cadastre and Register</i> also used in Lithuania) - reserved records administered by the Ministry of Justice. The information about the register may be obtained in the State Enterprise called "Register Center" ( <i>Valstybės įmonė Registrų centras</i> ). These are the public records kept in both paper and electronic formats, covering all country. The basic scope of data: name, last name, date of birth, personal identifier, information about the enterprise (address, etc.). Obligatorily fed by the owner, in paper format. Access - reserved for the users of the register, owners, police, Notaries Public and local governments. The data have been collected as of January 29, 1998, the data completeness as of March 20, 2008. The data are stored for an indefinite period. Data protection - in compliance with the law on state registers of the Republic of Lithuania.
<b>Germany</b>	Departments of land and mortgage registers and commercial registers of the magistrates. Very similar, yet with different characteristics and substantive content, the databases are in the departments of the land and mortgage registers and commercial registers of the magistrates in Poland. Real Estate Office ( <i>Liegenschaftsamt</i> ) – information about real estates within the territory of the district. It refers to the owner, size and satellite images of real estates. Electronic database. In Poland such data are included in the land and building register as well as in the Land and Mortgage Registers. In the departments of the land and mortgage registers in the districts, the land and mortgage registers whose entries correspond to the entries in the Polish registers are located.
<b>Hungary</b>	Real Estate Register ( <i>Ingatlan tulajdon iktató hivatal</i> ) – public records administered by local registration offices, regionally competent for certain real estates. The register is public and electronic. It includes the information about all real estates. The data stored in the register include: address details and data identifying the real estates. The registration of a real estate is obligatory and must be performed by the owners of the real estate. The register is available to public. The register has been maintained since January 1, 1973 (based on Decree no. 31 of 1972 on the real estate register). The register is complete and includes a list of all real estates. Legal basis: Decree no. XX of 1996 on the methods for identifying personal numbers and ID code utilization.
<b>The United Kingdom</b>	British Land Registry. One of the most popular commercial databases concerning real estate transactions in Great Britain. It registers real estate transactions and activities related thereto. The access to the database is public and paid. The main purpose of the Land Registry is to provide information on the current legal situation of a given real estate in Great Britain, changes in the legal status of the real estate and any announcements concerning the real estate published by the Leader of the House of Lords, and the price index. The database already contains over 20 million items and the number is still growing. Thanks to this collection, it is possible to obtain address details of the real estate as well as the information about the title and even geodetic plans. The database is available to public. The manner of obtaining access to the data is by searching an alphabetical list in order to find an interesting real estate, and then - after making a payment - to obtain all available data on the title, location and value. The main tool for searching the system is the Land Registry Direct search engine. The database resource are accessible via a user's individual account. It is possible to obtain full access to such information as the titles, archive issues of the register, bankruptcy details, geodetic maps, border disputes, list of real estate owners (no mail address). Additionally, the information on the environmental protection, e.g. land utilization plans, floods risk areas may be accessed. The system provides access to the ordered documents in electronic format on the same day, on which the request was filed. The service is available to public on-line.

In none of the above-mentioned real estate registers, the information about geolocation is contained. It seems justified to use the geographic coordinated as basic attributes of any real estate. Modern technology allows to collect and use such data in a relatively easy manner. The majority of the presented registers were designed and implemented a few decades ago, when the technology was still in its infancy. If at least two basic data (latitude and longitude or, possibly, height above sea level) were used, any issues related to clear location would be solved in most cases.

## General data model

The presented scope of the data stored and processed in the systems concerning the above-mentioned registers and records (not always kept in electronic format) may differ in details. The differences relate to both typically technical issues (type of data, size of data, used sets of national symbols, etc.) and semantic aspects (for example, different statuses of businesses or different understanding of types of used addresses: address of permanent residence, address of residence, address of stay, mailing address, etc.). The semantic differences also result from different legal systems applicable in the subject countries. In such cases, when the registers and records are based on or apply international regulations, the differences are definitely less significant.

For example, the data related to travel documentation, whose content is precisely defined by the International Civil Aviation Organization (ICAO) are almost identical in all countries which belong to this organization. The informational content of passports with respect to both graphics and electronic elements are almost identical. The above also refers to the format of biometric data used in passports (if applicable).

Table 5 contains a proposition of the scope of selected data, whose meaning is intuitively understandable and which occur in all or most of the described countries was presented. Such list is for illustrative purposes and constitutes a proposition that may form grounds for creating a general data model in future studies.

**Table 5.** List of selected data.

Attribute	Population register	Business register	Property register	Vehicle register	Notes
Personal ID number	x	x	x		Different in different countries
Name	x	x	x	x	
Birth name	x	x			
Home address	x	x	x	x	Used for identification of persons in contacts between EU Member States
Date of birth	x	x			
Place of birth	x	x			
Documents	x	x	x		List of ID documents (passport, ID_card)
Date of death	x				
Citizenship	x				
Company name		x	x	x	Additionally, the company's logo
Company address		x	x	x	Addresses of all subsidiaries and branches
Type of business		x			Status of business, type (services, trade, production, etc.)
Duration of business activity		x			From - to, duration of company vacation
Place of business activity		x			List of countries, regions
Management Board	x	x			For all members of the Management Board
Shares	x	x			Amount of shares, list of shareholders
Real estate identifier			x		Different in different countries
Designation of real estate			x		Geographic coordinates, maps
Type of real estate			x		Lands, buildings, premises
Purpose of real estate			x		Apartment, trade, services, etc.
Value of real estate			x		Carrying and/or market value
Owner of real estate	x	x	x		Volume of shares, representation
Additional real estate details			x		Depending on the type, the following: area, dimensions, type of development
Mortgage	x	x	x		Type and amount of mortgage, entity in whose favor the mortgage was registered



VIN			x	Permanent structure for all vehicles
Additional vehicle details			x	Additional vehicle details, such as: make, model, year of production, capacity, type of fuel, weight, mileage
Vehicle owner	x	x	x	When
Transport incident	x		x	Time, place, participants
Vehicle insurance	x	x	x	Type of insurance, coverage period

Resource: Own study.

The discussed manner of presentation is not a formal way of defining data models. At this point, it is possible to use elements of notation intended for relational or object models (e.g. Entity Relationship Diagrams). However, the purpose is not the presentation in accordance with the notation model, but only a general outline of data and description of the procedure when creating the model.

## Conclusions

The generalized data model (homogeneous data model) is one of the possibilities of creating an integrated, uniform system. Another solution may be the use of mechanisms applied in the so-called data marts. On the other hand, the design of a special, dedicated IT system including the described scope of data, specially designed for such purposes, would be extremely time-consuming; additionally, practical implementation could face many difficulties (not necessarily of technical nature).

When creating such solutions, it is also important to define potential and actual recipients of the collected data. A possibility of collecting information on various aspects of the functioning of businesses (natural and legal persons) in one place (at least logically, not necessarily physically) may result in its use for purposes other than presumed. Legal and ethical issues already arise in case of using heterogeneous data resources related to different areas of human activities. The term "Big Data" was coined to describe access to the unstructured data resources. The presented proposition together with potential adding of other data areas (also present in IT resources of different countries) could on one hand provide a possibility of their rational use, and on the other - generate negative effects of using mass data. In particular, the above refers to the so-called sensitive data, whose main administrators should be persons or entities that the data concern.

Nonetheless, a possibility of using global and complete data resources produces a number of positive impacts that may contribute to the development of the entire society. Certainly, the above shall bring the reduction of current and future costs related to the production and modernization of ICT infrastructure resources, in particular the part thereof that refers to the collected data and information that may be obtained thanks to them.

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