



INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

**Charles University in Prague  
Institute of Information Studies and Librarianship**

Modul No. 7

**Information services in global context**

**Lucie Vavříková**

For the project:

Title: Studies of Information and Knowledge Management in the European Context

Reg. No: CZ.1.07/2.2.00/07.0284

OP: Education for Competitiveness

Support area. 2.2 University Education

Realization: VŠB-Technical University of Ostrava, Faculty of Economics, separate unit:

Business Academy and HPS Valašské Meziříčí

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# 1 INFORMATION SERVICES IN THE CONTEXT OF INFORMATION SCIENCE AND LIBRARIANSHIP

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Information service is a very broad concept that is constantly evolving. In the times of information boom, Google generation and rapid development of information and communication technologies it is logic and very natural that the concept develops consequently. Information in its broadest sense could not be easily tackled, for its clear definition it is necessary to put it into certain framework.

Information service is deemed necessary to be understood as a part of information cycle; such a cycle consists of information creation → information collection → information processing → information storage → dissemination of information. But, what is information service itself? Firstly, service is an activity reacting to a certain need. Information service is then a response to an information need. Information has many meanings; for determining and clarification of the term information service information is understood to be an article, that can be gained, transferred (or sold), transported and preserved [Cejpek, 2001, s. 11]. Therefore, primarily it is recorded information, respectively often a document that is a subject of information service. The object of information service lies in the process of treating the information resources in general. Thus, the concept of information service is closely connected and mostly determined by the concept of the organized collection of information that is created on some purpose.

This concept brings the information service into context of information science and librarianship what is at the same while a natural environment for providing information services. In this field information service is understood mainly in two ways - as providing of scholarly information, both primary information (source information) and information with added value [Pojerová, 2007], or as a general term for services of public libraries. The second mentioned mirrors historical development of the libraries, or today often information centres, that were the only ones managing organized collections of information (documents) and these were at the same time at service for the users of the libraries. The second body that was historically collecting and organizing information were administrative bodies, or better the chronicles and archives, today public/state administration. Often, the collection of these administrative bodies are also connected with the first written language memories; although at that time these information was not subject of information services, because they were not meant to be used by public users, they were more private property. Today the access to this information is guaranteed by law. Another body traditionally connected with information services in this sense is news agency. Their activity was based on the information need of gaining up-to-date information about latest happenings. During the times a number of other commercial bodies has established whose activities are in the field of information industry (including news agencies), that handle information services on a professional level and it is a subject of their business.

## 1.1 Information service and information need

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Information service in the context of information science and librarianship could be defined as:

Database of Czech terminology in information science and librarianship (TDKIV) describes information service on very general level as a “service provided by libraries, information

institutions or other organizations, that has as an objective of providing information in any form and any field of human activity“ [TDKIV, 2003].

According to Harrod's librarians' glossary and reference “information service is a generic term for a library or other organization of which a main role is the collection, analysis, dissemination and presentation of information. Such information may be held by the organization, assembled on demand, or distributed for publicity purposes” [Harrods, 2005].

M. Černá and A. Stöcklová [Černá, Stöcklová, 1992, s. 8] broaden the concept of information service with the user aspect. Information service is then “on purpose organised activity of giving access to resources and information to the user, effective and active satisfaction of users' information and cultural needs by adequate systems, processes, methods and means”.

Information needs could be divided in [Stöcklová, 2007]:

- Information needs of everyman – personal need; need of practical information helping to solve everyday problems in family, household and occupation (job offer, tax information) and spending free time. Citizen has to be supported during disasters and life crisis.
- Information needs of practitioners – scholarly information needed for professional activities (within occupation)

Within information need there are three significant aspects: task (problem), solver, information source. When there are two solvers deemed to solve one and the same task, their information need differs, it is not the same. Information need varies according to knowledge, abilities, possibilities and motivation of everyman to receive information [Stöcklová, 2007].

## **1.2 Information (and communication) noise and barriers**

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Information noise is, as defines I. Wiesenberger, random and accidental occurrence of obstacles in information systems that are changing the quality and quantity of information [Stöcklová, 2007]. There are several types of noise:

- Functional noise or information need's problem - from beginning it is necessary to be aware of the fact that information need and information request are two different things. Information need is defined as lack of information that is deemed necessary for solving a problem. Information request is written or oral expression of information need. Ideally, the content of information demand and information need is equal. This noise could be limited by improving the information literacy of users or by feedback ensuring specification of the information demand;
- Semantic noise causes misinterpretation of content and meaning of words;
- Technical noise causes distraction of the information transfer. For example, it could be defect of communication appliance, improper graphic design or interface, mispronunciation and others;
- Selection noise is caused by ignorance of information retrieval strategies and by errors in information retrieval; it could also be a incorrect information retrieval;
- Gnoseological noise is a result of limited knowledge thesaurus of user (receiver of information).

Information barriers are usually defined as obstacles in the information flow towards user [Stöcklová, 2007]:

- Space or distance barriers are caused by distance between information source (creator) and user. Today it is suppressed to a large extent by using Internet;
- Time barriers (obsolete information, slow process of gaining information) could be overcome by use of Internet and information with added value or summarizing works.
- Language barriers; barriers within the same language are caused by vague character of natural language what can be limited by use of selection languages;
- Foreign language barriers are to be overcome by education;
- Knowledge barriers are caused by lack of information literacy. It is a question of information education and also of a design and promotion of services in a way that makes them easily usable and understandable;
- Communication barriers are caused by incompatibility of information systems and improper reduction of information. Also an information density in information sources is needed to be considered.
- Economic barriers are currently the most often obstacle reported within providing of information. Lack of funding affects mostly public producers of information.

### **1.3 Information services in global context**

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What does the term global within the concept of information service mean? Information services considered in global context or global information services seems to be intrinsically dissociated from regional dimension. However, this could be considered from two points of view:

- Information are provided for local users, but the type of service could be found worldwide
- Service is provided for users regardless of the user's location and the sphere of activity

First mentioned point of view means that services respective to a certain field tends to occur worldwide; even it has more regional character. Such a service could be for instance a national bibliography, or services determined by law as a free access to information; these services are having its own characteristics but the preliminary intention is established on the same basis (for instance necessity to publish certain information, e.g. those originating in public funding). This regional determination is thus a reason of differences in the services and in their setting, functionality and validity. To touch on these services tangentially those could depend on the level of democratic regime in the country, or partially could be influenced by the level of development and funding possibilities and priorities of the country.

Second point of view mentioned talks about the service whose core and character is tailored to a predefined potential user that could exist at any place or institution. As an example could be taken a provision of an article from the field of chemistry from the database specific to the chemistry topic – service is not limited to the user of any location and it is not changed depending on the location (depends only on subscription conditions). These two points of views could be complementary – a national bibliography could serve for any user from any location in the world.

### **1.4 Information service and its development in a broader sense**

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Main driver of the development of information services has been information and communication technology advancement, respectively the development of the Internet. Global networks like Internet is a new mean of concentrating and collecting of recorded knowledge in documents. Compared to a classic storage of documents into collections such as libraries, archives, film archives, video archives etc. it enables collecting recorded knowledge in digital

document ad hoc (on certain purpose or demand) within a globally wide computer network [Cejpek 2, 2001]. Hence, today large majority of Internet services could conform to the characteristics of information service as providing information from and organized collection. Therefore, Internet could be designated as one extensive information service, although it is not as a whole organised in the library sense.

Development of information services in the broader sense of the word (or in the sense of internet network as known today) has been discussed within the concept of information highway or information superhighway, developed by Al Gore (the concept is attributed to him). Information highway should have been providing electronic service to individuals regardless the time or place. User should have had approach to any information anytime and from anywhere, what could mean home, work, school, hospital or even public place – kiosks on the streets. Such a highway is satisfying both personal and professional information needs. Information highway offers wide range of information service responding the professional information needs as monitoring electronic documents, enabling information retrieval from database information systems, transfer of selected passages of text to own computers or participation in scholarly discussion groups, conferences and videoconferences [Stöcklová, 2001].

Information services are developing quickly also today and it is clear that the vision of information (super)highway has been fulfilled. It is possible today to manage wide range of things via computers, from reservation at the doctor's or tax return; of course in the case the person provides it with digital signature. Information services today are also predominantly of electronic character. Transition from analogue to digital environment initiated mass digitization of physical funds, although electronic books hasn't surpassed classic books yet. However another significant shift towards electronic books is availability of reading devices with high quality displays optimised for book reading and at reasonable price. Development towards electronic books could affect significantly the most natural information service – book lending. Computerization has contributed to development of wide scope of new information services that are further evolving. Drivers of further development are e.g. the trend of system integration and the services based on such integration.

## 1.5 Typology of information services

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Information services according to their role, function or character could be divided into many categories. Many aspects could be distinguished:

- price
  - free of charge
  - against payment / commercial
- availability
  - non-stop
  - limited in time
- type of information service
  - basic information service
  - value added type of service

- user type
  - selective dissemination service
  - non-selective service
- demand
  - detailed, on purpose
  - generally defined (by law etc.)
- provider
  - commercial
  - public
  - interest group
- form
  - classic
  - electronic
- approach
  - public / general
  - selective
  - secret

Information service could be divided further according to other attributes, e.g. medium (mean of transfer) was not discussed yet. Some aspects today are losing their significance. Again medium type as an example could be used. Large majority of services are nowadays realized electronically, so the output delivered is simply online (information databases) or user only choose the type of delivery (mail, server download or USB flash disk). But, this is not affecting the service in any way neither often the price.

Typology of information service could be defined on basic level mainly according to the type of providers. Within providers their competences and the subject of service is mainly considered. Libraries have their range of services, public institutions are obliged to provide certain information services and lastly the commercial companies are building certain portfolio of services. These three main types are further discussed in chapters of this paper.

## 1.6 Information ethics

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Any information service provided and offered has to meet requirements of information ethics [Janoš, 2001]. Information ethics is (was) not always respected, particularly non-democratic regimes historically or of today are those where the ethics has not been playing main role. Neither today could it be claimed that information ethics is fully respected. Information ethics covers amongst others ethics of researcher's work, problem of ownership, digital divide.

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## 2 HISTORICAL ASPECTS OF INFORMATION SERVICES

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To describe detailed history of information services would be an enormous task regarding their broad definition. But key aspects could be identified. As a drivers in development of information services its environment, forms and means could be considered. History of information services corresponds very closely with the history of information science and librarianship and its selected aspects. The beginning of information science could be taken also as a start for information services. Main development in the field of information services is dated to second half of twentieth century as it is incrementally connected with the evolution of information and communication technologies.

The very beginning of information science and respectively information services could be seen between 669-630 B.C., when Assyrian king Ashurbanipal established the first library with a collection of cuneiform texts from all over Mesopotamia. It was the first systematically organized collection that the world has evidence that covered knowledge, experiences and imaginations of ancient times [Cejpek, 2001]. And with existence of systematic collection we can start to speak about information services. Next detailed development is more a question of history of librarianship and so we leave it here.

A significant milestone in history of information science are documentation efforts of Paul Otlet and Henri La Fontaine. In 1895 they established *Institut International de Bibliographie*, later renamed as the *International Federation for Information and Documentation*. At this institute they tried to collect all recorded human knowledge and to create universal bibliography. From the view of information services it is interesting that they wanted also to provide correspondence service, to send information retrieval results against payment. For that time it was revolutionary idea, in fact it was one of the first commercial information services. Otlet's and La Fontaine's goals, very ambitious, were not fulfilled, however, as they proceeded to work in this field, they contributed a lot to development of information science and information services overall. Amongst others they started a change in the way of thinking; they initiated the shift from the documentation to the concept of information, respectively organization of knowledge. The word information later on had been replacing the term documentation (mostly in USA) in the names of schools, scholarly journals, professions etc. [Cejpek 2, 2001].

As already mentioned, information services has been evolving in the context of information and communication technologies. In the twentieth century, information services went through several stages; firstly it was mechanisation, after it was automatization and then cybernetization of information services. Beginnings of mechanisation and automatization could be seen already in the nineteenth century, for instance development of punched cards could be mentioned. Through these stages information services were constantly developing; they were being broadened, accelerated and simplified without affecting the traditional services and their outputs as e.g. traditional library services like book lending. Cybernetization is the highest level of automatization that is associated with introducing of machines that were simplifying information processing. Cybernetization enables quantitative information processing, modelling of information systems including feedback, solving the rules of management and regulation of information systems, using new displaying methods and new cognition methods, enhancing and accelerating information process, enabling interactive approach to scholarly information, working online and with multimedia, using online internet services, electronic conferences etc. [Königová, 2001]. Essential change here

is also the possibility of unique input and numerous uses; this principle stimulates development of information systems not only in the context of information services and information until today.

Development of information services has been long time a subject of prognosis and predictions of future. What concerns the fulfilment of these predictions; generally, progress is surpassing the prognosis in terms of computation capacity, whilst on the other hand those hypotheses anticipating artificial intelligence are not as much fulfilled. One of the most important prognosis articles that shifted thinking in information science towards more interest about information and information processes, is the article *As we may think* by Vannevar Bush published in American journal *Atlantic Monthly* in July, 1945. The article contains a vision of hypothetical mean called MEMEX used in science of communication between computers and human beings resembling today's online regime. The article further deals with the problem of more effective "automated" scholarly information processing, anticipates the concept of hypertext and web as it is known today [Cejpek, 2001] [Bartošek, 2001].

In the second half of the twentieth century technology revolution began. Main aspects could be identified – firstly the evolution of computers, development of networks and then software and information systems and data storage devices generally. All aspects are closely related and their development has been mutually influenced. Development of computers, from mainframe computers and minicomputers, caused increased need to store data. The oldest data storage device enabling automated processing not only in the context of computers but also in machines generally (e.g. weaving loom) and that coded the information stored is punched card. Information is represented by a matrix - of the presence or absence of holes in predefined positions. Punched cards evolved into punched tapes, but vast development of information services was brought by historically succeeding data storage device – the magnetic tapes. They gave also the name to the type of information services. They enabled to transfer within any distance (by mail) numerous data or procedures (programmes), what brought the ease of dissemination of information service outputs. Followers of the magnetic tapes were optical storage devices: floppy disks, CD-ROMs and DVD. Last development is, the other way round, not as important for services. In the meanwhile the Internet has developed, and it significantly suppressed the need of the storage device for providing information services. On the other hand information service providers and those processing information today necessarily need wide extensive solutions for data storage (data warehouse), what is also a result of exponential growth of information (information boom, information overload concepts).

It was computers of so called third generation developed in sixties that had started to change information services significantly. These were followed by computers of fourth generation in eighties that already very much resembled the computers of today. They were developed mutually in accordance with the development of networks and internet. Networks are important here, whilst the advance of information service is given by a possibility of dialog regime and remote access. History of networks began with the effort to connect two and more computers, what was achieved by sixties. Following efforts aimed at improving functionality of such connection, new protocols were developed (e.g. mail) and only when 1989 Tim Berners Lee published draft of WWW followed by the concept of hypertext. Afterwards WWW was developed by swiss CERN (*Centre Européen pour la Recherche Nucleaire*). In 1994 the Internet has been commercialised.

This year was also the year targeted by predictions of J.C.R. Licklider that studied in sixties on MIT the possibilities of transformation of libraries with the use of digital computers (unlike V. Bush that - although he knew digital ones - based his considerations on the analogue technologies). In 1965 he published book *Libraries of the Future* where he identified research and development needed for realisation of usable digital library and depicted his vision of digital library in 30 years (hence 1994) [Bartošek, 2001]. Concept of digital library was a basis for modern information services, today is majority of them are necessarily based on a digital libraries. Another important milestone for librarianship and library services was the development of MARC format (*Machine-Readable Cataloguing*) by the *Library of Congress* in USA. This format standardized structure of bibliographic record in electronic version and it was used for shared library cataloguing within the OCLC system. First online library catalogues are developed; named by librarians as OPAC (*Online Public Access Catalogue*). Digital libraries are evolving, i.e. systematically organized collections of digital information – databases of scholarly information etc.

At the beginning of nineties the field of digital libraries is evolving very quickly. Mainly it was thanks to the fact, that technological progress in all three areas critical for digital libraries containing *computing* (computation and both short-time and long-time memory capacity), *communications* (global network and transfer capacity) and *content* (quantity of digital information) achieved sufficient level at the reasonable unit price with general accessibility. This enabled to start realization of the projects responding to real users needs. It has started huge development in the area of digitization, electronic publishing and information dissemination [Bartošek, 2001].

In nineties traditional databases of scholarly information started to change from the databases distributed on CD-ROM to the online communication regime<sup>1</sup>. Subscriber gets user name and password enabling him to enter into the database. In the context of further simplifying and improving of user interface another simplification for user and also for service providers started to evolve – advanced integration technologies what is the biggest trend today. Therefore databases become accessible through the IP identification or Shibboleth service (unified signing-in across information products). Integration is bringing much more, it is the service of interconnecting of data and metadata, for instance under the SFX by Exlibris, that enables to pass over from one system to another and pick and carry relevant information with the user.

This text shortly enlisted historical aspects of formation of information services, what was happening in this field and what were the key drivers of their development. It would take whole book to describe each phases of development of this field including the library services. More information on history of information service are covered in the respective chapters further investigating particular points of the development or bring new points of view, as for example the information on the history of law for free access to information that is underlying wide scope of information services today. Within commercial products the history could be found on their websites as well as in the teaching materials of respective study courses.

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<sup>1</sup> First database online was Spire High Energy Physics Preprint Database in December 1991 (today available on <http://www.slac.stanford.edu/spires/hep/>)

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### **3 MODERN TECHNOLOGIES, SYSTEM INTEGRATION, STANDARDIZATION AND TRENDS**

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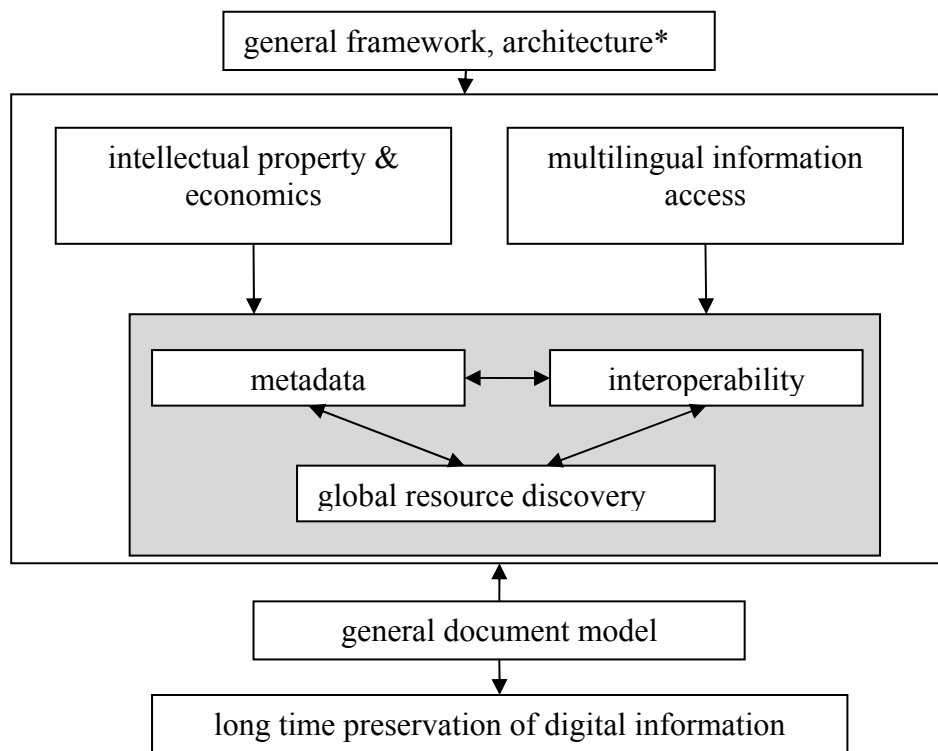
„ Give me a place to stand, and I will move the Earth“. Archimedes' quotation can be applied also to field of information services and to the technology development necessary for the evolvement of information services. Historically the portfolio of information services was quite stable until the technology development began; also the Otlet and La Fontaine left their objective of universal bibliography, what was not so much a new goal as only too wide goal, because they admitted it is not manageable. Today they would answer definitely differently. Back to the quotation – to ensure wide use of services and their transferability into other systems (integration) (“to move the Earth”), it is necessary to assure above all standardization (“place to stand”). It means generally to ensure standardized user interface, through which different systems could communicate and to define standardized structure of transferred information. If we talk about information systems, in the context of information services the most typical system is digital library.

It is presumable that today we are in the middle of information and communication technology boom and that this development will advance very quickly. And what was before few years considered as grand discovery and change of paradigm, today it is taken as matter of course, not at all something special. As an example the terms like hypertext, full text or digital library could be indicated, as they are today very normal but it is they that were firstly absolutely dependent on the technology development and in the end they shifted information services to completely different level. Realization and common use of above mentioned hypertext, full text and realization of digital libraries demand technologies for interconnecting different (autonomously managed) information components [Bartošek, 2001]. Interconnection not only in the systems but mainly across systems could be named as integration. Primary goal of integration of information sources is to offer relevant information in easy and unified (common) way towards as wide group of entitled users as possible in the shortest time possible independently on place diffusion [Pokorný 3, 2007]. With integration there is second term very frequently used. It is the term interoperability that designates the ability to cooperate between technologically diverse and organisationally independent components while solving given task. Sometimes it is claimed with little bit of exaggeration, that all technical problems or challenges of digital libraries are not anything else than different aspects of interoperability [Bartošek, 2001]. Integration and interoperability based on standardization are the main drivers of development of information services and they could be considered to be major trends in the information technology development. Integration and interoperability is aptly depicted in the paper Digital libraries (Digitální knihovny) by Miroslav Bartošek [Bartošek, 2001]. In this paper the general aspects of digital libraries will be discussed.

#### **3.1 Digital libraries and Kahn-Wilensky architecture**

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Wider model of digital libraries that could be seen on the picture below enlists key areas, take into consideration association of concept of digital document including his preservation and also points out the environment (intellectual property and economics). In the very centre of the model there is interoperability, metadata and also global resource discovery [Shauble, Smeaton, 1998] (adapted by [Bartošek, 2001] by adding the terms around the main frame):



Picture 1 – key areas of digital libraries

Integration aims at ensuring users unified (coherent) access to relevant digital information regardless their form, format, technique or place of storage [Bartošek, 2001]. Theoretically integration is depicted by so called Kahn-Wilensky architecture. The architecture, inter alia, defines a handle system – distributed global resolution mechanism. Such a system returns according to the unique identifier of digital object a list of repositories where the record of digital object (described by the identifier) is stored. The term resolution or resolution distributed mechanism is a problem in Czech since it does not have Czech equivalent. From the term resolution also tool named *resolver* is derived. Basically resolution means to decompose again once assembled expression.

Basic item of Kahn-Wilensky architecture is digital object, the data structure of basic stand-alone information item that consists of two parts: content and key metadata [Bartošek, 2001] (with global identifier of digital object, the so called *handle*; further contains properties, content and transactional log – list of operations that the digital object has undergone). Such objects are stored in repositories where access protocol ensures service and communication with environment. Handle-system is a resolution mechanism working across all repositories that is able to identify according to the given handle (unique identifier) where the digital object is stored (multiple locations).

Whole system then works this way [Kahn, Wilensky, 1995]:

- user discovers through advance user interface where digital object is stored (**search**);
- user chooses the source (**select**);
- identifier is delivered to the global resolution mechanism (**retrieve 1**)
- after resolving given identifier by the mechanism the document is requested from the repository (**retrieve 2**)
- document is displayed to the user (**display**)

The most renowned resolving technology is a standard openURL (NISO Z39.88) that enables integration via links (URL – Uniform Resource Locator). Standard defines structure of the assembled expression, in this case expression is URL, and hence it must be assembled into the structure of URL. Receiving system has to know this structure, it has a resolving tool and again decomposes the assembled expression (URL) and transform it into own system. Typical example (implemented also in the Czech Republic) of such a solution is SFX service by Ex Libris and portal using this solution Uniform Information Gateway at [www.jib.cz](http://www.jib.cz). User types a search query that is transformed into unified structure of standardized openURL and SFX server (link server or link resolver) passes it whilst decomposing into other library catalogues and their structures. Thus it is possible to retrieve in all the participating catalogues through one user interface.

### **3.2 Standardisation and metadata**

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Integration is possible only with standardization of the both systems and the data, respectively metadata. Standardization of the system is realized more frequently not internally by redesigning system itself, but more often by creating of interface, module or protocol that enables communication with other systems. Therefore this it is more than standardization really system integration.

Generally, metadata are data about data (or information about information). Standardization of metadata is then a predefined structure, content and its characteristics (number or letter) of descriptive information of primary document. Metadata are of key importance for communication of systems as well as for retrieving of primary data, although today thanks to searching robots (indexing robots) that are indexing full text and returning results according to the match of term from query with the full text and other terms in source document, its importance in normal usage decreases.

Basic principles for describing documents are theoretically given by Functional requirements for bibliographic records (FRBR) [IFLA, 1998]. This paper investigates a model that would give a possibility to create bibliographic records effectively. Bibliographic records are metadata typical for libraries but it could be used as a general model for metadata. FRBR distinguishes four levels of work from the most abstract to the most concrete: work, expression, manifestation and item. Work is realized as an expression that could be embodied in several manifestations and one exemplar of such a manifestation is an item. It could be illustrated on example of book – story is a work, written down into the book it is an expression of this work, whilst once printed there it is a manifestation and each of this book in one edition is an item. Different identifiers could be assigned to each level. This model has much broader sense than only for the field of librarianship.

This was a theoretical model; each of its four basic stones could be described by metadata. Today, there is a broad scope of metadata schemes. The most renowned are e.g. DublinCore<sup>2</sup>, MARC format and metadata of Library of Congress in librarianship, or RDF<sup>3</sup>. Every library information system (or digital library) that manages digital objects or classical physical documents has to use metadata. Metadata could be also standardized on second level, as a part of thesauri, subject headings or other dictionary of controlled terms.

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<sup>2</sup> <http://dublincore.org/>

<sup>3</sup> Resource Description Framework, <http://www.w3.org/RDF/>



### 3.3 Examples of standards and integration tools

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Today, there is large offer of tools, access and projects in the area of integration, or interoperability. This table gives a short overview of open standards in IT in libraries [Pokorný 2, 2007]:

Communication protocol	HTTP, Z39.50, FTP
Special services protocol	OAI-PMH, openURL, EDI, SRU/SRW
Query language	CCL, CQL, Z39.50, SQL
Formats of descriptive data	MARC 21/MARCXML, DC, MODS, MADS, METS
Subject headings systems	Konspekt, UDC, DDC
Full text formats	HTML/CSS, PDF, RTF
Graphic object formats	JPEG, PNG, TIFF, DjVu, SVG
Sound object formats	WAV, MP3, AU, MIDI
Video object formats	AVI, MPG, DVD
Authentication	LDAP, EAP, Shibboleth, SAML

### 3.4 Societal and legal issues in technology development

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Technology development and system integration influence many areas of human lives. It rises up legislative and also generally societal issues. From the legal point of view systems have to respect copyrights and the rights connected with ownership of the digital objects or their licensing, that is particularly due to the necessity of openness and large integration very difficult. It is difficult, inter alia, as well due to that user does not have to necessarily know such restrictions (disregarding the aspects of abuse) and therefore systems has to secure as much as it is possible these issues to ensure legal correctness. These provisions of systems are very often to the detriment of user friendliness. The problem also lies in different legislations across countries whilst the information and communication technologies and dissemination of information has global operation and impact. Presence of user rises up the necessity to increase user information literacy, abilities to work with technologies, good knowledge of the system and their use. This increases demands on information providers (the most often libraries), that have to in their own interest raise user's knowledge of information literacy. Information literacy is also incorporated in the subjects at universities, at the level of high school it develops slowly.

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## 4 PUBLIC ADMINISTRATION AS PROVIDER OF INFORMATION SERVICES

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Public administration and its bodies as they are of public nature have to make information public for the citizens so it is ensured that they are informed to be able to operate in the given framework of the state. This is a general basis of information service in the rule of law of the state. Naturally, there are several exceptions as e.g. information being secret due to many reasons.

It is not only issue of the administrators that need to know information about societal organisation but also of the citizens that need to know laws, provisions, policies and administration decisions. Information demand for state or administrative information has long history; it firstly appeared when people started to organized themselves into certain organization forms (the settlement developed). These information needs have steadily increased, on the one hand as a result of ever-greater involvement of the government in the life of the community (taxation, social welfare, and planning), and on the other because of the growth of democratic participation in administration [Vickery, 2004].

Information resulting from public administration is often categorized as grey literature. But, not all information sources of the administration have to be classified this way.

### 4.1 Free access to information

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Right of citizens to free access to information is entitled in the *Charter of Fundamental Rights and Basic Freedoms* that is a part of a constitutional system in the Czech Republic. Provisions from this document concerning free access to information are legally embodied in the act no. 106/1999 as amended [Czech Republic, 106/1999]. Last amendment was adopted in April, 2010; the law is also harmonized with the EU legislation. Similar acts could be found in many countries, particularly those with democratic regimes. One of the most renowned is the USA act with the title *Freedom of Information Act* that was adopted already in 1966. However, there was significant further development. The oldest law in this area at all is the Swedish act *Freedom of the Press Act* from the year 1766.

Freedom of information legislation ensures access to documents resulting from the public administration, or where the owner of the document is the state. In the Czech Republic the act 196/1999 Sb. obliges state authorities, local authorities and public institutions and other bodies, that act on the authority (more details to be found in act) to ensure free access to information. Act does not apply to providing information being a subject of industrial property rights. Act defines the way of publishing information, its time limits and extent, how to request the information and also defines sanctions for the case the law is not respected. Act delineates also pricing of these services. Annual reports of the authorities have to cover summary of providing these services.

### 4.2 Information services of public administration

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Information resulting from public administration could be obtained either by monitoring places that are determined for publishing such information or by requesting the authorities. The most common and traditional way of publishing is make information public on noticeboards. These noticeboards are today of two kinds, physical (noticeboard in the institution or in front of it) and digital (accessible via internet). Publishing information on

noticeboards is given by the law, paragraph § 26 of Act 500/2004 Sb. on administrative procedure [Czech Republic, 500/2004 Sb.]. Regarding this act every authority has to set up public noticeboard that is constantly (day and night) accessible, content of the noticeboard has to be also published in the way that ensures the possibility of remote access. Noticeboards are further adjusted in subsequent regulations. Inter alia, also university has to set its own noticeboards.

Consequently with development of technologies and attempts to install so called eGovernment (computerization of public administration) the portals of public administration are being established. In the Czech Republic, there is a portal [portal.gov.cz](http://portal.gov.cz) – Portal of the Public Administration accessible via <http://portal.gov.cz> [Czech Republic, Portál veřejné správy ČR]. The portal offers information about the Czech Republic in general, about public authorities and governing bodies and categories of types of information that has to be publicly accessible. It contains also information on tenders, public consultations for governmental materials, law and acts, but also e.g. vacance posts that are also subject of public access. The portal includes application “Podání” (submit) that embodies electronic services of public administration, mainly sending and receiving forms from administration. Portal is organized according to the user’s relationship to the Czech Republic (citizen, entrepreneur, and foreigner) or according to the life situations. For each situation correct administrative procedures is described, e.g. change of permanent residence, registering for real estate tax payment. The portal contains also added value information concerning subsequent particulars in a given situation, e.g. change of permanent residence is completed with the list where this change has to be announced.

The European Union has also portal of public administration, it could be found on [http://europa.eu/index\\_cs.htm](http://europa.eu/index_cs.htm) with the title Europa, Gateway to the European Union [EU, Europa]. Gateway is translated into all official languages of the European Union to certain extent, not every part of it is translated. Gateway offers up-to-date information about EU activities including basic information on European integration. Users could view all valid legal regulations (including those being prepared), go to the websites of all European institutions and could find information about policies that are executed by the EU being within its authority according to the Treaties [EU, Europa]. Gateway is trying to attract users; it contains many interactive tool or videos. It is also organized according to types of information and types of users: entrepreneurs, non-governmental organizations, school and universities, children.

The system of public administration produces large amount of information. Authorised bodies manage manifold registers, databases of documents or factographic data. The most common are legal information that will be discussed in on of the sub-chapters. Other area where systematic collection of information could be found is standard literature that is managed by *Czech office for standards, metrology and testing*. Standard could be defined by law or requested by law. However, norms could be also issued by interest organizations, for instance it is the case of *World Wide Web Consortium* handling internet standards. Therefore norms have different level of obligatory character and different level of validity (and legal force). Further, there is the area of information resulting from intellectual and industrial property rights. This area is managed by *Industrial Property Office in the Czech Republic*.

There are many other registers or indices. Ministry of Finance administrates the register of economic entities ARES, similar register manages also *Czech Statistical Office* with slightly more information on the entities. Website [Justice.cz](http://Justice.cz) managed by Ministry of Justice contains

business register and register of insolvency. Further it manages the list of judges, public prosecutors, expert organisations, bankrupt managers etc. Also trade register is put in place. Important service is brought by statistical offices collecting, analyzing and publishing data on country (Czech Statistical Office) or EU level (Eurostat).

Commercial products based on some of these types of information are introduced; it is mainly the case of databases of legal information or databases of patent information, but we can find many others. Whole register of economic entities produced by Czech Statistical Office could be bought via their website.

It was already mentioned, the case of secret information. Basically authorities managing secret information do not provide these data because of its secret character, however still these authorities are obliged to publish some information. In the Czech Republic, there is *National Security Authority* that provides within its information centre information following the provisions of the Act 106/1999 Sb. on Free Access to Information.

### 4.3 Standard (norm) literature

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Standards (or norms) are recorded agreements providing rules, directives, instructions or characteristics of activities or its results ensuring that materials, product, procedures and services comply with the purpose. Standards are of limited validity and are not mandatory [Bratková, 2001]. Only in the case it is so called harmonised norm what shifts the standard on the level of law it has to be respected. Respecting the standards is today an indicator of product quality; therefore their application is increasing [Fabián, 2001]. Standards are issued either by the bodies authorised by public administration on national or international level, or by professional organizations (e.g. *World Wide Web Consortium*). Standard contains usually the code of issuing authority; designation of the standard gives other information about other characteristics, e.g. if it is harmonised standard. The standard is published in official journal and put into the database of standard literature. Providing the standards is usually charged, the reverse is the case of professional organizations that are mostly free of charge. Library standards as e.g. MARC handled by *Library of Congress* could also be classified as standards (or norms).

The world's largest developer and publisher of international standards is *International Organization for Standardization (ISO)* with 163 members. General office of this organisation is based in Geneva. It is a non-governmental organization. ISO publishes around thousand standards per year, there are 18 thousand issued by ISO in total. Standards has own designation, that consists of the prefix ISO, serial number and publication year. Often it publishes standards together with other authorities then the designation mark includes also the prefix of the cooperating authority. Other renowned standard organisations are *American Society of Testing and Materials (ASTM)*, *Institute of Electrical and Electronic Engineers*, *Organization for Economic Cooperation and Development (OECD)*. In the EU there is a standard organization *CEN* (<http://www.cen.eu/>) and *Cenelec* (<http://www.cenelec.eu/>). Perinorm is the most popular standard's database; it is developed by standard authorities *AFNOR* (France), *BSI* (United Kingdom) and *DIN* (Německo). Perinorm contains standards from 23 countries.

In the Czech Republic, standards development and management lies on the *Czech office for standards, metrology and testing (ÚNMZ)*. It is established by law in the act no. 20/1993 Sb. on ensuring state administration in the area of technical standards, metrology and testing. Main objective of ÚNMZ is to ensure the goals given by law in mentioned areas and also in

the context of the European Union. It is also a member of ISO. From 2009 ÚNMZ is responsible also for publishing Czech technical standards, before it was managed by Czech standards institute that does not exist anymore. ÚNMZ is under the gestion of Ministry of Industry and Trade. ÚNMZ produces standard's database ČSN online (<http://csnonline.unmz.cz/>), access is charged.

#### 4.4 Legal information

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Legal informatics is historically the discipline that concerns to information in the field of law. It is not often used today, as the term informatics is nowadays more dedicated to computer science more than to information science. Founder of this discipline in the Czech Republic is the author of the paper *Právo a informace* (Law and information) professor Viktor Knapp [Knapp, 1963]. Development of this field is also assigned to Jiří Cejpek, nestor of the information science in the Czech Republic, who projected and administrated the systems of legal information for several years. Inter alia, he cooperated with professor Knapp on the ASPI project. In historical context also paper *Základy právní informatiky* (Introduction to legal informatics) written by František Cvrček and František Novák [Cvrček, Novák, 1992] has to be mentioned.

The basis of legal service from the user's point of view (user is physical or legal entity in a given country where the law is applied) is respecting the rule of law whilst it has to be stressed that "ignorance of the law is no excuse". Therefore state has to provide information, or ensure the dissemination service so that information about rule of law and its acts are accessible. This necessity is defined by law that describes how such information has to be published. Usually acts and subsequent regulations in different countries are published in official journal with the title *Statute book* (or *legal code*) or similar.

In the Czech Republic this obligation is given by the act no. 309/1999 Sb. on the Statute book and the International Agreements Code<sup>4</sup> [ČR, 309/1999] as amended. Acts and other legal regulations have to be published in short order, 30 days at latest after delivery to the Ministry of Interior that is responsible for publication and dissemination of the Statutes book.

From information services point of view it is important that in the law is directly enshrined that: "Ministry of Interior publishes in a way ensuring the possibility of remote access the Statute book published after 4<sup>th</sup> May 1945 and the International Agreements Code". This quotation refers to the act 106/2001 Sb. on free access to information, where remote access could be interpreted as accessibility via internet. The Statute book and its archive to 1945 are accessible on the website of the Ministry of Interior (<http://www.mvcr.cz/clanek/sbirka-zakonu.aspx>) in Czech language. Acts are published also on aforementioned Portal of the Public Administration (<http://portal.gov.cz>) where particularly up-to-date full legislation could be found (the text of the act with integration of all amendments). The Statute book is also sold in paper form (current price is circa 1 € (25 CZK) per issue). Further, the capital city of Prague and regions are obliged to provide access working days to everyman to the Statute book, the International Agreements Code and the Official Journal of the European Union; municipalities and city districts have to provide access only to the Statute book.

On the level of the European union this information service is ensured by the Official Journal of the European Union that is published by the Publication Office. The Publication Office is

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<sup>4</sup> Sbirka mezinárodních smluv – loosely translated



an interinstitutional office whose task is to publish the publications of the institutions of the European Communities and the European Union at the best convenience. The Official Journal of the European Union is Publisher in all 22 official languages. This office also has to ensure on-line free of charge publication of the Journal on the portal EUR-lex (<http://eur-lex.europa.eu/cs/>). Developed countries today has their own systems of publication of legislation, most of the legislation is today online (but still mostly only in national languages).

Legal information are naturally processed by commercial entities, particularly they establish the acts databases with added functionality. The most renowned is the ASPI system produced by Wolters Kluwer, information about the law in western contries is provided mostly in the system Westlaw, tangentially are legal information present in LexisNexis. Detail information on information source in the area of law could be found in a paper *Elektronické zdroje právních informací v České republice* (Electronic sources of legal information in the Czech Republic) [Schwarz, 2001].

## 4.5 Information on industrial property

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Information on industrial property is very important source of information and, inter alia, statistics on industrial property rightht are part of measuring economy performance in the statistical indicators. Systems on industrial property rights are manifold. In the area of the EU currently the efforts for unification and harmonisation are culminating (unified EU patent). On the global level there is a trend to make patent full text information public free of charge [Fabián, 2009].

Issue of information on industrial property is described in detail in the papers of D. Pičman where also he covers difficult issue of patent information retrieval and analysis [Pičman, 2004].

Industrial property rights protect:

- patents
- utility models
- industrial designs
- trade marks
- topographies of semiconductors products
- geographical indications (geographical denominations and appellations of origin)

Patent is an exclusive right to use an invention; however the owner of the patent can change. Establishing a patent starts by patent application. Patent is valid only for geographical location for which it applies. Thanks to World Patent Treaty (signed in 1970) it is possible to use patents of more countries. Patent protection lasts 20 years and it is necessary to pay patent fee for the whole period of protection. Utility model, also called “small patent”, is a technical solution. Industrial design protects concepts and specifications that optimize the function, value and appearance of products and systems. Trade marks are registered logos, words and phrases, that unambiguously indentify the owner and represented products.

*World Intellectual Property Organization* (WIPO) is global level institution in this area that developes inter alia standardization and International Patent Classification. Data on patents are freely available including fulltext within the system PatentScope (<http://www.wipo.int/patentscope/en/>). WIPO also compiles patent statistics. On European level works *European Patent Organization* (EPO) providing information on patents freely via

the database Esp@cenet. User interface is available in all official languages of the EU, for Czech it is <http://cz.espacenet.com/>. On the contrary, EPO produces commercial database INPADOC containing bibliographic data and information on legal status. Patent statistics and surveys are traditionally processed by OECD and within the Czech Republic also by *Czech Statistical Office*. Czech authority in industrial property is *Industrial Property Office*.

As mentioned before, access to information concerned to industrial property is not a subject of the act on free access to information. They are regulated by their own laws. Current orientation list of law concerning this area is available on the website of *Industrial Property Office* (<http://upv.cz/>). Database of patents and trade marks, industrial designs, trade marks valid in the Czech Republic and database of geographical indications could be found on the website of the office.

Derwent World Patens Index is commercial system currently developed by Thomson Reuters. It contains around 19 million of unique inventions and the data are further improved. Data collection covers 40 patent authorities in the world.

## 4.6 Environmental information

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Next example of compulsorily provided information by public administration is the area of environment. In the Czech Republic, the citizen has the right for information about environment. This is defined by the law 123/1998 Sb. on public access to environmental information. Ministry of Environment therefore established Czech Environmental Information Agency (CENIA). The law intervene in vast scope of issues, for instance it is also labelling of environment-friendly products. Details and further information about environmentalistics, discipline covering these issues is summarized in the paper of Jan Činčera *Humanistická environmentalistika a environmentální informační systémy* (Humanistic environmentalistics and environmental information systems) [Činčera, 2001].

## 4.7 Information on research and development

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Information from research and development that was funded from public resources should be available publicly, logically. But this is only theoretical base while practice in real differs. Historically was very important issuing of the provision no. 189 (issued on 21. 9. 1985) by president of the USA Ronald Reagan on National Policy on the Transfer of Scientific, Technical and Engineering Information (<http://www.fas.org/irp/offdocs/nsdd/nsdd-189.htm>). This provision, inter alia, defined that to the maximum extent possible, the products of fundamental research remain unrestricted [Bratková, 2008].

In the European Union there is a portal of European Commission called CORDIS (Community Research and Development Information Service, <http://cordis.europa.eu/>) that provides information on research and development in the EU, particularly about so called Framework Programmes (currently 7<sup>th</sup> Framework Programme runs). Framework programmes are the largest financing mechanism in terms of budget allocated into the area of research and development. CORDIS contains beyond all the documents necessary for processing the programmes also the database of projects that are funded from this programme.

Act no. č. 300/1992 Sb. on state support of research activities and technology development established Research and Development Council whose responsibility is the area of research



and development. The Council inter alia is responsible for the database of the results of research, development and innovation that are yearly collected. This database has several modules covering projects, long-term scientific grants, providers etc, it is accessible free of charge on the website <http://www.isvav.cz/>.

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## 5 INFORMATION SERVICES OF COMMERCIAL PRODUCERS

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This chapter summarises aspects of information services in commercial use. It does not describe commercial information services themselves. Theoretical aspects as a concept of information as good, or pragmatic issues as funding of these services in the Czech Republic in public institutions are discussed. Detailed information on these information services with their characteristics could be studied in specific publications covering documentographic information systems or information sources and services (e.g. [Fabián, 2009]). Examples of services are described in the chapter 8 – *Examples of scholarly information databases and other information services*.

### 5.1 Information as a good

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Firstly think about when information became good or a subject of commercial service. Information in some point of view started to be good long time ago, particularly if the aspect of so called secret services is considered – the task to collect information about enemy. Another milestone could be seen in the disposal of material and production capacity: while book print was introduced producing information (recorded in documents) became much more effective. The costs of printing were later accompanied with the cost necessary for processing information. Information processing was already in old libraries and other organized collections, but when it should be a commercial service the processing has to contain added value to be bought, e.g. technology or added information. Although there have been several global projects (WorldCat etc.), it has to be admitted that these attempts are – regardless their usability and contribution – always imperfect and incomplete. There is a large space for specialized services that gives opportunities for smaller commercial projects specialized at certain type of information or particular group of users. Example could be seen in the law – although there is a digital library of acts and other documents, current law firms cannot operate without specialized commercial information services and often with information specialists employed in the company. Narrow specialisation enables to tailor services and their further improvements. These services are sparing the time and effort of employees. Second specific example could be given from the field of chemistry - chemical factographic databases or databases of clinical studies. Here the chapter about integration has to be noticed because these specialised services are influenced by this trend to a certain level.

When discussing commercial services, the theory of information as a good has to be mentioned. There is really a large amount of theories of information; several of them are also touching economic aspects. Information is for economic theory problematic concept and has several interpretations. The most problematic for the economic theory of information is the difficulty of setting the value and costs of information. Economics misses clear quantification of information. Quantification of information depends necessarily on the quality of information that stays also theoretically until today undefined on general level. Information as a good were solving such economists as F. Machlup or M. Porat, their attempts are dated back to the half of the twentieth century. Economic concept of information brings three clear properties of information – it is transferable, has a certain level of utility and can have value [Bates, 1990]. However, this brings more question into the concept of information, e.g. whether information is public or private. Further information does not meet the characteristics of the good in that its efficiency of information cannot be defined, because it is unlimitedly reproducible. When it is sold, the information does not leave the vendor.

## 5.2 Digital library as a product

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In the context of information services the digital libraries are clearly defined product. By digital library as product is meant collection of information with the added value. Added value is provided by the means of organization of information (thesauri, indices, or other tools for organization of information), by specific user interface and its functionality (including searching etc.) or by the content itself. In real such a product is most often a publication or information database (mainly scholarly even though it is not a necessary condition) where the access is charged. Every collection today is more or less digital library, but still the services profiting from classical document are working. Services that are provided against payment covering their processing, mainly interlibrary loans or information provided based on the free access to information are not considered as commercial because their aim is not to profit from the service but only to cover the costs.

## 5.3 Access to commercial information services

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As described before, from the technology point of view today information databases are accessible mainly via internet (or networks) in real time. Majority of producers and providers of databases enables access through IP authentication, where IP address has to be in certain range of IP addresses. Also the possibility of remote access is quite usual today. Remote access is necessary for that user can access database from other location than from institution (or the range of IP addresses given in the agreement) that is paying the fee, e.g. from home, business trips etc. Remote access could be enabled by several possibilities. Firstly institution has a system that enables to assign IP address from needed range remotely instead of users own IP address, e.g. it is VPN protocol or EZ proxy solution. Further, remote access could be provided by the provider's facility by adding this propriety to a user registered into the system; this is administrated by library (or system administrator). Third option is based on integration of both sides and third party that provides authentication facility independent of the system. This facility has to be supported and installed both by the service provider and by the library. Such facilities are denoted as access management systems and it is e.g. Shibboleth currently set in the Czech Republic or Athens service, typical for the United Kingdom.

## 5.4 Access to commercial information services in the Czech Republic

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Information services, respectively acquisition of information databases is possible directly from the provider or through agents. In the Czech Republic both way are in practice, however acquisition through agent is much more common than in the case of Western Europe. Agent helps with price and licence conditions negotiation as well as further with the administration. In the Czech Republic, amongst the most renowned agents are:

**Albertina icome** – [www.aip.cz](http://www.aip.cz)

Albertina is one of the oldest companies on the market in this field. It resells product from providers such as ProQuest, GALE, McGraw-Hill, Wolters/Kluwer, K. G. Saur, CABI, Oxford University Press, John Wiley & Sons and many others. It provides gateway [www.infozdroje.cz](http://www.infozdroje.cz) that indicates according to the IP address which sources are accessible for the user. It contains also reference material or informs about news of the products and producers. Albertina icome is inter alia organiser of the international conference of information sources, Inforum ([www.inforum.cz](http://www.inforum.cz)) that is the largest in the field in the Czech Republic.

**Suweco** – [www.suweco.cz](http://www.suweco.cz)

Suweco is traditional agent as well; it introduced their services in the year 1997. The main products in the portfolio are those of Elsevier, further it represents Academic Press, Cambridge University Press, Reaxys (bývalý Beilstein), Emerald, Wiley-Blackwell, Kluwer, Springer, Sage and others.

## 5.5 Funding of information services in the Czech Republic

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Commercial information services are despite the policy of some producers to favour central and eastern European countries in terms of lower prices extremely financially demanding. Particularly it is important in the publicly funded universities declaring constant insufficient funding of university sector. Nevertheless, without the support of information services the strategic evolving of research and development cannot be ensured as well as current demands placed by the system of evaluation of results of research development and innovation. Institutional funding is based on this evaluation.

Therefore Ministry of Education, Youth and Sports (MŠMT) traditionally systematically ensures funding of key information sources. Ministry by the support programme dedicated to funding of information sources selects and awards projects based on meeting the programme criteria. Funding is multiannual. Between years 2004-2008 the programme 1N was in operation with the allocation of 613 million CZK. After the programme's end a new programme INFOZ had to be introduced, however its opening was complicated due to the use of European funds and was significantly delayed. Therefore several key sources were funded directly from the MŠMT budget as otherwise the access would be stopped. INFOZ programme was published in the summer 2009 with very short period for project preparation; first projects started already in September 2009. Projects are regularly monitored and its efficiency is evaluated. All supported projects are enlisted in the Information system of research development and innovation on [www.isvav.cz](http://www.isvav.cz).

Funding of information services in the Czech Republic is based on constituting consortia. Consortium is association of institutions that have common interest in one or several information sources. Main responsibility lies upon on of the institutions, the head of consortia that finally signs the agreement. In the context of support funding programme it is consortium that applies with the project proposal and not institutions themselves. This approach is directly favoured by MŠMT in the conditions of the programmes, since such aggregation of institutions increases the order and hence the position for price negotiation is enhanced. Finally each member has a lower price than if the sources are bought separately. Information sources are not funded only from the aforementioned programme but also from own resources or from other programmes, particularly those concerning research, where often part of the budget could be dedicated for its acquisition.

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## 6 OPEN ACCESS

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In the framework of information and communication technology development a movement could be identified that aims at opposing to commercial services and offer an alternative possibility that is free of charge. This alternative solution is possible mainly thanks to the availability of technologies and possibilities if the internet network. Examples are operational system alternative to Windows, development of Wikipedia or internet browser Mozilla that is currently dominating on the market. Amongst these attempts the Creative Commons could be enlisted as well, it is an alternative to copyright where the owner (author) designates the level of protection of his work himself. Similarly in scholarly communication free archives have developed; initial motivation lied in the need of shortening the very long time of publication process and in the possibility of exchanging research results. Pioneers of open archives were mainly physicist. This approach is generally described as “open”, either open source when it comes to software and open access within the free publishing. Open access usually utilise open source systems.

Open access stands for permanent free online access to documents, particularly to the full texts for all users. Free access does not mean that it is created at no costs [Bratková, 2008], on the contrary in some archives author has to pay to publish his paper in the repository. Copyright owner by publishing in open archive gives permission to unlimited reading of the paper, downloading, copying, sharing, storing, printing, retrieving and hypertext interlinking [Hardy, 2005] [Bratková, 2008]. Start of open access initiative is dated back to the year 1990. Historically there were several groups and initiatives; history overview is well described in the paper *Open-Access Timeline* by Peter Suber [Suber, 2008].

Initiatives of open access are closely interconnected with the development of digital libraries, metadata schemes or integration tools. E.g. protocols of effective integration have been introduced by organisations supporting open access (as for example the protocol OAI-PMH for metadata collection or OAI-ORE for digital object exchange).

Open Access information services are mainly journals, thematic repositories or institutional repositories. Open Access repositories often contain grey literature.

### 6.1 Open Access initiatives and projects

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Aforementioned protocols were developed by Open Archive Initiative (<http://www.openarchives.org/>), one of the most renowned initiatives in open access. This initiative concerns mainly to integration of local sources. Budapest Open Access Initiative (<http://www.soros.org/openaccess/>) stresses mainly free access [Bratková, 2008] that is not always ensured. Open access is also supported by public administration, the European Commission lasts on the conditions of free access and it e.g. establishes the database of the research results that is freely available. SHERPA (<http://www.sherpa.ac.uk/>) is other project developing issues of Open Access. Its project RoMEO monitors publishers that allow autoarchiving of preprint or postprint on free basis in digital repositories [Fabián, 2009].

### 6.2 Electronic archive platforms

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Repositories are often built on the software that was developed by the open access initiatives or institutions supporting open access. In 2002 CERN published and provided free of charge a software for ensuring operation of electronic archives CDSWare (<http://cdsware.cern.ch/>). University of Southampton that operates number of repositories has developed software



EPrints (<http://www.eprints.org/>), today one of the most widespread. Software with the most numerous usage indicated in the directory of repositories is DSpace (<http://www.dspace.org/>) that has been developed on MIT and belongs to the open source software as well, it is provided free of charge. Further there is Fedora (<http://www.fedora-commons.org/>) or Greenstone Digital Library (<http://www.greenstone.org/>). Charles University in the Czech Republic installs DigiTool (<http://digitool.is.cuni.cz/>) from ExLibris.

### 6.3 Open Access repositories

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The most notable among repositories with open access is Arxiv.org (<http://lanl.arxiv.org/>) that has been launched in 1991. It is operated by Cornell University and it contains over 600 000 e-print records. Arxiv has Scientific Advisory Board for each of covered disciplines recommending whether the paper could be put in the repository. Repository covers physics, mathematics, computer science, quantitative biology and statistics. Through the time Arxiv integrated several smaller repositories, e.g. CoRR – Computing Research Repository.

In the field of information science and librarianship there is a repository E-LIS (E-prints in Library and Information Science) on <http://eprints.rclis.org/>. One of its priorities is providing access to information materials in national languages [Fabián, 2009] and consequently today there are circa 20 documents with Czech provenience. French archive @rchiveSIC (<http://archivesic.ccsd.cnrs.fr/>) is specialised in the field of information and communication what reflects the traditional concept of information science in francophone countries. Repository DLIST (Digital Library of Information Science and Technology) has been developed by School of Information Resources and Library Science on University of Arizona (<http://sirls.arizona.edu/>).

Further there is CogPrints (<http://cogprints.org/>), an archive of University of Southampton focusing on cognitive science, another university archive ECS EPrints Repository (<http://eprints.ecs.soton.ac.uk/>) is focusing on the field of electronics and computer science. Project New Zealand Digital Library (<http://www.nzdl.org/>) offers a number of thematically specified repositories, it was created on University of Waikato and primarily was oriented to the content from computer science; today it contains a number of other archives. RePEC – Research Papers in Economics (<http://repec.org/>) is renowned repository in economics and it is one of the largest in the terms of number of records, where within majority of the records the full text is available. Repository has integrated the service CitEc that enables to manage citations. One of the largest institutional repositories is CERN Document Server (<http://cdsweb.cern.ch/>) that serves as a preprint archive and as a bibliographic repository that integrated other functionality e.g. within books the possibility to buy it on Amazon.com. The repository contains more than 1 million records. Formerly very interesting system NCSTRL (Networked Computer Science Technical Reference Library) was member of Open Archive Initiative, focused on computer science, however in the year 2007 it was ended. Specific initiative is project Driver, Digital Repository Infrastructure Vision for European Research that on its websites <http://www.driver-community.eu/> make accessible documents from 260 repositories and cares about development of open access issues on the EU level. The project itself is funded by the EU.

For better organisation and identification of repositories around the world there are directories of the open access repositories. One of them is ROAR (Registry of Open Access Repositories) on <http://roar.eprints.org/> registering around 2000 repositories, amongst them 6 Czech repositories could be found. Registration works on voluntary principle. ROAR provides searching according to country, software and repository type, search results can be analysed

according to several criteria (world map, records per year etc.). Similar directory is OpenDOAR (Directory of Open Access Repositories) on <http://opendoar.org/> led under the project SHERPA that associates institutions developing open access repositories. It contains slightly less repositories than former directory. It enables search according to more criteria (area, language, content type) and it is possible to retrieve in the repositories directly. Search results could be visualised through the Google Maps by the service Repository66.org <http://maps.repository66.org/>, map gives the location of the repository. Long list of repositories could be found in the project focusing on webometric evaluation of repositories, it is Ranking Web of World Repositories (<http://repositories.webometrics.info/>). Open Archive Initiative publishes a catalogue of repositories using protocol OAI-PMH – OAIster on [www.oaister.org/](http://www.oaister.org/). This catalogue is created in cooperation with OCLC.

Detail description of the topic of open access could be found in paper by Eva Bratková *Otevřený přístup a digitální knihovny v oblasti vědy a výzkumu (vybrané systémy)* (Open access and digital libraries in research and development (selected systems) [Bratková, 2008], or in the paper of Ondřej Fabián *Elektronické informační zdroje I* (Electronic information resources) [Fabián, 2009]. Regarding the fact that systems are developing very quickly, it is reasonable to verify information directly on the given websites before they are further used.

## 6.4 Open Access journals

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History of open access journals started already in 1989. One of the first, the journal *Psychology* (<http://psycprints.ecs.soton.ac.uk>) was sponsored by American Psychological Association. Further there was The Public-Access Computer Systems Review (PACS Review) in the field of computer science (<http://epress.lib.uh.edu/pr/pacsrev.html>).

Although there are many more commercial publishers than open access publishers, the share of open access increases, today it is 20 % [Björk, 2009]. Open access journals could be regarded today as a trend; some traditional publishers are planning to publish some of their journals in open access regime. It is for instance Springer Science that should start open access journals in the beginning of 2011 (<http://www.springeropen.com/>).

For orientation among open access journals Directory of Open Access Journals (DOAJ), available on <http://www.doaj.org/> could be used.

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## 7 LIBRARY INFORMATION SERVICES

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Libraries are the most traditional providers of information services. Not only libraries, but also information centres, information and study departments or any other department and institutions that are overarching services traditionally connected with public or scholarly libraries. Information services depend directly on the library type and its reach. National library is obliged by the law to perform certain services, specialized libraries and libraries in research institutions ensure activities necessary in this area (collection of bibliographic records of research results). Smaller public libraries are discharged by so called regional function and are providing subsequent services to their function. Library services are often connected to Czech legislation.

Firstly the term library has to be discussed. Today it has two main meanings in the area of information services – library as an institution and library as a term used in computer science and in online environment (programme libraries, digital libraries, and repositories). Although both programme libraries and digital libraries are providing information services if we consider the broad concept of information service – but this chapter is focusing only on the libraries as institutions and their services. Of course, one of the services of the library could be providing or using digital library. Digital libraries and libraries as institutions could have many common characteristics [Bartošek, 2001]. It could be for instance in the area of services: access methods, data management, acquisition, analysis, reference services or selective dissemination of information.

Basic goal of library services is to satisfy information and cultural needs of citizen. Within personal needs it can be pointed out the fact that librarian could be a kind of advisor or he can lead user to appropriate information channels. Librarians have to be interested in these needs, investigate them, adjust the profile of the library according to them and completing the reference collections [Stöcklová, 2007]. The same basically pays for the professional information needs as well; these services are adjusting to user needs as well in time.

Services are dynamic part of the library system. Although part of the services are based on law or are following the library role as an department of given institution, library launches and respectively cancels services on the basis of information needs that are surveyed among library users. Today, many technological tools are utilised for user behaviour monitoring; user statistics are the very basis. Libraries among other could use bibliometric and webometric methods for their surveys.

### 7.1 Legislation in the Czech Republic

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As mentioned before activities of library could result from legislation. National library sums up on its webpage overview of Czech legislation as well as international recommendations documents [NK, 2009]. Fundamental law for library activities is the act no. 257/2001 on libraries and conditions under which public library and information services are provided [Czech Republic, 257/2001]. This law defines the composition of the system of libraries in the Czech Republic:

- National Library of the Czech Republic (hereinafter only "National library"), K. E. Macan's Library and Printing Office for Blind Person, Moravian Library in Brno, that are established by the Ministry of Culture;
- Regional libraries, established by appropriate regional authority;
- Basic libraries, established by appropriate city authority;

- Specialized libraries.

Law provides what public library and information services are including which of them have to be provided free of charge. Law further discuss register of libraries that is managed by Ministry of Culture. Law defines in detail the types of libraries (from national to specialised libraries). It occupies with the evidence and reviews of the library collection including removal of books. Interlibrary loans' conditions as well as library collection preservation are covered. Naturally the law also provides conditions of library funding.

Further legislation falling in the scope of library activities are copyright law, law on non-periodical publications ruling the legal deposit copy, law on free access to information, law on collections of museum character, archiving legislation and several others.

Library development and its activities are influenced by policies as for instance Library strategy to 2020 currently being compiled by Ministry of Culture and expert group. Moreover there are European Council (Council of the EU) draft recommendations on library legislation. More details on the legislation, international documents concerning information services and other useful information could be found on the website of National Library in the section Informace knihovnán (LIS Portal) at <http://knihovnam.nkp.cz/english/index.php3>.

## 7.2 Library services

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A lot of demands are placed on library services. First of all, there is a condition which determines that services are provided regardless race, nationality, religion, cultural or political orientations, age, physical or mental disabilities, sex or sexual orientation. Basic library services publicly funded should be provided free of charge and equally. Following these demands library website should correspond with the rules of web accessibility and regarding the needs of visually impaired or hearing-impaired users and users with limited ability to move hands or with concentration disorder. Location of library is very important; it is recommended that library should have its place in the middle of settlement structure or near the centre. Distance should not exceed 15 minutes of walking or use of public transport for the district of direct operation. Whether this limit is exceeded it is suitable to ensure accessibility by opening a library branch, by mobile library or in other way [Stöcklová, 2007].

The list of library services that would cover them all is not easy to draw up. Some of these services are free of charge, the other based on payment. Among library services are enlisted by law (loosely adopted from [Czech Republic, 257/2001]):

- to give access to library documents from own library collection or via the interlibrary loans from the collection of other library;
- to provide oral bibliographic, reference or factographic information and information retrieval;
- to mediate information from external information sources, particularly the information from public administration;
- to give access to information on internet, where library has free access;
- to give access to external information service where library has free access via telecommunication device.

From the aforementioned services these are (could be) charged:

- to give access to library documents from own library collection that has a character of copy of audio or video records;
- to give access to library documents from other libraries' collections by providing the copies within interlibrary reprographic services;

- to give access to library documents from other libraries' collections within the international interlibrary loan services.

Library could further provide these services:

- to give access to paid information on the internet;
- to give access to paid information sources via telecommunication device;
- cultural, educational and pedagogic activities;
- to publish thematic publications;
- to provide reprographic services;
- to provide written bibliographic, reference and factographic information and information retrieval.

### 7.3 National library and its services

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Existence of national library is a common matter in developed countries. In the Czech Republic, national library is established by law. However, their activities could differ across countries, but some of the services are provided by almost all of the libraries. Following information services should be provided by the National Library of the Czech Republic (selected from [Czech Republic, 257/2001]):

- it has universal collection supplemented by specialized collections;
- it keeps preservative and historic collection;
- it creates union catalogue of the Czech Republic;
- it creates national bibliography;
- it is a national centre for international interlibrary loans in the Czech Republic.

### 7.4 Library services for special types of users

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Libraries provide their services also for special types of users that are disadvantaged compared to common citizen. Specialized libraries or departments in larger libraries are established. Libraries this way loosely follow *Universal Declaration of Human Rights*, where within freedom of opinion and expression the freedom to seek, receive and impart information through any media and regardless frontier is codified.

Services for disabled have its specificities according to their handicap that has to be overcome and these services could be distinguished based on the disability [Kánská, 2001]:

- citizens visually impaired;
- citizens hearing-impaired;
- citizens physically disabled;
- citizens mentally disabled.

For the physical access to information it is necessary to eliminate architectonic obstacles, e.g. ensure automatic door opening, elevator, appropriate study places, sufficient bookshelf spacing, adapted toilet etc. Within electronic access to information it is necessary to adapt computers and their peripheries, to install special hardware and software. Issue of the access to information for socially handicapped (e.g. homeless people) or for national minorities has to be considered.

The law defines the existence of K. E. Macan's Library and Printing Office for Blind Person ([www.ktn.cz](http://www.ktn.cz)) that is settled in Prague. This library has universal collection and permanently keeps historical and preservative collection [Czech Republic, 257/2001]. Readers are either visiting the library personally and can borrow books or mail order service or delivery service within Prague is ensured. Sheet-musics in Braille are also at library disposal, they could be

custom-tailored according to the user's request as well. Library has a digital library with inter alia MP3 records that could be played directly in the browser (<https://biblio.brailcom.org/biblio/catalog>). Further this institution ensures rewriting and rereading service, copying of material for the blind, selling of paper for the blind, books and sheet-music, it provides audio books by recording on storage device. Website of this library indicates the list of specialized departments of the libraries providing services for visually impaired in other libraries.

## 7.5 References

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## **8 EXAMPLES OF SCHOLARLY INFORMATION DATABASES AND OTHER INFORMATION SERVICES**

### **8.1 Access to information databases**

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The list of information sources being at institution's disposal is indicated usually on the institution library's website or on specially created portal. These websites (or portal) include also information about remote access and further useful information. For instance, Charles University has created a portal *Electronic Information Resources at Charles University in Prague* ([www.bi.cuni.cz](http://www.bi.cuni.cz)). The portal contains information about remote access, Shibboleth login, SFX service or provides video tutorials. Resources could be retrieved according to the scientific field or alphabetically. Portal informs about news, problems, free access, trial versions etc. There are several tools for effective information resources management. It is for instance MetaLib by ExLibris enabling information retrieval across all information resources.

### **8.2 Information resources typology**

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Information resources, represented by databases or digital libraries can be classified according to criteria. Traditional typology is based on the type of the document collected: primary document, secondary document, or tertiary document, respectively special types of information services [Papik, 2001]. Further categorisation could be done according to their content and functionality. Typology could be regarded from many other criteria, similar to the typology of information services (see chapter 1). It could be the type of information, document type, topic (field sources or polythematic) and other possibilities could be identified. Basic typology according to the information type covered distinguishes full text databases, bibliographic and factographic databases.

#### **8.2.1 Full text databases**

Obvious trend today in the field of information resources is providing full text (primary document) as fast as possible. There are large investments into acquisition of full text databases; integration tools for different resources are developed so that quick and simple delivery of full text is ensured. The biggest added value of full text databases is the ability of full text search.

#### **8.2.2 Bibliographic databases**

Bibliographic databases contain secondary information – records about existing documents (or information). Functionality is very often similar to full text databases, sometimes they could be more developed, particularly regarding long history of these resources. However, they cannot provide the possibility of full text search.

#### **8.2.3 Factographic databases**

Factographic database is characterized by the fact that it represents directly data and facts [Cejpek, 1998]. Factographic information is complementary to the bibliographic information [KTD, 2003]. Above all it has to be stressed that it is primary information. Factographic databases are the type of information services that provide facts and data about topic as a retrieval results [Cejpek, 1998]. For instance, factographic databases are: statistical databases, within databases of scholarly information it is often the database in the field of chemistry, physics, geography or economy. Specific databases are those of encyclopaedia character. Theoretically these databases can be divided into numeric (mainly statistics), data (summary

of facts), databases of the handbook or guide type (company directories, product catalogue etc.) [Fabián, 2009]. These databases are today starting to be more and more integrated with other databases.

### 8.3 Information sources types with examples

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Often, it is difficult to distinguish precisely, which type the information source belongs to. Many of the information sources could be classified into more categories. The classification below is then only indicative and it is loosely adopted from the paper *Elektronické informační zdroje* (Electronic information sources) by Ondřej Fabián [Fabián, 2009] providing exhausting list and description of information sources and investigating this area in detail. As in Czech language there is usual that the information source of the type of digital library is called database, hereinafter this term will be used. It also should have to be mentioned that the databases are very dynamic in their development so the character of this text is very temporary and if used further the information should be verified.

#### 8.3.1 Polythematic databases

Polythematic databases, as the title indicates are covering information from more fields of science. Frequently, these databases are of bibliographic character. Historically most renowned is the database Current Contents (today produced by Thomson Reuters) providing latest contents of the scholarly journals, database Pascal of French provenience created by *Institut de l'Information Scientifique et Technique* (INIST, <http://www.inist.fr/>) that covers articles mainly from medical science and engineering. The same institute produces other polythematic database Francis that is focused on humanities. *All-Russian Institute of Scientific and Technical Information* creates wide-ranging polythematic database VINITI (<http://www2.viniti.ru/>). The database Academic OneFile from the company Gale is also very large, half of the records is accompanied with full text and e.g. it contains New York Times archive from the year 1985. Another database, JSTOR, was established as initiative for preservation of older journals issues in digital form (most of them is in TIFF format). PIO and PAO are known abbreviations of the databases Periodical Index Online and Periodical Archive Online representing vast retrospective collection of electronic journal; first mentioned is full text database. Famous and popular in the Czech Republic are polythematic databases Ebsco and Proquest that were made accessible nationwide (accessible also in common libraries). Among polythematic databases also Wilson OmniFile Full Text could be counted. Also citation databases are mostly of polythematic character, but due to their specific characteristic these are discussed in separate subchapter.

#### 8.3.2 Citation databases

Citation databases compared to others provide the information about how many times given paper was cited by other papers in the database (only in the one that is providing the number). This is ensured by that every record, although it is bibliographic record, involve the list of references. These references are linked with the source articles and these links are counted as citations. Linkage is done mostly automatically and although there is human hand helping with the processing, counts are not absolutely complete and precise. This interlinking provides spaces for further analysis that explores domain of scientometrics. Basic analysis are analysing the most cited authors, articles, journals. Further the indicators as impact factor and other could be counted; advanced analysis explore more indicators, analysis of teams, countries, field etc., up to maps of science and the identification of interdisciplinarity of the fields. Databases are today very important as the stress on science evaluation increases. As mentioned, citation databases are mostly polythematic. Although



there are several databases including citations to certain level, only two commercial databases could be fully marked as citation databases, Web of Science and Scopus.

Web of Science that has developed from citation indices of Eugene Garfield, inventor of the idea of citation index in late fifties of twentieth century, is available on the Web of Knowledge platform. After few changes of producer the database is today in the portfolio of media magnate Thomson Reuters. One of the biggest publishers of scholarly literature and the producer of scholarly databases Elsevier has launched citation and abstract database Scopus in the year 2004. Competition of these databases is a strong driver of further development of the databases' functionality, services and content.

Sometimes, third citation database is listed, Google Scholar that is marked as Beta version from the beginning until today. Google Scholar is constantly enhancing its service that enables search among scholarly literature and gives the citation numbers. It is freely available at <http://scholar.google.cz/> resp. <http://scholar.google.com/>.

### 8.3.3 Field databases

Logically, databases focused on relevant scientific fields are produced. The advantage of these databases is their deep coverage and specific functionality adjusted to the field that enables more efficient work with information. These databases contain specific indices, thesauri or they are connected with other tools (ontologies, factographic databases, knowledge platforms). They also could contain field specific document types. Scientific communication in certain fields significantly differs from others; whilst in medicine the very typical source of information is clinical study, in physics the "letters" are common, and within humanities the information are most frequently published in books. The list could continue, from the math to the law, every field has its specific communication patterns.

For **agriculture** the databases Agricola, AGRIS and CARIS that are freely available are very important. First mentioned is managed by USA National Agriculture Library, second and third are of FAO (Food and Agriculture Organization) provenience. CARIS provides information about research projects in agriculture (in USA there is a similar database CRIS). Both, AGRIS and CARIS use international thesaurus AGROVOC. FSTA is renowned database in food science. CAB Abstract is wide-range database patronized by Commonwealth, again it has own thesaurus CAB and thematic classification CABICODES. Agricultural and food information are often part of charity projects and are freely provided to developing countries (HINARI, OARE, Elsevier project).

In the field of **chemistry** it is typical that databases have specific characteristics or factographic databases are created. This is caused by the need to capture chemical language and to efficiently cover chemical substances so that reactions are described in a better words than only with words. Non-profit organization Chemical Abstract Service except for database Chemical Abstracts administers also chemical substances registry CAS Chemistry Numbers that is used worldwide. Database is equipped further with CA General Subject Headings. Very expensive and important is the Reaxys platform produced by Elsevier that integrates factographic databases Beilstein (organic chemistry) and Gmelin (anorganic chemistry), and Patent Chemistry Database. In Reaxys, bibliographic records are only one part, added value is provided by advanced functionality adapted to work with information about reactions, substances, interconnected patents etc.

**Math** is also discipline that needs its specific apparatus. The database MathSci hence offers Mathematics Subject Classification. This classification is used in Zentralblatt Math as well, that is another database from the field of math.



The field of **engineering** is secured in the terms of information by the platform Engineering Village (Elsevier) that absorbed the most important databases INSPEC, Compendex, NTIS and others. Also these databases have own subject apparatus (e.g. INSPEC Thesaurus etc.). Further in this field there are databases as IEEE Xplore, ICONDA for civil engineering, INIS covering information from nuclear science, or database TULSA in the field of oil industry that should be mentioned.

**Social sciences and humanities** are often oriented on polythematic databases. In the field of education the most renowned seems to be the database ERIC, in sociology it is the database Sociological Abstracts, in psychology PsycInfo, Philosopher's Index in philosophy, EconLit and SourceOECD in economy. In these scientific branches national information sources are very important and used.

In **economy** not only scholarly articles are important but also factographic information and miscellaneous registers are of great importance. Worldwide among strong producers of such information Dow Jones with many products including renowned Factiva or Dow Jones Index, and Dun&Bradstreet covering by its database portfolio whole world economic events should be mentioned. Another information producer in this field is Thomas Publishing Company. In the Czech Republic the register Albertina Firemní Monitor from Albertina data was widely used, today it is provided by company CreditInfo that has more products focusing on economic information in Czech market.

In **geography** classic databases are completed by the factographic databases or gateways as well. For instance there is CountryReports.org (<http://www.countryreports.org/>), World FactBook produced by CIA (<https://www.cia.gov/library/publications/the-world-factbook/index.html>) or Library of Congress' database Country Studies (<http://lcweb2.loc.gov/frd/cs/>).

Regarding the fact that this paper is concerned to information science, also information databases for this field have to be mentioned. There are LISA, LLIS, ISTA and the largest LISTA database. For the Czech Republic, these sources are acquired by a consortium project from INFOZ programme (discussed in preceding chapter).

#### **8.3.4 Patent and standards databases**

These systems are mentioned in the charter 4 concerning public administration information services. Often, their registration is following the law and therefore publicly available databases are created by registration authorities. But, commercial databases with added value are at place as well. In the Czech Republic there is the standards database ČSN Online, from others the service Perinorm has to be mentioned. Area of legal information is covered except for publicly available sources mainly in the ASPI or Westlaw products.

#### **8.3.5 Journal databases**

These databases have bibliographic character. Often they are successors of library catalogues as in case of union periodicals catalogue USA Conser or German Zeitschriften Datenbank. In Czech Republic there is union periodicals catalogue CASLIN. Commercial database Ulrich's Periodicals Directory is exhausting catalogue of journals and it presents large descriptive data including journal history (is keeping the track if journal is renamed, merged or other) or impact factor of the journal. Worldwide journal database has developed thanks to the ISSN agency that is registering body for periodicals (it assigns the ISSN number). It contains almost

1,5 millions of records. Czech national database of ISSN is unlike general database ISSN Portal freely accessible. It registers circa 10.000 journal records and the interface is available on the National technical library's website.

### 8.3.6 Directory of databases and other registers

Traditionally, the directory of databases is provided by Gale Cengage Library with the title Gale Directory of the Databases. This database is regularly updated; current 32th edition registers 26.000 records. Coverage of the Czech Republic is 20 information products and services from Albertina data, ČTK, Inform CZ (company directories etc.) and Prague Post. Database is available via the platform Gale Virtual Reference Library.

Possibility of advance work with different databases, among others to assess relevant source, is offered by the database Dialog and its tool DIALINDEX. So called Dialog Bluesheets that are publicly available contain database index that can be searched in Dialog interface according to the name, field and OneSearch category. OneSearch category is a thematic cluster of databases created for efficient search in the Dialog database. Bluesheets gives detailed description of every database, e.g. it is the discipline covered by the database, its special tools or information about publisher etc. On its website, Dialog presents its Dialog-Datatar Database Catalog 2010 (<http://support.dialog.com/publications/dbcat/dbcat2010.pdf>) that contains short description of circa 600 databases with field and alphabet index. Moreover, on the website could be found Dialog, resp. Datatar Database Selection Guide ([http://support.dialog.com/techdocs/co018002mi\\_dlg\\_dbsselguide.pdf](http://support.dialog.com/techdocs/co018002mi_dlg_dbsselguide.pdf)).

More details on this topic are summarized in the paper *Databáze databází* (Databases of databases) by E. Bratková [Bratková, 2007].

### 8.3.7 Database centres

Database centres are enabling access to group of databases. Their development has begun together with the development of dialog communication with computers. Database centres were extremely expensive and their use was a domain of experienced information specialists. Today, these centres have user friendly interfaces and they are available online on internet. The advantage of database centres is parallel search in many databases or groups of databases (Dialog OneSearch). Already few examples that are mentioned in the field databases could be considered as database centres. It is for instance Engineering Village that has integrated through the time several other databases. It could be seen that database centres are traditionally identified more from the historical perspective than from the current state-of-art. The oldest and most renowned database centre is Dialog that is giving access to more than 900 databases. Recently it was merged with competing DataStar and it is developed by ProQuest. DIALINDEX and Dialog Bluesheets, integral part of the database, have been mentioned in the section of directory of databases.

Except for Dialog there are other database centres. Around 200 databases in the natural science and engineering are collected in the centre STN-International (<http://www.stn-international.de/>). Further there is OVID, Questel/Orbit with focus also on patent information, Cambridge Scientific Abstract, more renowned under the name of its platform CSA Illumina, Lexis/Nexis covering among others law and business, DIMDI, oriented at medicine and offering several databases free of charge. This is of course incomplete list also regarding the fact that it is not easy to distinguish the border between database centre and database only.

### 8.3.8 Grey literature

The term grey literature is common more in scholarly community than in public. Importance of this type of information is increasing; new systems and services for grey literature are established. There is a number of definitions trying to precisely define and characterise this

type of literature [Fabián, 2009]. One of the most widespread is that grey literature is all literature that is not processed by classic commercial publishers [Papík, 2000]. The greatest advantage of this source is that the information is highly up-to-date [Fabián, 2009].

Typical representatives of grey literature are [Fabián, 2009]:

- reports (research, technical, developmental, travel, study, annual etc.);
- thesis (bachelor thesis, thesis, dissertation);
- preprints – documents being available before official publishing or presenting;
- conference materials;
- business reviews;
- expert's reports;
- official correspondence.

From above it is clear that grey literature is produced sectors-wide, by public administration, academic and research institutions and private sector communicating other way than it is usual in science. Grey literature within public administration was discussed in the chapter 4.

For a long time, the flagship initiative in grey literature was collaborative and decentralized system SIGLE. The system was closed in the year 2005. Largely the content is now freely available as an OpenSIGLE on the INIST website <http://opensigle.inist.fr/>. Interesting projects in the field of grey literature are many, in the USA it is e.g. NASA Technical Report Server or NTIS (National Technical Information Service) produced by american Ministry of Trade. In the United Kingdom, British Library is providing a service called BLDSO (British Library Document Supply Centre) where the database National Reports Collection is created. Already mentioned French organization INIST is engaged in this field as well, what confirms the SIGLE takeover. In the Czech Republic, currently National repository of grey literature is built by National Technical Library.

Currently widely discussed in the Czech Republic is the topic of public access to thesis that are except for few universities stored in many faculty and university libraries and there is no single access to them. Recent scandals concerning frauds in conferring the degrees showed that transparent and central access is necessary. The website [www.theses.cz](http://www.theses.cz) contains national register of thesis that serves also for detecting plagiarism. This system was developed by Masaryk University, until today around 30 universities have joint the system. Such systems are not new abroad, there are several systems. One centre focusing on this issue on European level was opened recently European e-Theses. Repository of thesis is available on <http://www.dart-europe.eu/>, portal indicates inter alia member institutions. In France, theses were registered as a part of national bibliography [Fabián, 2009], except for that there are two projects Thesa and Les Theses (<http://www.abes.fr/abes/page,356,theses.html>) registering theses already for a long time. In German speaking countries there is DissOnline.de <http://www.dissonline.de/>. Large system for thesis represents Proquest Dissertations and Theses; its retrospective collection is going back to 1861. System has its „open“ version that provides at no charge freely available theses. ND LTD (Networked Digital Library of Theses and Dissertation) is the thesis system for USA and other countries.

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