ESTUDOS AVANÇADOS EM CIÊNCIA DA INFORMAÇÃO: PESQUISA EM METADADOS E WEBSEMÂNTICA

Aula 01 – Contexto da pesquisa em Metadados e Websemântica

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Rodada de apresentação

Ementa e página da disciplina

- http://daltonmartins.fci.unb.br/estudos-avancados-em-ciencia-da-informacao-pesquisa-em-metadados-e-websemantica/

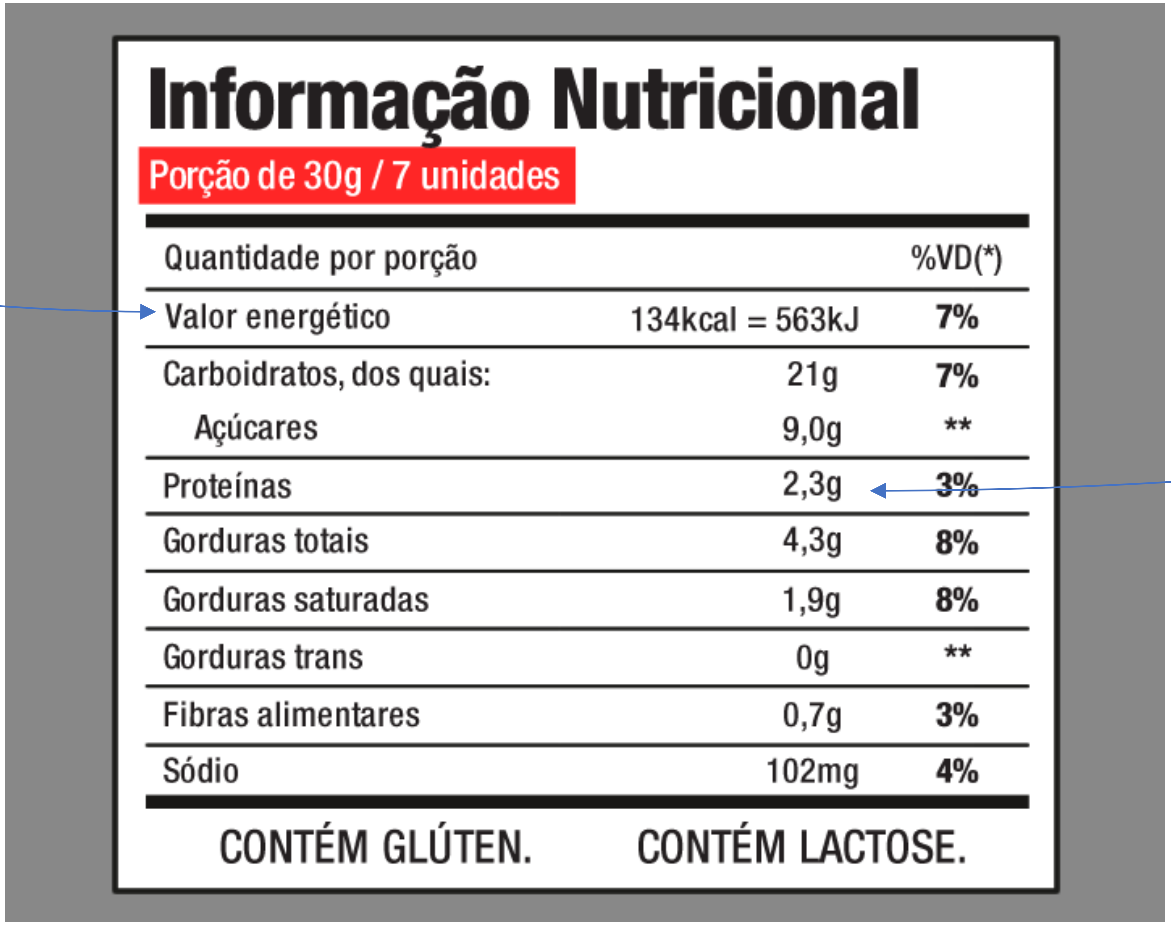
Reflexões iniciais...

- A busca por informação, em nosso cotidiano, depende de duas questões básicas:
  - O que é esta “coisa”?
  - Como esta “coisa” se relaciona com outras ”coisas”?
- As informações estruturadas que ajudam a descrever as “coisas” estão imersas no cotidiano e compõem elementos tão simples, como um rótulo de comida:
  - A estrutura de uma informação estruturada sempre se dará, basicamente, pela relação:
    - Propriedade
    - Valor.

Reflexões iniciais...

Propriedades

Valores



Informação Nutricional

Porção de 30g / 7 unidades

Quantidade por porção		%VD(*)
Valor energético	134kcal = 563kJ	7%
Carboidratos, dos quais:	21g	7%
Açúcares	9,0g	**
Proteínas	2,3g	3%
Gorduras totais	4,3g	8%
Gorduras saturadas	1,9g	8%
Gorduras trans	0g	**
Fibras alimentares	0,7g	3%
Sódio	102mg	4%

CONTÉM GLÚTEN. CONTÉM LACTOSE.

Rótulo de remédio

Reflexões iniciais...

Propriedades

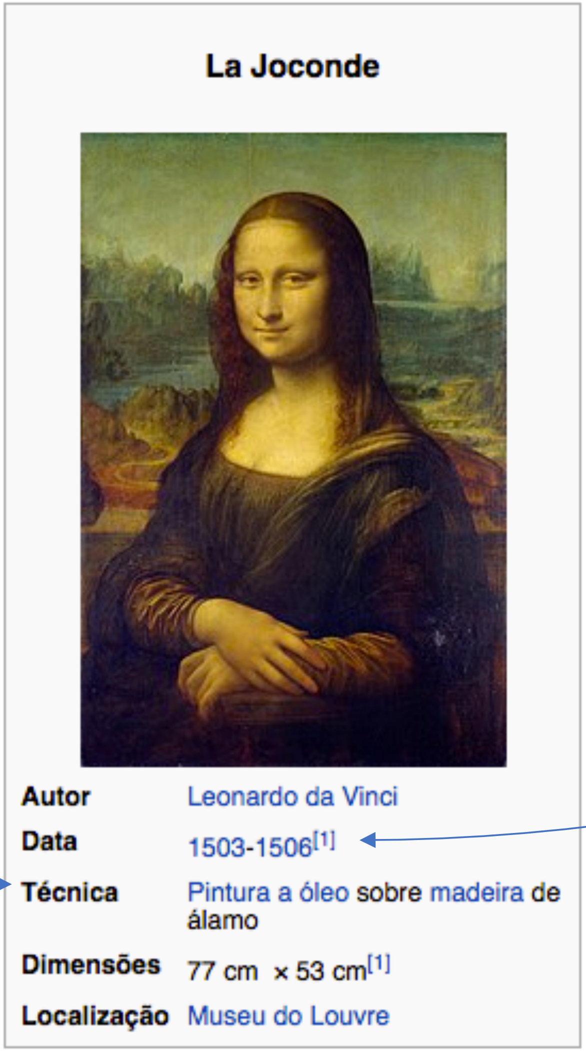
Valores

Google Knowledge Graph

Reflexões iniciais...

Propriedades

Valores



La Joconde

Autor	Leonardo da Vinci
Data	1503-1506[1]
Técnica	Pintura a óleo sobre madeira de álamo
Dimensões	77 cm × 53 cm[1]
Localização	Museu do Louvre

Wikipedia Infobox

Reflexões iniciais...

Como a ideia de dados organizados se relaciona com as abstrações conceituais relacionadas a ideia de informação?

De que maneira é importante pensarmos sobre isso para refletir de modo crítico no tipo de trabalho que envolve a produção e gestão de metadados?

JIS

The wisdom hierarchy: representations of the DIKW hierarchy

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Abstract.

This paper revisits the data–information–knowledge–wisdom (DIKW) hierarchy by examining the articulation of the hierarchy in a number of widely read textbooks, and analysing their statements about the nature of data, information, knowledge, and wisdom. The hierarchy referred to variously as the 'Knowledge Hierarchy', the 'Information Hierarchy' and the 'Knowledge Pyramid' is one of the fundamental, widely recognized and 'taken-for-granted' models in the information and knowledge literatures. It is often quoted, or used implicitly, in definitions of data, information and knowledge in the information management, information systems and knowledge management literatures, but there has been limited direct discussion of the hierarchy. After revisiting Ackoff's original articulation of the hierarchy, definitions of data, information, knowledge and wisdom as articulated in recent textbooks in information systems and knowledge management are reviewed and assessed, in pursuit of a consensus on definitions and transformation processes. This process brings to the surface the extent of agreement and dissent in relation to these definitions, and provides a basis for a discussion as to whether these articulations present an adequate distinction between data, information, and knowledge. Typically information is defined in terms of data, knowledge in terms of information, and wisdom in terms of knowledge, but there is less consensus in the description of the processes that transform elements lower in the hierarchy into those above them, leading to a lack of definitional clarity. In addition, there is limited reference to wisdom in these texts.

Keywords: DIKW hierarchy; wisdom hierarchy; wisdom; knowledge management; wisdom management

1. Introduction

The data–information–knowledge–wisdom hierarchy (DIKW), referred to variously as the 'Knowledge Hierarchy', the 'Information Hierarchy' and the 'Knowledge Pyramid' is one of the fundamental, widely recognized and 'taken-for-granted' models in the information and knowl-

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Reflexões iniciais...

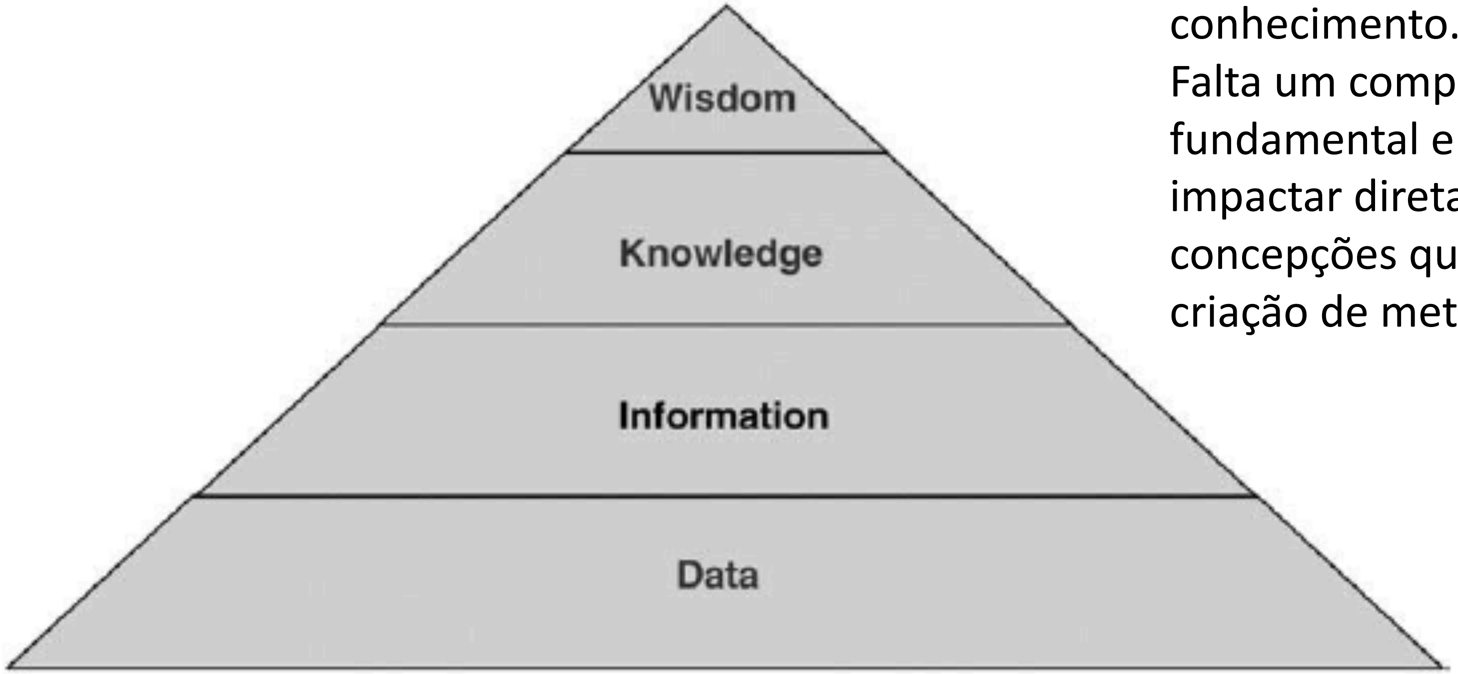

Fig. 1. The DIKW hierarchy.

Uma perspectiva que ”naturaliza” a ideia de que dados levam a conhecimento.
Falta um componente fundamental e que vai impactar diretamente nas concepções que levarão a criação de metadados...

Reflexões iniciais...

É a cultura que dá o contexto e contorno da visão de mundo em torno dessas abstrações conceituais.

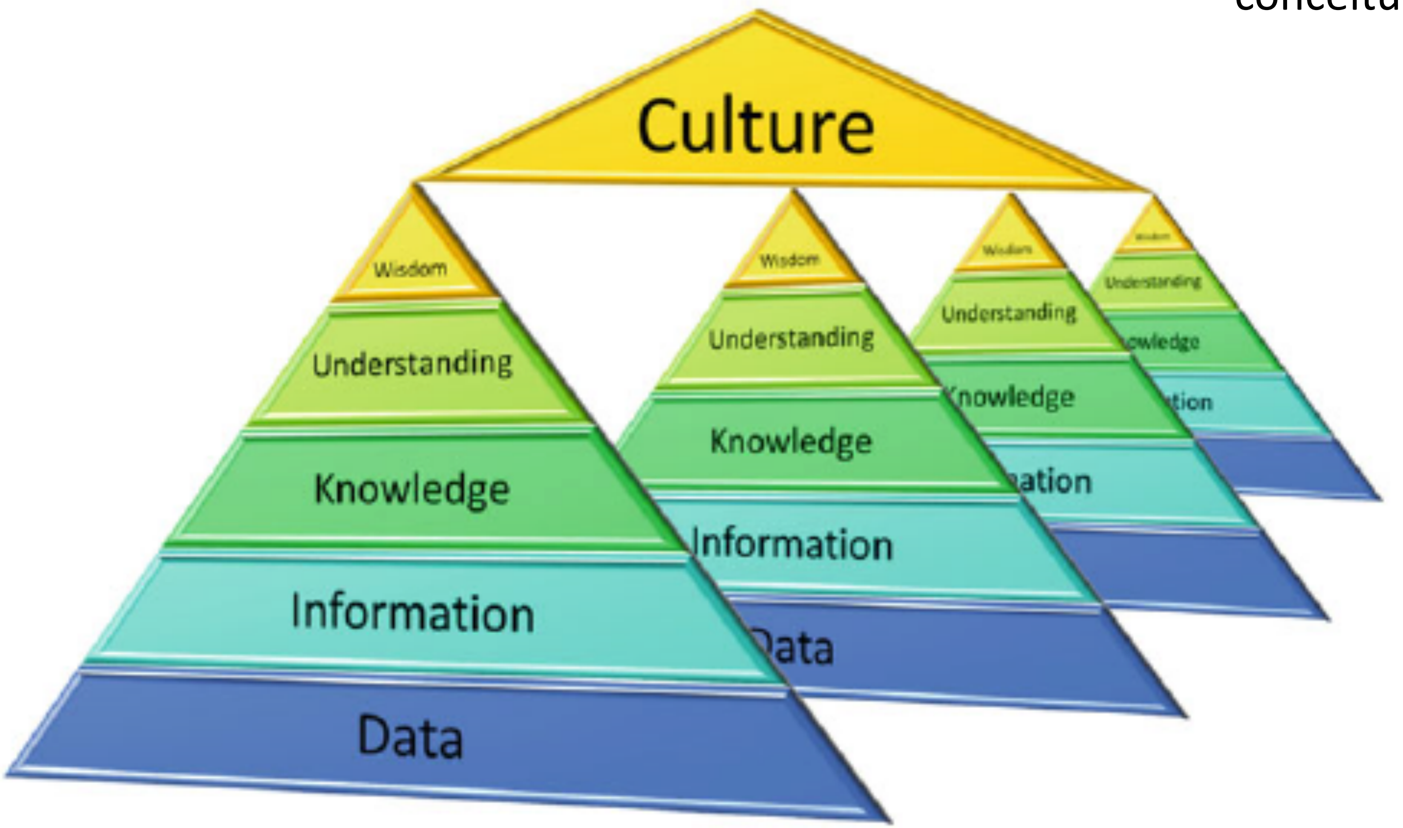

Fig. 1.6 Ackoff's Pyramid topped by a layer for culture

Reflexões iniciais...

As várias formas de se compreender a passagem entre essas etapas conceituais...

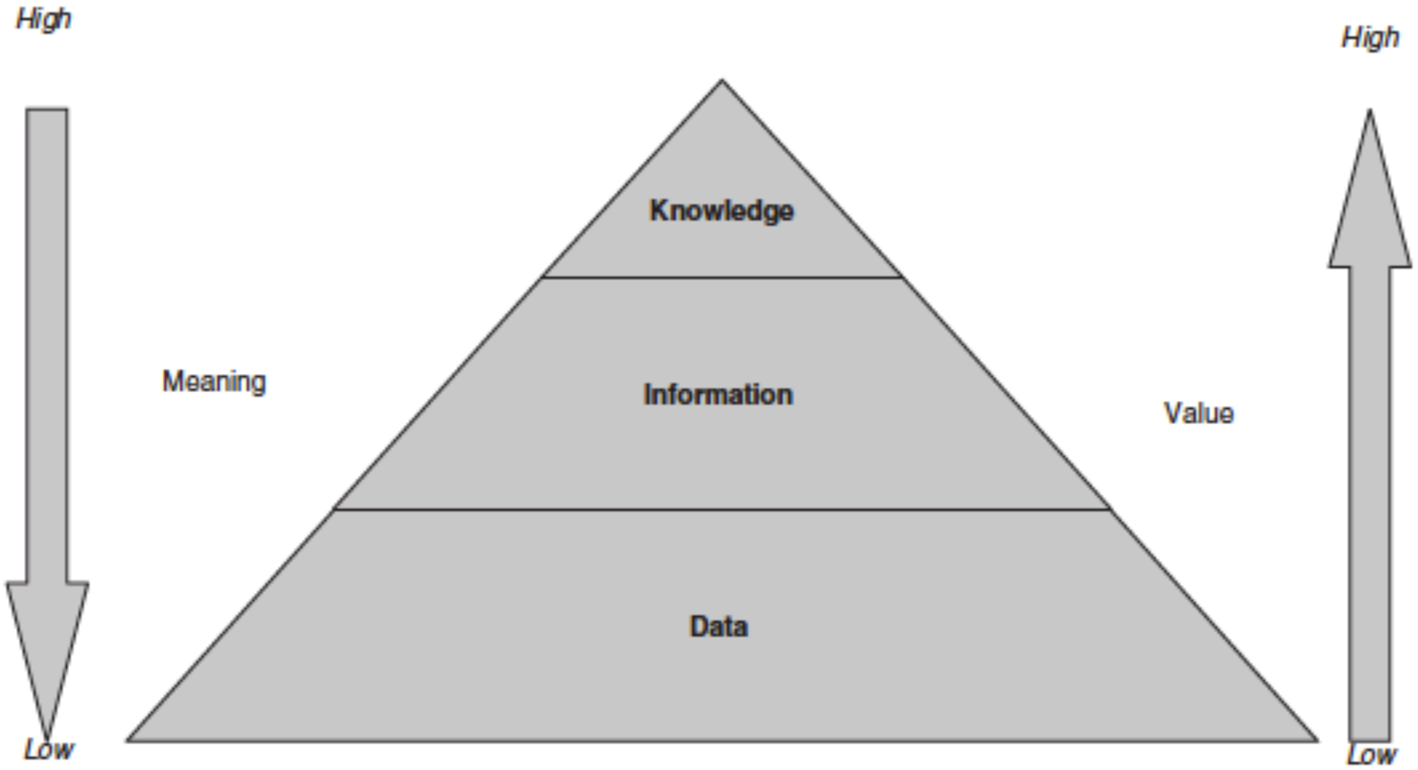

Fig. 2. Data, information and knowledge, according to Chaffey and Wood [37].

Reflexões iniciais...

As várias formas de se compreender a passagem entre essas etapas conceituais...

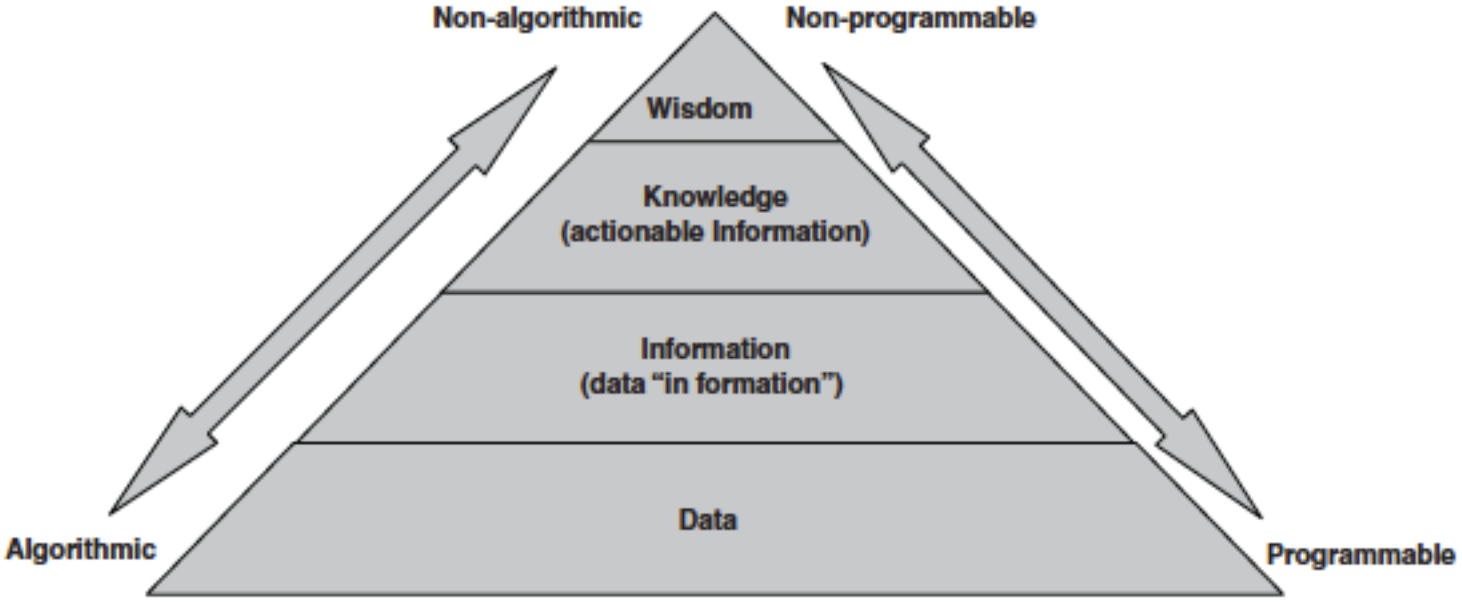

Fig. 3. Data, information and knowledge, according to Awad and Ghaziri [20].

Reflexões iniciais...

As várias formas de se compreender a passagem entre essas etapas conceituais...

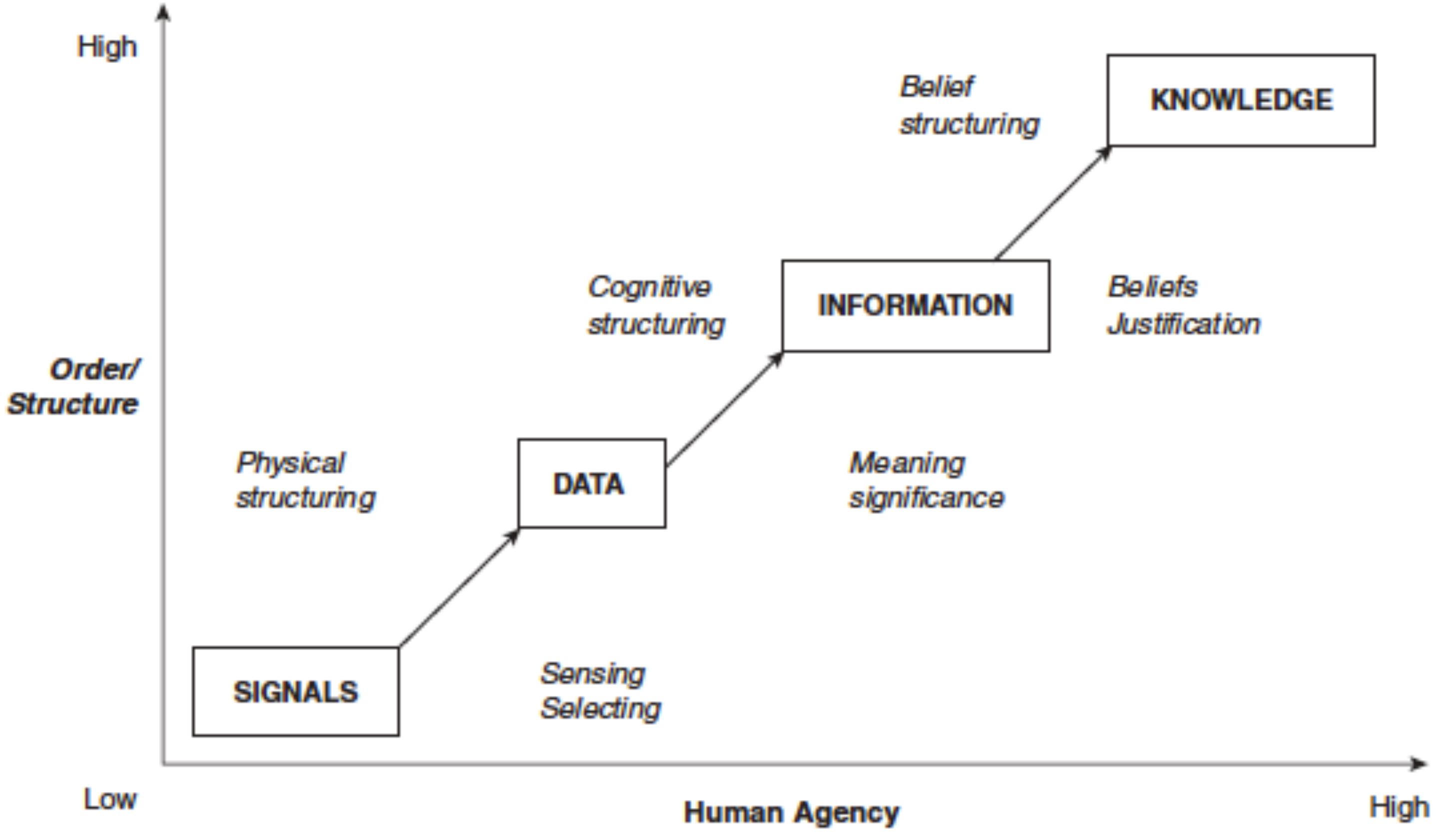

Fig. 4. Data, information and knowledge, according to Choo [25].

Reflexões iniciais...

5.2. *Defining data*

Where definitions of data are offered these are typically clearly and succinctly stated, sometimes with examples. In summary the definitions variously suggest that:

- Data has no meaning or value because it is without context and interpretation [27, 40–42].
- Data are discrete, objective facts or observations, which are unorganized and unprocessed, and do not convey any specific meaning [20, 37, 38, 41].
- Data items are an elementary and recorded description of things, events, activities and transactions [43–45].

Choo [25] suggests that data are often elements of larger physical systems (such as books, or instrument panels) which give clues about what data to notice and how they should be read.

Reflexões iniciais...

5.3. Defining information

Information systems books tend to focus on the relationship between data and information, often defining information in terms of data. The concepts of format, structure, organization, meaning and value feature in the various definitions:

- 'Information is formatted data [...(and)] can be defined as a representation of reality' [40, p. 7].
- 'Information is data which adds value to the understanding of a subject' [37, p. 223 based on the European Framework for Knowledge Management].
- 'Information is data that have been shaped into a form that is meaningful and useful to human beings' [43, p. 13].
- 'Information is data that have been organized so that they have meaning and value to the recipient' [44, 45].
- 'Information is data processed for a purpose' [46, p. 3].

Bocij et al. [41] concur with the findings that there are a number of definitions of information in common use, which they suggest are:

- data that have been processed so that they are meaningful;
- data that have been processed for a purpose; and
- data that have been interpreted and understood by the recipient.

Reflexões iniciais...

5.4. Defining knowledge

Definitional statements on knowledge are often much more complex than those for data or information. Indeed a number of the knowledge management texts offer extended definitional discussions on the nature of knowledge, its various representations and manifestations, and philosophical debates on the nature of knowledge. These debates make it more difficult to distil the essence of the statements on the nature of knowledge than it is to capture and represent the definitional statements that relate to data and information. Indeed, as some texts opine:

- 'Knowledge is an intrinsically ambiguous and equivocal term' [49, p. 3].
- 'There is still no consensus on the nature of knowledge, except that it is based on perception that can provide a rational justification for it' [39, pp. 16–17].

Six of the information systems books offer definitional statements in relation to knowledge, frequently defining knowledge in terms of data and information. For example:

- 'Knowledge is the combination of data and information, to which is added expert opinion, skills, and experience, to result in a valuable asset which can be used to aid decision making' [37, p. 223, quoting the European Framework for Knowledge Management].
- 'Knowledge is data and/or information that have been organized and processed to convey understanding, experience, accumulated learning, and expertise as they apply to a current problem or activity' [44, p. 38].
- 'Knowledge builds on information that is extracted from data [...] While data is a property of things, knowledge is a property of people that predisposes them to act in a particular way' [45, p. 9].

Reflexões iniciais...

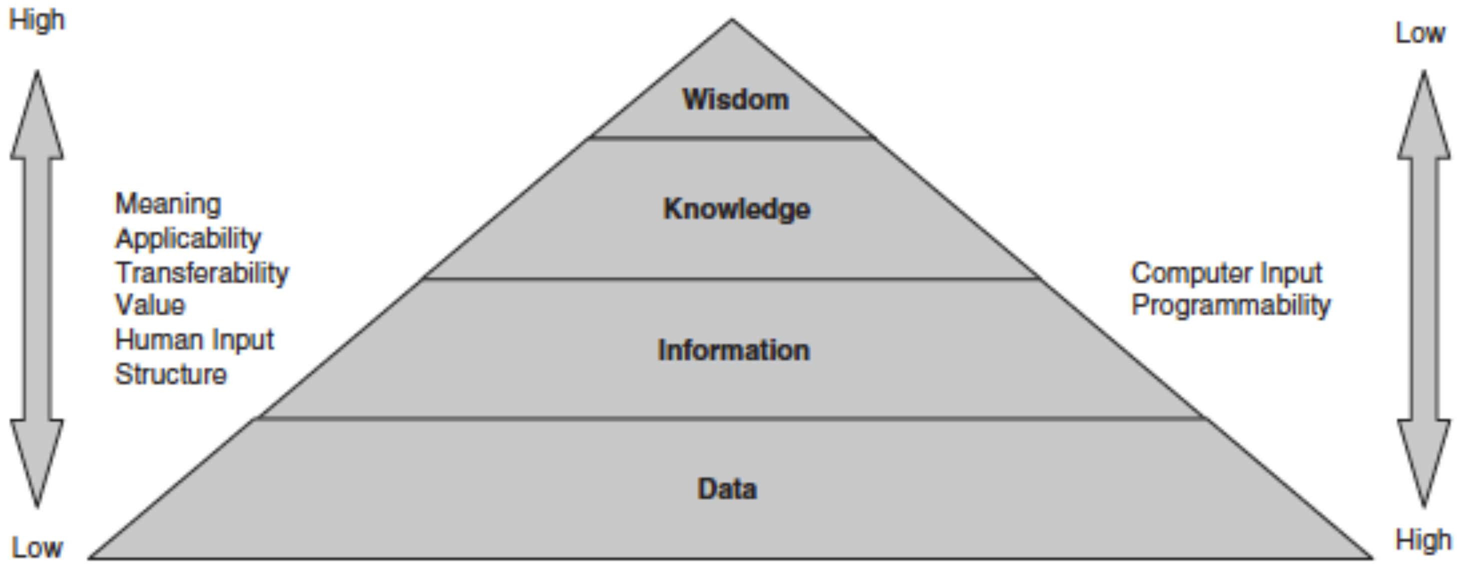

Fig. 6. The wisdom hierarchy.

Reflexões iniciais...

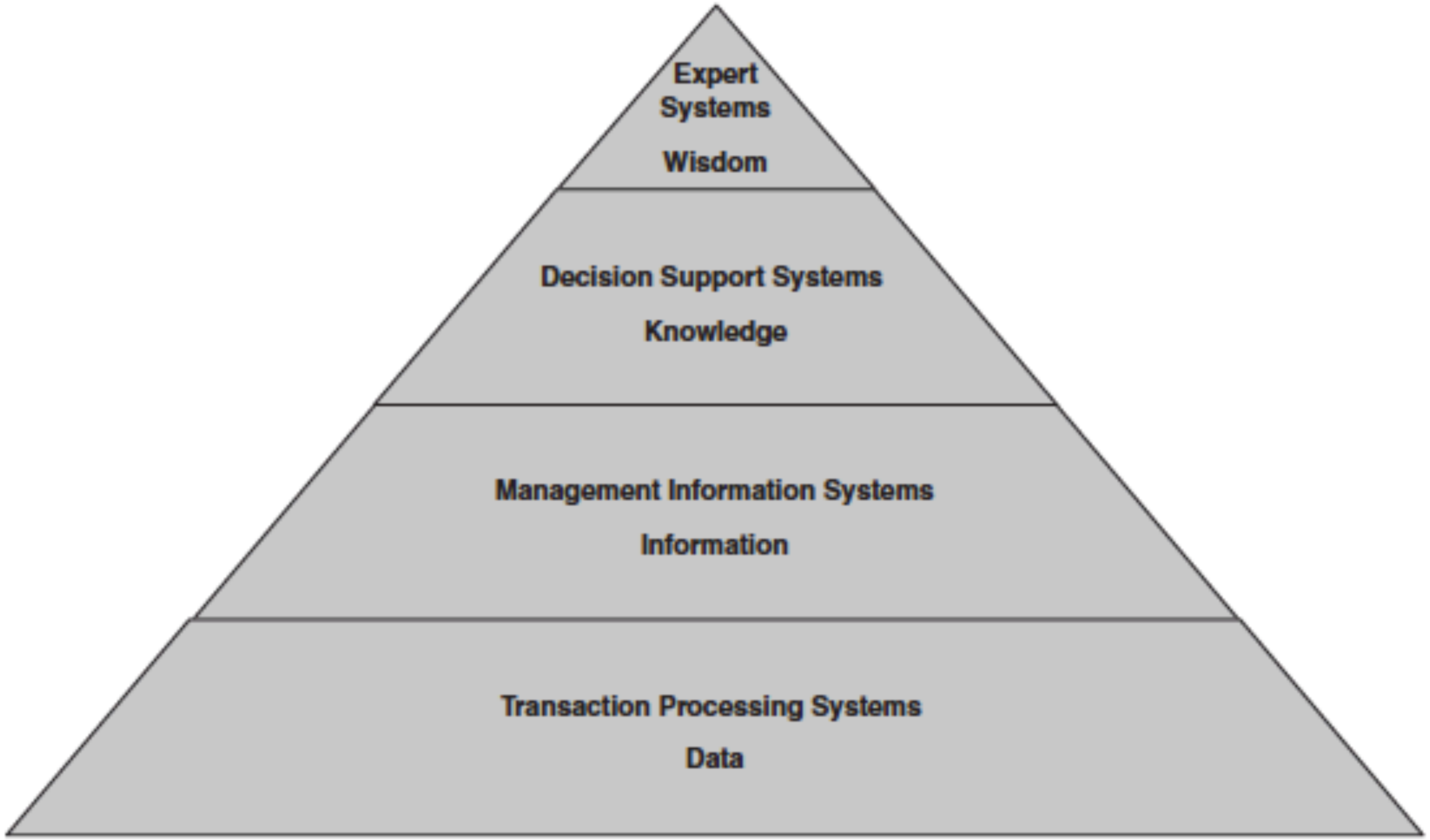

Fig. 7. The wisdom hierarchy mapping to types of information systems.

A cada etapa desse processo, estrutura é acrescentada visando sistematizar e organizar os dados em direções que levem a maior capacidade de usá-los em diferentes contextos.

O objetivo principal dos metadados é suportar estruturalmente esse processo de organização dos dados. Sem eles, torna-se impossível manipular a informação.

Reflexões iniciais...

- A estrutura, codificada na descrição das características dessas entidades informacionais, é o que chamaremos de “metadados”
- Indivíduos, organizações, empresas, comunidades enfrentam a tarefa de organizar uma massa cada vez maior de dados digitais (externos e internos aos seus sistemas de informação) antes de poderem:
  - Pesquisar e descobrir informações;
  - Localizar;
  - Usar;
  - Reutilizar.

Reflexões iniciais...

- Os metadados surgiram para realizar as seguintes funções (National Information Standards Organization, 2004):
  - Descrever que recursos representam e sobre o que eles são, além de organizá-los segundo critérios controláveis;
  - Permitir os recursos serem encontrados por critérios de relevância, agregando similares e fornecendo caminhos para a localização dos recursos desejados;
  - Facilitar a troca de metadados e permitir a interoperabilidade;
  - Fornecer identificação digital e descrição para arquivamento e preservação dos recursos.

Definições

- A definição mais simples de metadado é “dado sobre dado” (NISO, 2004) ou “informação sobre informação”;
- Os metadados vêm sendo utilizados em diferentes contextos para referenciar informação sobre coisas específicas (alguns exemplos restritos ao mundo da CI):
  - Catálogos de materiais publicados;
  - Catálogos de obras em exposição num museu;
  - Dicas de ajuda para busca em material de arquivo;
  - Índices de revistas científicas.
- Em termos gerais, **metadados encapsulam a informação que descreve QUALQUER entidade informacional.**

Definições

- American Library Association Committee on Cataloging: Description and Access (CC:DA, 2000):
  - “Metadados são dados estruturados e codificados de maneira a descrever as características de entidades informacionais, viabilizando a identificação, descoberta, avaliação e gestão dessas entidades.”
- Conforme a pesquisa e aplicação sobre metadados evoluiu, sua definição foi refinada para:
  - “informação estruturada que descreve, explica, localiza e facilita a recuperação, uso e gestão de recursos informacionais” (NISO, 2004)
  - “dados associados com sistemas de informação ou um objeto informacional para os propósitos de descrição, administração, requisitos legais, funcionalidades técnicas, uso, reuso e preservação”

Definições

"Metadados são descrições de dados armazenados em um banco de dados [...]"

(SOUZA; CATARINO; SANTOS, 1997, p.02)

"[...] informação descritiva sobre o contexto, qualidade, condição ou características de um recurso, dado ou objeto que tem a finalidade de facilitar sua recuperação, autenticação, evolução, preservação ou interoperabilidade.

(SENSO; ROSA PIÑERO, 2002, p. 99)

"[...] dados estruturados que descrevem as características de um recurso de informação."

(TAKAHASHI, 2000, p.172)

"[...] conjunto de dados chamados de elementos, cujo número é variável de acordo com o padrão, e que descreve o conteúdo de um recurso, possibilitando a um usuário ou a um mecanismo de busca acessar e recuperar esse recurso. [...]

(GRÁCIO, 2002, p. 21)

"[...] Esses elementos descrevem informações do tipo nome, descrição, localização, formato, entre outras, que possibilitam um número maior de campos para pesquisas."

(GRÁCIO, 2002, p. 21)

"[...] também dados, mas dados representacionais, que acrescentado a própria informação adquirem um valor semântico para substituí-la ou representá-la"

(BERNERS-LEE , 2000, p. 225 apud MÉNDEZ RODRÍGUEZ, 2002, p. 30).

Dados sobre catalogação e indexação, criados para: identificar, localizar, organizar, recuperar e tornar mais acessível a informação.

(GILLILAND-SWETLAND, 1999).

Tipos e funções

- 05 tipos:
  - Administrativos
  - Descritivos
  - Preservação
  - Técnicos
  - Uso

http://www.getty.edu/publications/intrometadata/

Tipos e funções

Table 2. Different Categories of Metadata and Their Functions

Category	Definition	Example
Administrative	Metadata used in managing and administering collections and information resources	• Acquisition and appraisal information • Rights and reproduction tracking • Documentation of legal, cultural, and community-access requirements and protocols • Location information • Selection criteria for digitization • Digital repatriation documentation

https://www.getty.edu/publications/intrometadata/setting-the-stage/

Tipos e funções

Descriptive	Metadata used to identify, authenticate, and describe collections and related trusted information resources	• Metadata generated by original creator and system • Submission-information package • Cataloging records • Finding aids • Version control • Specialized indexes • Curatorial information • Linked relationships among resources • Descriptions, annotations, and emendations by creators and other users

https://www.getty.edu/publications/intrometadata/setting-the-stage/

Tipos e funções

Preservation	Metadata related to the preservation management of collections and information resources	• Documentation of physical condition of resources • Documentation of actions taken to preserve physical and digital versions of resources (e.g., data refreshing and migration) • Documentation of any changes occurring during digitization or preservation

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Tipos e funções

Technical	Metadata related to how a system functions or metadata behaves	• Hardware and software documentation • System-generated procedural information (e.g., routing and event metadata) • Technical digitization information (e.g., formats, compression ratios, scaling routines) • Tracking of system-response times • Authentication and security data (e.g., encryption keys, passwords)

https://www.getty.edu/publications/intrometadata/setting-the-stage/

Tipos e funções

Use	Metadata related to the level and type of use of collections and information resources	• Circulation records • Physical and digital exhibition records • Use and user tracking • Content reuse and multiversioning information • Search logs • Rights metadata

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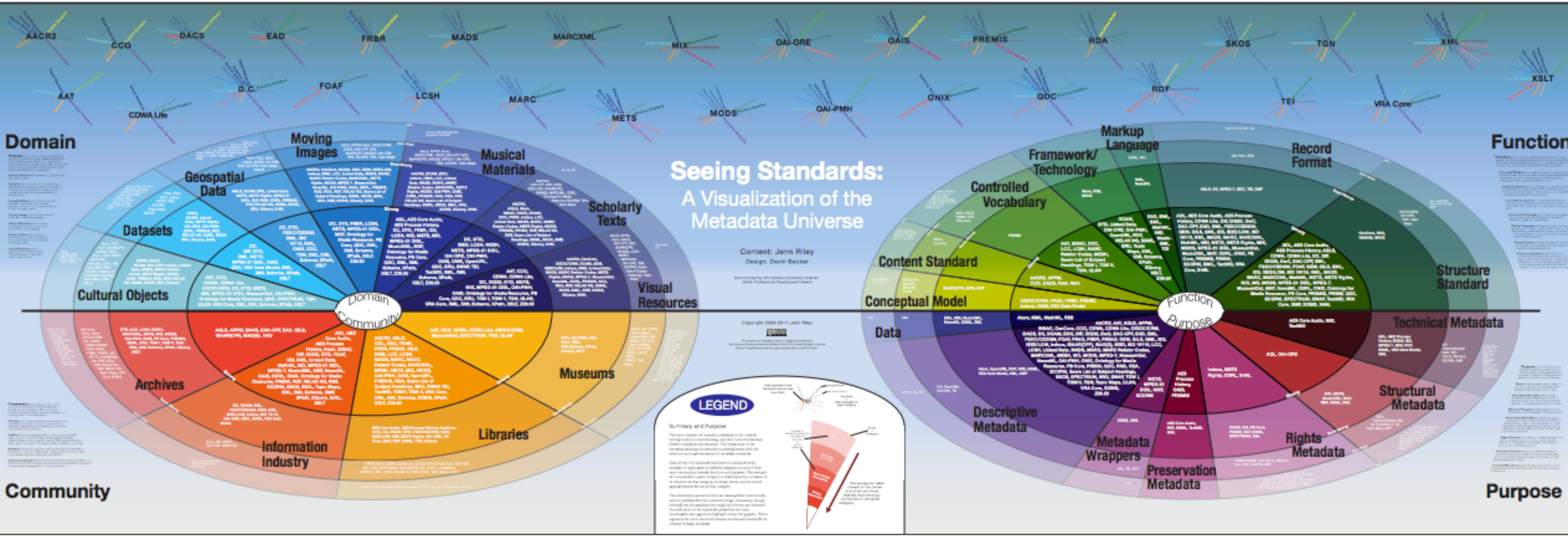
O uso dos metadados

- Organizar recursos informacionais e fornecer serviços para recuperação e uso é um processo complexo que requer vários tipos de metadados para diferentes propósitos e funções;
- Todo objeto informacional, não importando se na sua forma física ou intelectual, possui 3 características chave:
  - Conteúdo (o que o objeto contém ou sobre o que ele é);
  - Contexto (quem, o que, por que e como – aspectos ligados a criação do objeto)
  - Estrutura (o conjunto formal de associações dentro e/ou entre objetos informacionais)
- É fundamental que essas 3 características sejam refletidas pelos tipos e formatos de metadados utilizados.

Padrões

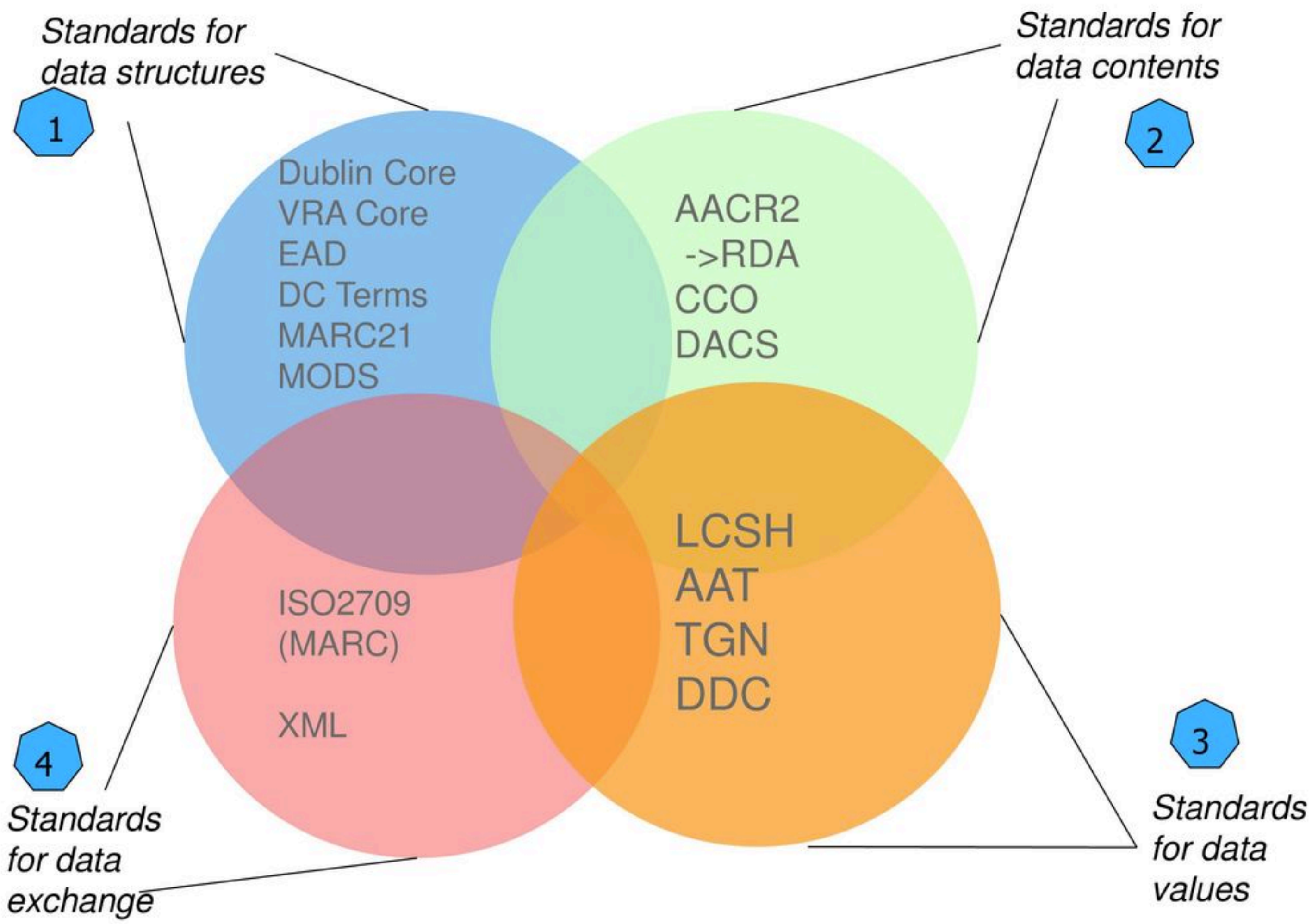


http://jennriley.com/metadatamap/

Tipos de Padrões

- 4 tipos:
  - Padrões para estrutura de dados:
    - Normalmente, é referenciado como o conjunto de elementos (os campos de metadados de um padrão). Definem a estrutura e a semântica.
  - Padrões para conteúdo dos dados:
    - São guias de práticas para a geração e catalogação. Formas sintáticas de preencher os campos. São as regras de catalogação. Ex: forma de se escrever uma data.
  - Padrões para comunicação de dados:
    - São os formatos de codificação dos metadados. Os elementos necessários para codificação computacional e comunicação entre diferentes sistemas de informação. Ex: XML, RDF, JSON.
  - Padrões para valores dos dados:
    - São os vocabulários controlados. As linguagens documentárias.

Tipos de Padrões (ex)



Tipos de Padrões (ex)

Table 1. A Typology of Data Standards

Type	Examples
Data *structure* standards (metadata element sets, schemas). These are "categories" or "containers" of data that make up a record or other information object.	MARC (Machine-Readable Cataloging) Format, Encoded Archival Description (EAD), BIBFRAME (Bibliographic Framework), Dublin Core Metadata Element Set, Categories for the Description of Works of Art, VRA Core
Data *value* standards (controlled vocabularies, thesauri, controlled lists). These are the terms, names, and other values that are used to populate data structure standards or metadata element sets.	Library of Congress Subject Headings, Name Authority File, and Thesaurus for Graphic Materials; Getty Art & Architecture Thesaurus, Union List of Artist Names (ULAN), and Thesaurus of Geographic Names; ICONCLASS; Medical Subject Headings
Data *content* standards (cataloging rules and codes). These are guidelines for the format and syntax of the data values that are used to populate metadata elements.	Anglo-American Cataloguing Rules, Resource Description and Access, International Standard Bibliographic Description, Cataloging Cultural Objects, Describing Archives: A Content Standard
Data *format/technical interchange* standards (metadata standards expressed in machine-readable form). This type of standard is often a manifestation of a particular data structure standard (see above), encoded or marked up for machine processing.	Resource Description Framework, MARC21, MARCXML, EAD XML DTD, METS, BIBFRAME, LIDO XML, Simple Dublin Core XML, Qualified Dublin Core XML, VRA Core 4.0 XML

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Princípios de construção de metadados

- Modular:
  - Permite a criação de metadados em blocos, ou seja, elementos de dados, vocabulários controlados, padrões sintáticos, entre outros, podem ser compostos para construir um bom metadado;
- Extensível:
  - Refere-se a habilidade do padrão de fornecer um conjunto de elementos mínimos para catalogação de um tipo de informação, mas permitindo esses elementos serem extendidos conforme necessidades específicas de uma comunidade de usuários;
- Refinar:
  - Refere-se a habilidade de refinar elementos para a descrição de detalhes mais específicos de uma característica informacional;
- Multilíngue:
  - Pode ser utilizado em várias linguagens simultaneamente;
- Interoperável:
  - Refere-se a habilidade de vários sistemas de informação poderem utilizar os mesmos dados.

Características dos metadados

- Podem ser observados pelas características:
  - Origem;
  - Método de criação;
  - Natureza;
  - Estrutura;
  - Situação;
  - Semântica;
  - Nível.

Características dos metadados

Table 3. Attributes and Characteristics of Metadata

Attribute	Characteristics	Examples
Source of metadata	Internal metadata generated by the creating agent for an information object at the time when it is first created or digitized Metadata intrinsic to an item or work	File names and header information Directory structures File format and compression scheme A title or inscription added to an artwork by its creator A title or subtitle on the title page of a manuscript or printed book
	External metadata relating to an original item or information object; this is generated after the object is first created or digitized, often by someone other than the original creator	URLs, URIs, PURLs, and other digital statements of provenance and online "location" "Tracked" changes Registrarial and cataloging records Rights and other legal information

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Características dos metadados

Method of metadata creation	Automatic creation, capture, or inferencing of metadata	Keyword indexes User-transaction logs Audit trails Descriptions of documentary interrelationships and intradocument relationships
	Manual creation of metadata by information specialists	Descriptive metadata such as catalog records, finding aids, and specialized indexes
	Manual or automatic creation of metadata during digitization processes	
	Individual user-contributed or crowd-sourced metadata	

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Características dos metadados

Nature of metadata	Nonexpert metadata created by persons who are not subject or community specialists or information professionals (e.g., the original creator of the information object or a folksonomist)	Title HTML tags and meta tags created for a personal web page Personal filing systems Folksonomies
	Expert metadata created by subject or community specialists and/or information professionals, often not the original creator of the information object	Specialized subject headings Bibliographic records Archival finding aids Catalog entries for museum objects Ad hoc metadata created by subject experts (e.g., tags added to an information object or catalog record by subject experts)

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Características dos metadados

Structure	Structured metadata that conforms to a predictable standardized or proprietary structure	MARC, BIBFRAME, TEI, EAD, LIDO, local database formats
	Unstructured metadata that does not conform to a predictable structure	Unstructured note fields and other free-text annotations

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Características dos metadados

Status	Static metadata that does not or should not change once it has been created	Technical information such as the date(s) of creation and modification of an information object, how it was created, file size
	Dynamic metadata that may change with use, manipulation, or preservation of an information object	Directory structure User-transaction logs
	Long-term metadata necessary to ensure that the information object continues to be accessible and usable	Technical format and processing information Rights information Preservation management documentation
	Short-term metadata, mainly of a transactional nature	Interim location information
	Legacy metadata	Metadata created using an earlier system of metadata scheme

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Características dos metadados

Semantics	Controlled metadata that conforms to a standardized vocabulary or authority form and that follows standard content (i.e., cataloging) rules	LCSH, LCNAF, AAT, ULAN, TGM, TGN AACR, RDA, DACS, CCO
	Uncontrolled metadata that does not conform to any standardized vocabulary or authority form	Free-text notes User-created tags

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Características dos metadados

Level	Collection-level or group-level metadata relating to collections or groupings of original items and/or information objects	Collection- or group-level record (e.g., a bibliographic record for a group or collection of items; a finding aid for an intact archival collection) Series- or group-level information in a bibliographic record, finding aid, or museum collection record
	Item-level or within-item-level metadata relating to individual items and/or information objects, often contained within collections	Catalog records for individual bibliographic items or unique cultural objects Transcribed image captions and dates "Tombstone" information for works of art and material culture Format information

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E como isso está sendo usado pelas bibliotecas mundo afora?

Já é algo consolidado ou que ainda demanda pesquisa, formação, desenvolvimento de práticas, processos de trabalho, etc...?

Journal of Library Metadata, 9:173–193, 2009

ISSN: 1938-6389 print / 1937-5034 online
DOI: 10.1080/19386380903405074

Routledge
Taylor & Francis Group

Metadata Decisions for Digital Libraries: A Survey Report

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A survey on metadata conducted at the end of 2007 received over 400 answers from 49 countries all over the world. It helped the authors to identify major issues and concerns regarding metadata that should be addressed in the IFLA Guidelines for Digital Libraries. The questionnaire included a question of the roles respondents may have, and five questions of the major concerns in any project that relates to metadata, regarding design and planning of digital projects, element set standards, data contents in a record, authority files and controlled vocabularies, and metadata encoding. Findings from the survey are reported and a workflow chart is included in this paper.

KEYWORDS *metadata decisions, survey on metadata, metadata workflow, IFLA Guidelines for Digital Libraries*

DATA COLLECTING

The authors created a questionnaire to identify major issues and concerns regarding metadata that should be addressed in the chapter on metadata in the *IFLA Guidelines for Digital Libraries*. It included

1. a question of the roles respondents may have and
2. five main questions of the major concerns in any project that relates to metadata regarding
   - design and planning of digital projects
   - element set standards (data structure decision)
   - data contents in a record (data content decision)
   - authority files and controlled vocabularies (data value decision), and
   - metadata encoding (data format/technical interchange decision)

TABLE 2 Major Concerns Related to Designing and Planning of Digital Library Projects (324 Answered, Each Respondent Could Choose All that Apply)

Concern	Response %	Response #
above 50%		
to understand possible workflows	58.30	189
to consider reusing existing cataloging records by integrating them or transforming them to other formats, e.g., MARC to DC, a local format to EAD, etc., or any other variation in the new project	58.30	189
to plan how search functions can be supported by metadata information	56.80	184
to explore how to include various types of resources (print, web pages, images, etc.) in one project	50.60	164
above 40%		
to learn how to measure and control metadata quality	49.40	160
to decide upon levels of description (e.g., item level, collection level)	47.80	155
to find if any metadata exist already in the objects themselves that could be extracted automatically and what tools are available for this	43.50	141
to understand types of metadata (e.g., descriptive, administrative, structural, preservation, rights metadata)	43.50	141
to see examples from similar projects	41.00	133
above 30%		
to plan how metadata records will be linked with authority records	39.80	129
to plan how the metadata describing a physical object will be associated with the metadata for its digital version	38.60	125
to understand the mechanisms of harvesting protocols	36.70	119
to understand the value of controlled vocabularies	32.70	106
to understand and adopt an abstract model (e.g., Dublin Core Abstract Model, FRBR conceptual model, CCO entity-relationship model)	31.50	102

TABLE 3 Major Concerns Regarding Decisions About Data Structure (303 Answered, Each Respondent Could Choose All that Apply)

Concern	Response %	Response #
to decide which metadata standard to use	62.40	189
to learn how to use different metadata schemes together in one project	59.40	180
to understand what factors influence the decision on which metadata standard to use, e.g., what sort of material they are good for	58.70	178
to find out what standards are available	47.90	145
to understand what sorts of adjustments might be made to a standard metadata schema that could result in a separate schema and/or application profile	42.60	129
to learn how to create crosswalks	41.60	126
to decide whether an application profile should be developed	33.00	100

TABLE 4 Major Concerns Regarding Decisions About Data Content (292 Answered, Each Respondent Could Choose All that Apply)

Concern	Response %	Response #
to decide which core elements should be included in all records (e.g., is RIGHTS information required), which elements are mandatory, and which are repeatable	71.90	210
to provide guides in order to ensure that metadata values will be entered consistently (e.g., for DATE, FORMAT information)	68.50	200
to decide which elements (e.g., SUBJECT, CREATOR) should use a controlled vocabulary/authority file	66.10	193
to find existing data content (i.e., cataloging) standards and best practice guides (e.g., Anglo-American Cataloging Rules (AACR), Cataloging Culture Objects (CCO), Describing Archives: A Content Standard (DACS), etc.)	53.10	155
to learn how to provide correct information in a record (e.g., where to find TITLE information from a Web site, what are the IDENTIFIERs, how many IDENTIFIERs should be included, etc.)	51.00	149

TABLE 5 Major Concerns Regarding Decisions About Data Values (274 Answered, Each Respondent Could Choose All that Apply)

Concern	Response %	Response #
to decide whether to use existing controlled vocabularies or authority files (e.g., LCSH, ULAN [The Union List of Artist Names], LC Authorities)	64.60	177
to develop controlled vocabularies (including controlled lists, taxonomies, thesauri, etc.)	53.30	146
to maintain our own authority files and controlled vocabularies	48.90	134
to establish our own authority files for names	35.00	96

TABLE 6 Major Concerns Regarding Decisions About Data Format and Technical Interchange (272 Answered, Each Respondent Could Choose All that Apply)

Concern	Response %	Response #
to learn about available tools for encoding and converting records	79.40	216
to understand what are the universal or widely used encoding formats	67.60	184
to see examples of encoded records	60.30	164

digital collections and digital libraries around the world. It is important for all digital library developers to recognize that metadata element sets, content standards, and value-encoding schemes are created with the intent of guiding and ensuring the construction of high-quality metadata records. This will guarantee the correct implementation of metadata standards and will support digital library functions. These building blocks need to be used in the construction of efficient and functional information architecture through metadata services and technologies.