

Definitions

The central concepts used in this monograph, including the ones displayed in Sect. 1.7, are defined below.

Aboutness. Fundamentally, the concept refers to ‘what’ an *information object*, text, image, etc. is about (i.e. the topic it discusses), and the ‘who’ deciding the ‘what’. Several definitions exist. In this book, aboutness is not an inherent feature of a document, but dependent on the *cognitive actor(s)* who determines the ‘what’ during the acts of interpretation and representation in a time-space continuum.

Actor, see *Cognitive Actor*

Affective Relevance. A assessment of emotional nature of *information objects* made by a seeking *cognitive actor* in strong association with subjective relevance types, such as, *topicality*, *pertinence*, *situational relevance* and, to an extend, *socio-cognitive* relevance.

Algorithmic Relevance. An objective assessment made by a retrieval algorithm, resulting in a calculated retrieval status value (RSV) for ranked output of the search engine. It refers to the degree of match between the *query* and a retrieved object as determined by the *retrieval model*.

Author Aboutness. The *aboutness* determined by the author(s) of *information objects* through natural language and other means of representation. For instance, the full document as well as author-generated abstract reflects author aboutness. See also *indexer aboutness*.

Bibliographic Relevance. That kind of *relevance* for which the relevance assessment is based on representations of metadata (catalogue records) of information objects, i.e., title and subtitle, author, publisher, year, small contents description (note), class code(s), a few descriptors, and alike restricted metadata.

Categorial Classification. The categorization of objects of any kind in a hierarchical and abstract manner, e.g., by means of generic or part-whole relationships. For example, a *cognitive actor* chooses ‘tools’ to cover hammer and saw. Related to *situational classification*.

Cognitive Actor. A person responsible for the interpretation or provision of *potential information* or signs represented as *information objects*, *IT*, *interface* functionalities and during communication. Central actor categories in IS&R are: searchers or seekers; authors; indexers; algorithmic system designers; interface designers; selectors, such as publishers, editors, employers.

Cognitive and Emotional Work Task Knowledge. See *Work Task Knowledge*.

Cognitive IS&R Framework. The research framework (or model) for studying IS&R phenomena based on the holistic *cognitive viewpoint*. It consists of five central components: *information seeker(s)*; *interface*; social-organizational *context*; *IT*; *information objects* –connected by *information interaction*.

Cognitive Model. A model possessed by a *cognitive actor* itself representing its *state of knowledge*, such as cognition, expectations, emotions, intentionality, experiences, imagination, intuition, values, and its environment, and consisting of *declarative* and *procedural knowledge* in the form of *cognitive structures*. Cognitive models can be implemented into information processing devices. See also *knowledge*.

Cognitive Structures. The system of categories and concepts that, for an information-processing device –whether human or machine –constitute his/its model of the world, i.e., the *knowledge* and *emotional state* of the *cognitive actor* or device. Used for knowledge structures. At any given point in time, the current cognitive structures, including emotions, are determined by the actor and its/his/her socio-organizational experiences, education, etc., in context. See also *Principle of complementary social and cognitive influence in IS&R* and *cognitive model*.

Cognitive Viewpoint. An epistemological holistic view whose central point is that any processing of *information*, whether perceptual or symbolic, is mediated by a system of categories or concepts which, for the information processing device, are a model of his/its world –whether the device is a human or a machine. According to this view, the ‘world model’ consists of *cognitive structures* (or knowledge structures) including emotions, which are determined by the individual and its social/collective experiences, education, etc. in social/organizational/cultural and systemic *contexts*. The cognitive viewpoint is born out of investigations of human mental behavior; computers (and their behavior) are seen as non-semantic manifestations or simulations of certain human mental processes, but not all.

Cognitivism. The epistemological view that the brain is (regarded as similar to) a digital computer and that the human mind is (regarded as similar to) a computer program. According to this view, and in contrast to the *cognitive viewpoint*, the thinking process is information processing, that is, symbol manipulation only, and human mental activities are carried out as if they are processed in computers. Cognitivism does not claim, unlike the related position of ‘strong AI’, that computers have feelings and thoughts.

Complementarity Principle, see *Principle of complementary social and cognitive influence in IS&R.*

Concept. Perceived regularities in events or objects as designated by a sign or symbol.

Conceptual Domain Knowledge. See *Domain Knowledge.*

Context. In IS&R *actors* and objects associated with each component of the *cognitive IS&R framework* function as context for their own elementary *cognitive structures* (intra-object context), as context to one another (inter-object context), and in context of the interaction processes between framework components, which themselves are contextual to each other. In the latter case one may talk about social/organizational/cultural as well as systemic contexts. The context of *interactive IR* processes ranges from algorithmic IR processes in context of interactive IR as well as information seeking processes to information behavior. All IS&R components and activities are in context of common social, physical and technological infrastructures as well as their history over time.

Daily-life Tasks or Interests. All kinds of *work tasks* and interests that are not job-related activities or *search tasks*. Such tasks may be of social and cultural nature, including leisure and entertainment.

Declarative Knowledge. In IS&R signifying *cognitive structures* of actors concerned with (passive) content properties of *IT, interface, information sources*, including persons and groups, in socio-organizational or cultural contexts. Declarative *domain knowledge*, including *work task* (content) *knowledge, domain* and *concept* perceptions belong to this kind of knowledge, as does declarative *IS&R* (search task) *knowledge*, including *information source & system knowledge*. It contrasts *procedural knowledge*.

Document. See *Information Objects*

Document Feature Relevance. That kind of *relevance* for which the relevance assessment is based on extracted features of information objects

that may have been processed prior to presentation, such as, term maps, sentences, passages, leit motifs, web page anchors, video stills, picture fragments, etc.

Document Relevance. That kind of *relevance* for which the relevance assessment is based on the full *information object*, e.g., in full text, natural language; no additional features have been added.

Domain. A scientific or professional field of activity, or a socio-organizational-cultural field of activity.

Domain Knowledge. Declarative and procedural knowledge concerned with cognitive actors' perception of work task (content-related) issues, concepts and domains, including problem and work task solving knowledge. In IS&R it contrasts IS&R knowledge.

Emotional State. The state of emotions of a cognitive actor at a given point in time. Emotions may be uncertainty, doubt, clarity, (dis)satisfaction, etc., and are closely associated and intermingled with *cognitive structures*.

Episodic Memory. Those parts of the human memory (long term memory), which refer to *knowledge* of (or *information* about) particular events experienced by the individual. The concept is related to *semantic memory*, and is eventually intermingled with *situational* and *categorical classification*.

Extended Bibliographic Relevance. That kind of *relevance* for which the relevance assessment is based on representations of bibliographic data with a table of contents (or web page anchors), a range of descriptors from an authoritative thesaurus and/or abstract added.

Extended Document Relevance. That kind of *relevance* for which the relevance assessment is based on the full object, with added data on contents, topicality, relationships (referral to inlinking and/or citing objects, no. of links or citations), and alike, most of which are of socio-cognitive nature.

Indexer Aboutness. The *aboutness* determined by an indexer or algorithmic indexing device, implying an analysis of an *information object*, which results in the addition to or/and a transformation of original features and concepts into those accepted by the indexer or indexing device. The use of controlled vocabularies or a thesaurus typically results in indexer aboutness.

Information. The concept of information, from a perspective of information science, has to satisfy dual requirements:

On the one hand information being the result of a transformation of a generator's *cognitive structures* (by intentionality, model of recipients' states of knowledge, and in the form of signs).

On the other hand being something which, when perceived, affects and transforms the recipient's *state of knowledge*.

Information is seen as supplementary or complementary to a conceptual system that represents the information processing system's *knowledge* of its world. If only the first condition is met, we are talking about *potential information*, i.e., data or similar entities stored in *information sources*, that is of potential value to recipients (whether humans or machines). If only the second condition is met, we are talking about perceived sensory data or signals from nature –not information.

Information Behavior. Human behavior dealing with generation, communication, use and other activities concerned with *information*, such as, *information seeking* behavior and *interactive IR*.

Information Need. Signifies a consciously identified gap in the *knowledge* available to an actor. Information needs may lead to *information seeking* and formulation of *requests* for information. Information needs may also be of collective cognitive nature, e.g., as experienced in organizational contexts.

Information Interaction. Signifies the exchange between two or more *cognitive actors* in contexts of IS&R. Interaction is a two-way communication activity, and information interaction signifies the central contextual bridge between the five components of the *cognitive IS&R framework*. In IS&R three kinds of interaction exist: short-term; session-based; and longitudinal IS&R interaction.

Information Objects. Physical (digital) entities in a variety of media belonging to the *information space* of IR systems, providing *potential information*, data or signs. Information objects are used interchangeably with the term documents, and are in line with people and other *information sources*.

Information Retrieval. The processes involved in representation, storage, searching, finding, filtering and presentation of *potential information* perceived *relevant* to a requirement of information desired by a human user in context. Information retrieval (IR) is commonly divided into algorithmic IR and *interactive IR*.

Information Searcher. See *Information Seeker*.

Information Seeker. The *cognitive actor(s)* seeking (or searching) for *information* in *information sources* by means of IR and *social interaction*. Equivalent to the term Information Searcher.

Information Seeking. Human information behavior dealing with searching or seeking information by means of *information sources* and (interactive) *information retrieval* systems; also called IS&R behavior.

Information Source & System Knowledge. Declarative *IS&R* (or search task) *knowledge*, associated with understanding the declarative (passive) structures of document representation means and types, database structures, and algorithmic contents of *IT* and interfaces as well as humans as *information sources*.

Information Sources. Physical (digital) entities in a variety of media providing *potential information*, data or signs that, when perceived, may affect and transform a recipient's *state of knowledge*, thus turning into *information*. Information sources are divided into entities belonging to *information space* and human information sources.

Information Space. That component of the cognitive IS&R framework that is represented by *information objects* consisting of *potential information* and commonly structured according to *IT* settings of information systems.

Information technology, see *IT*

Intentionality. The underlying cognitive/emotional reasons for engaging into physical and mental activities, such as, information and IS&R behavior. Regarded the generic conception of terms like: purpose, aim, goal, objective, etc.

Interactive IR. The interactive communication processes that occur during retrieval of *information* by involving all major participants in IS&R, i.e., the *searcher*, the *socio-organizational context*, the *IT* setting, *interface* and *information space*.

Interface. A mechanism located as the go-between two electronic or human components of an information system. In IS&R commonly referred to as the (user) interface between the *IT* and *information space* components of an IR system and the seeking actor(s). The interface may be placed locally as a front-end to one or several IR systems, or it may be in full control of (being part of) the underlying IR system's IT components and information space, as a stand-alone system.

Intermediary. A person located in the communication channel between an IR system and current searcher(s) with the purpose interactively to transform *requests* for information into *query* formulations that suit the *IT* system component's retrieval algorithms, logic and commands.

IR System. An information system which is constituted by interactive processes between its *information space*, *IT* setting, *interface* functionalities and its environment, and capable of searching and finding *information* of potential value to seeker(s) of information.

IS&R Behavior, see *Information seeking*.

IS&R Knowledge. *Declarative* and *procedural IS&R knowledge* concerned with *cognitive actors'* perception of *search task* (content-related) issues, such as, perceived information need and *information source and system knowledge*, as well as *search task solving knowledge* and communication and *social interaction* skills. Contrasting *domain knowledge*.

IT. The component of the *cognitive IS&R framework* concerned with the *IR system's* information technology architecture, i.e., primarily the algorithmic structures, *retrieval model*, computational logic and database design.

Knowledge. An individual's total understanding of itself and the world around it at any given point in time, incorporating thinking and cognition as well as emotional, intuitive properties and (sub)conscious memory (tacit knowledge).

Knowledge is structured in a variety of ways and displays semantic as well as pragmatic characteristics. In contrast to computers and other man-made mechanisms storing data, human knowledge and *cognitive structures* are capable of self-regulation and acute, non-predetermined transformations, based on self-generated expectations. The former devices contain only manifestations of actors' cognitive structures.

In *IS&R* one may operate with *declarative* and *procedural knowledge* as one dimension and, as another dimension, *domain knowledge*, that is, knowledge of work task contents, *domains*, *concepts*, topics, persons, *problem and work task solving* processes, etc., and *IS&R knowledge* concerned with *IT setting*, *information space* and *information sources*, *interface* and *search task solving* activities and *social interaction*.

Knowledge Representation. The representation of the *aboutness* (and other content-related features) of *information objects* in the form of signs (metadata) made by a *cognitive actor* in order to ease the intellectual access to such objects by *information seekers*.

Knowledge Structures, see *Cognitive Structures*.

Label Effect. The phenomenon that *request* formulations may often consist of one or few concepts, which are of a more general nature or out of the context that constitutes the perceived information need.

Longitudinal IS&R Interaction. A prolonged IS&R activity containing several sessions over a longer period of time, e.g., days, weeks, or months.

Person and Group Knowledge. The acquaintance of and expectations about other people or teams as *information sources*. It involves *declarative knowledge* on formal as well as informal communication channels.

Pertinence. The relationship between the nature of retrieved and viewed *information objects* and the *information need* as perceived by the searcher at a given point in time. Important features are: document currency, novelty of information, interpreted cognitive authority of authors, publishers, institutions and carriers (e.g., journals), etc.

Potential Information. The data or sign structures that are the result of a transformation of a generator's *cognitive structures* (by intentionality, model of recipients' states of knowledge, and in the form of signs). *IR systems* contain potential information, or *information* metaphorically speaking, that is, information of potential value to recipients.

Principle of Complementary Social and Cognitive Influence in IS&R. This combined bottom-up and top-down view of cognition reflects the holistic cognitive view of Information Science and IS&R that mutual connections and influences exist between the individual *cognitive actor(s)* and socio-organizational, cultural and systemic *contexts*, including *domains*, as well as between individual and collective *intentionality*, knowledge, preferences and emotions, expectations and experiences and behavior. Through the actor's interpretations of the latter, via interactive communication processes, the former is the determining factor for change.

Problem Space. A situation-specific state of mind in which the individual *cognitive actor* recognizes lack of *knowledge*, e.g., in order to choose between possibilities of action, of solution to problems, or in relation to the fulfillment of factual or emotional goals and tasks. The problem space forms part of the actual *state of knowledge* and the *cognitive model* of the individual at any given point in time and may change properties through time.

Problem and Work Task Solving Knowledge. *Procedural knowledge* concerned with the execution process and procedures of fulfilling a *work task* or non-job related *daily-life task* or interest.

Procedural Knowledge. *Cognitive structures* concerned with procedural *IS&R knowledge*, such as *search task solving* processes as well as *social interaction skills*, and *procedural domain knowledge*, i.e., activities and processes associated with *problem and work task solving*.

Query. A transformation of a *request* formulation made by an *intermediary* or an *interface* in order to interrogate an *IR system's information space*, in concordance with the system's indexing and retrieval algorithms.

Relevance. The assessment of the perceived topicality, pertinence, usefulness or utility, etc., of *information sources*, made by *cognitive actor(s)* or algorithmic devices, with reference to an information situation, it being a perceived *work task* situation, *problem state* or *information need* formulation, at a given point in time. It can change dynamically over time for the same actor. Relevance can be of a low order objective nature or of higher order, i.e., of subjective multidimensional nature. It's measurement can be binary or graded.

Relevance Types. Aside from the forms of objects assessed, i.e., *bibliographic relevance* or *document relevance*, this monograph operates with the following five types of relevance: algorithmic relevance; topical relevance (or (intellectual) topicality); pertinence; situational relevance; and socio-cognitive relevance. The latter four relevance types are of higher order, due to their subjectivity, and the dimension of *affective relevance* is involved in those types.

Request. The formulation of the information need or the underlying states of *intentionality*, as perceived, and provided at a given point in time by the actual searcher to an *IR system* or other *information sources*. Requests are causally associated to the same cognitive actor(s)' formulations of intentionality in the forms of problem statements and work task descriptions.

Retrieval Model. A retrieval model comprises of a specification (and method) for document representation, a specification (and method) for request representation as a query, and a specification (and method) for matching these representations. Major retrieval models include the Boolean Model within exact match models and the Vector Space and Probabilistic Models within the best match models.

Search Task. The task to be carried out by a cognitive seeking actor(s) as a means to obtain information associated with fulfilling the *work task*. Search tasks are either seeking tasks or retrieval tasks, depending on the involvement of *IR systems*, and include information need generation, information interaction and search task solving. Search task situation are

natural in real-life settings and simulated or assigned (as plain requests) in IR experiments.

Search Task Knowledge. Declarative and procedural *IS&R knowledge* concerned with *information sources and systems*, perceived information need and *search task solving*.

Search Task Solving Knowledge. The procedural *IS&R* (or search task) *knowledge* on how to perform information seeking and retrieval, i.e., experiences on (in)formal search activities, strategies, tactics and techniques.

Semantic Memory. Those parts of the human memory (long term memory) that refer to the class of *knowledge* characterized by the definitions of concepts that people have acquired during their experiences of the world. Semantic memory is dependent on the individual's socio-cultural experiences, education, etc., and may demonstrate conceptual relations and definitions shared by many individuals (collective *cognitive structures*), e.g., within particular social groups. The concept is related to *episodic memory*, and is eventually intermingled with *situational* and *categorial classification*.

Semantic Values. Linguistic interpretations of a sentence in a text. Through (morpho)-syntactic analysis, one or several possible 'explicit' interpretations can be made out of a sentence. For example, the sentence 'Time flies like an arrow' may contain at least four different explicit semantic values. For each explicit value a set of 'implicit' semantic values may exist, as actor-generated associative interpretations made by adding own context, not present in the explicit value.

Session-Based Interaction. Several *short-term interactions* make up session-based interactions.

Short-Term Interaction. Short-term interaction with *information sources*, human or *information objects*, is here understood as a few iterations including clarification of information need and (probably) relevance feedback, briefly interrupted (ended) by some other line of action or intellectual behavior, for instance *social interaction*.

Simulated Work Task. *Work tasks*/interest situations designed for IS&R research by involving a specified but artificial scenario or cover story of semantic openness. The situation at hand is meant to trigger individual information needs in test persons in a controlled manner –functioning like natural work tasks.

Situational Classification. The categorization of objects of any kind in a process or event-related structure of concepts. Individuals performing situational classification involve the objects encountered in concrete situations, thereby grouping them together, e.g., 'during house construction hammers are used to hit nails driving them into wood'. 'Related terms' in a thesaurus consist mainly of situational relations. Related to *categorical classification*.

Situational Relevance. The relation between the retrieved and viewed information sources, including human ones via social interaction, and the work task situation as perceived by an individual searcher.

Social Interaction Skills. Implies *procedural knowledge* of social communication conventions, behavior, procedure and codes. Is incorporated into procedural *IS&R knowledge*.

Socio-Cognitive Relevance. It signifies *situational relevance* assessments and interpretations made by *cognitive actors*, either simultaneously (like in a team) and/or over time. Citations (or inlinks) given to objects or collective selections during editorial work, are exemplary manifestations of socio-cognitive relevance judgments made by actors over time. Socio-cognitive relevance is commonly tangible and measurable.

State of Knowledge. The state of the individual's cognitive-emotional structures which, at a given moment, holds what is known and emotionally experienced by the individual, including its attention, actual *intentionality*, as well as its perceived *work task*, *problem space* and *state of uncertainty*.

State of Uncertainty. An emotional state of conscious doubt in which the cognitive actor's own *state of (domain) knowledge* cannot fill the *problem space* by thinking, causing interaction with the world around it to obtain supplementary *information*, e.g., by *information interaction* or *social interaction*.

Topical Relevance. Signifies the relation between the *aboutness* of *information objects* and the *aboutness* of *requests* as perceived by an actor (whether task performer, searcher or judge in IR experiments). Owing to the human assessment (interpretation) this type of relevance is of subjective emotional and intellectual nature.

User Aboutness. 1) The *aboutness* of information object(s) determined by the seeking actor(s) when confronted with such objects. See also *relevance types*. 2) The kind of *indexer aboutness* that attempts to tailor *knowledge representations* of *information objects* to known pre-suppositions of the searchers in *domain(s)*.

User Interface. See *Interface*

Work Task. A job-related task or non-job associated daily-life task or interest to be fulfilled by *cognitive actor(s)*. Work tasks can be natural, real-life tasks or be assigned as *simulated work task* situations or assigned *requests*. If perceived and not immediately solvable by actor(s), a work task may lead to *state of uncertainty* and to *search task* situations.

Work Task Knowledge. Declarative as well procedural *domain knowledge* dealing with cognitive and emotional *work task* contents, *state of uncertainty*, *problem space* as well as *problem and work task solving*.

Work Task Execution. See Problem and Work Task Solving.

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