Semantic interoperability in an international comprehensive knowledge organisation system

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RESEDA

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Agenda

- RESEDA
- Premisses
- Goals
- Methods
- Retrieval paradigms
- Relational structures
- Inventories / taxonomies
- Prospects

RESEDA (Repräsentationsmodelle semantischer Daten)

- Representational Models for semantic Data
- Assessment, analysis and enrichment/reengineering of existing indexing languages.
- Typification of relations
- Development and definition of stratified Inventories
- Development of retrieval strategies and functionalities for semantically enriched knowledge bases

- Establishment of an interdisciplinary research-hub

Premisses

- Focussing on the conceptual level is vital for knowledge organisation.
- Integration of machine-assisted reasoning and cognitive interpretation is possible.
- In knowledge organisation formal systems should support cognitive interpretation.
- Existing indexing languages are to be expanded and enriched.
- Coherences and relations between concepts are vital to the understanding and interpretation of complex themes and subjects and the creation of personal knowledge.
- The end-users personal knowledge of a subject field is a valuable resource that deserves to be fostered by offering him an explorative approach towards indexing languages.

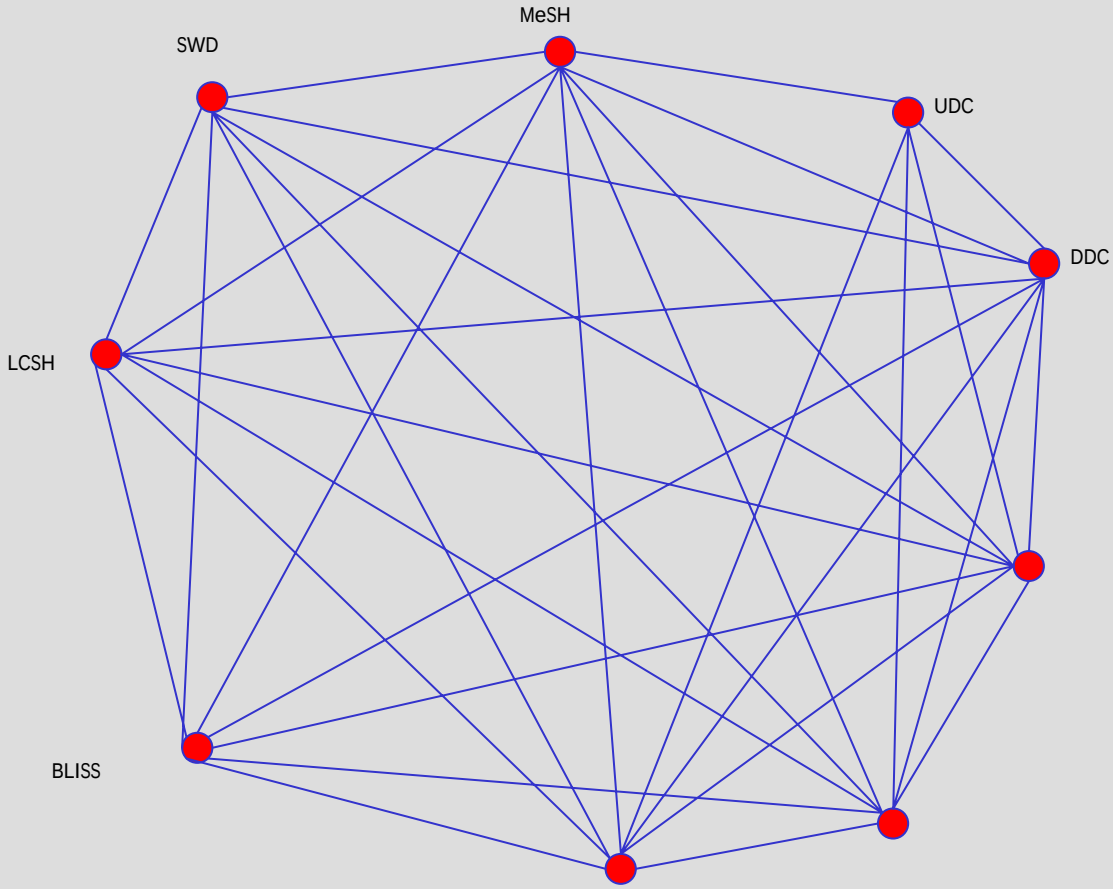
Goals

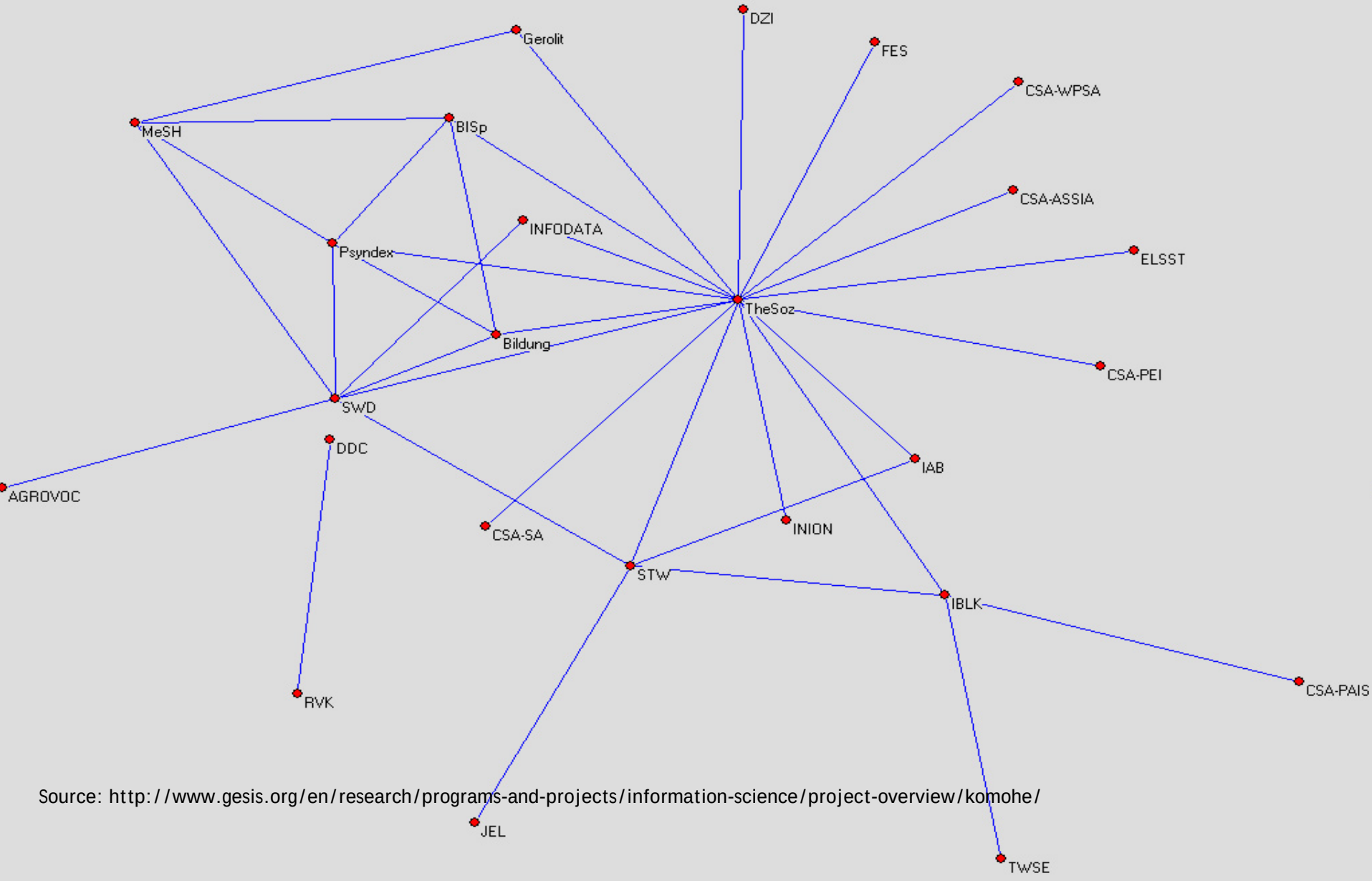
- Facilitating advanced forms of focussed and efficient information retrieval
- Supporting strategies of knowledge exploration
- Enabling the end-user to integrate new information into his own cognitive structures as a preparation for retrieval and exploration

in a

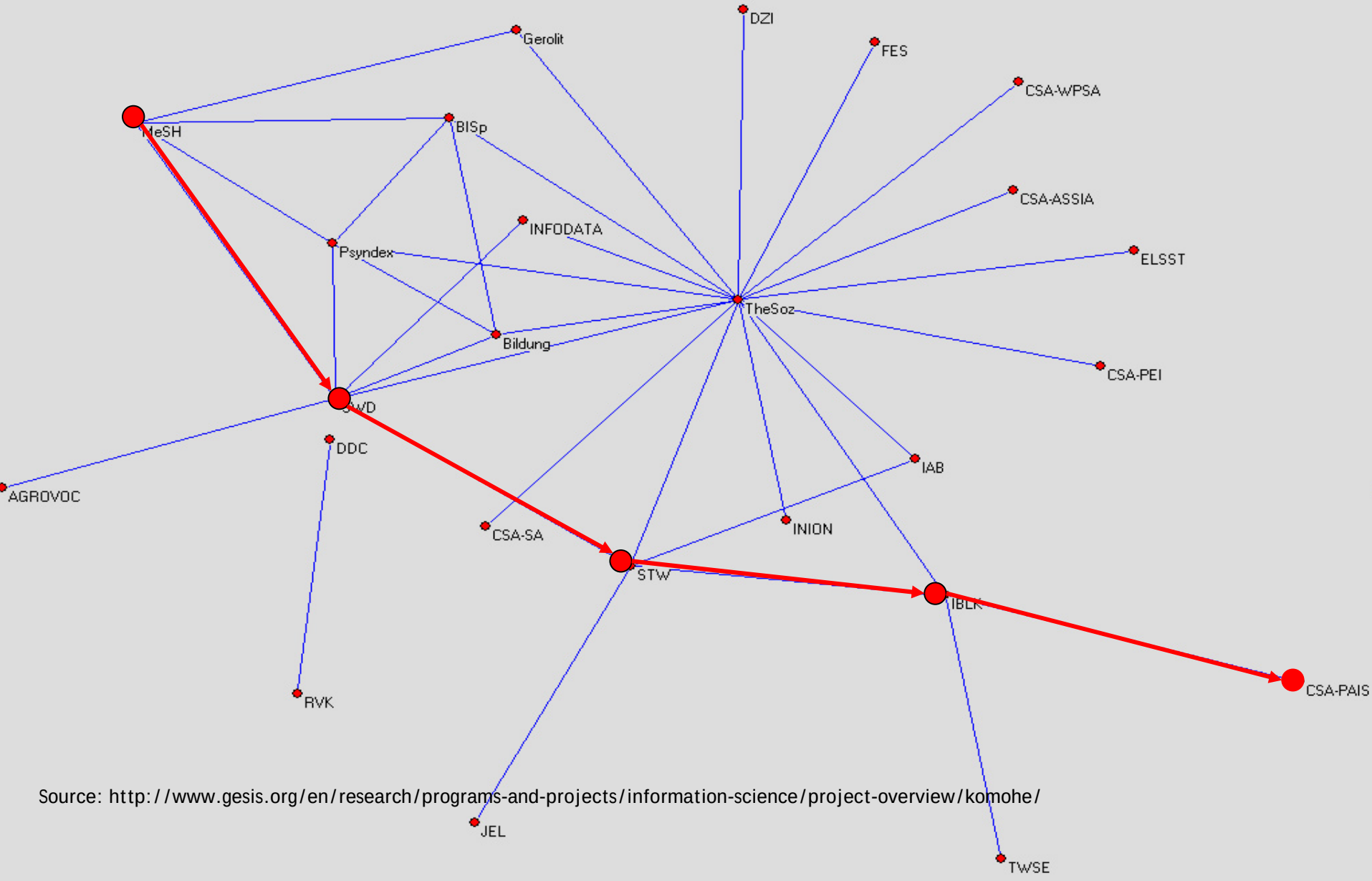
- Comprehensive international knowledge organisation system

Topology of concordances





Source: http://www.gesis.org/en/research/programs-and-projects/information-science/project-overview/komohe/



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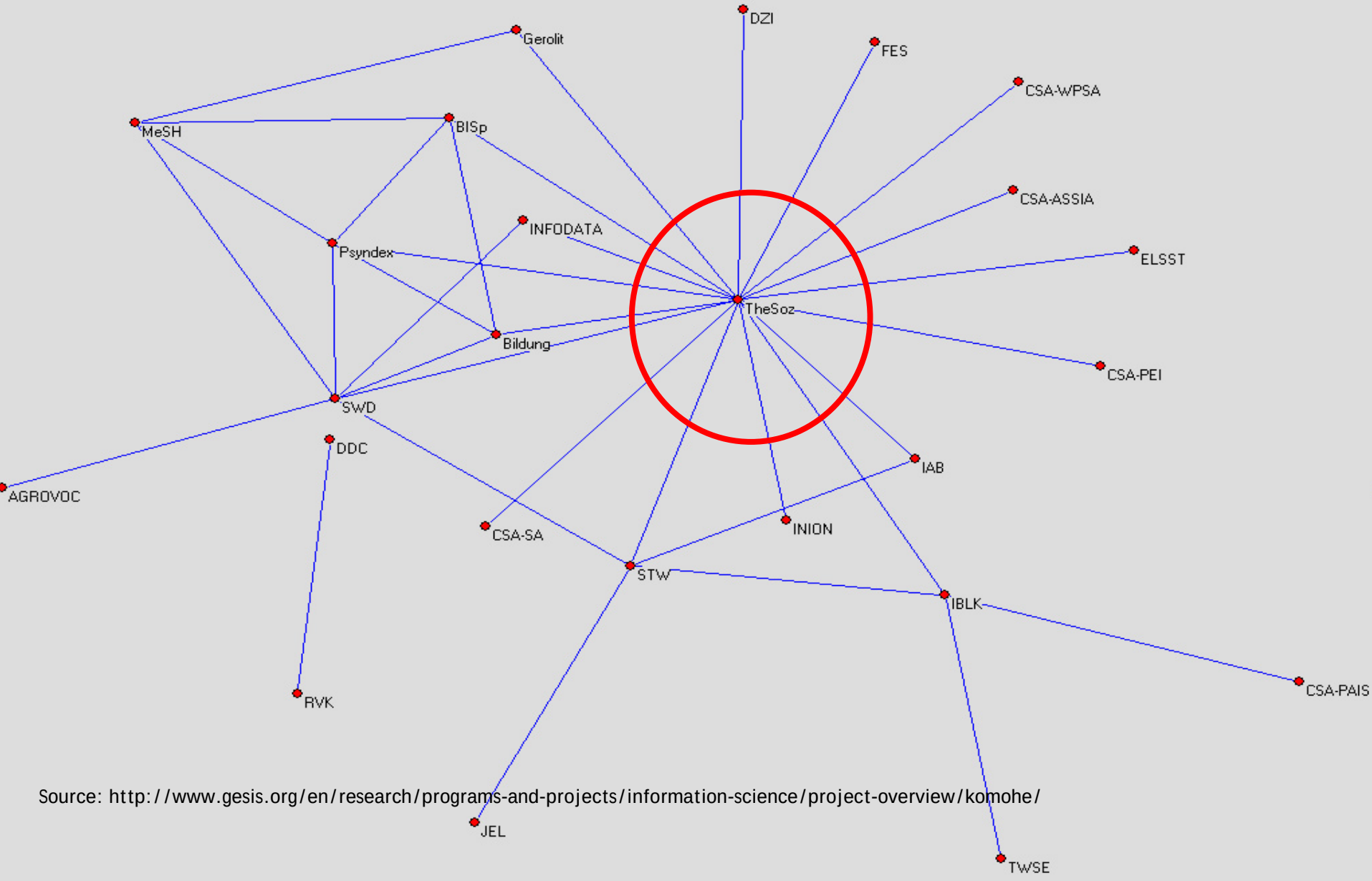

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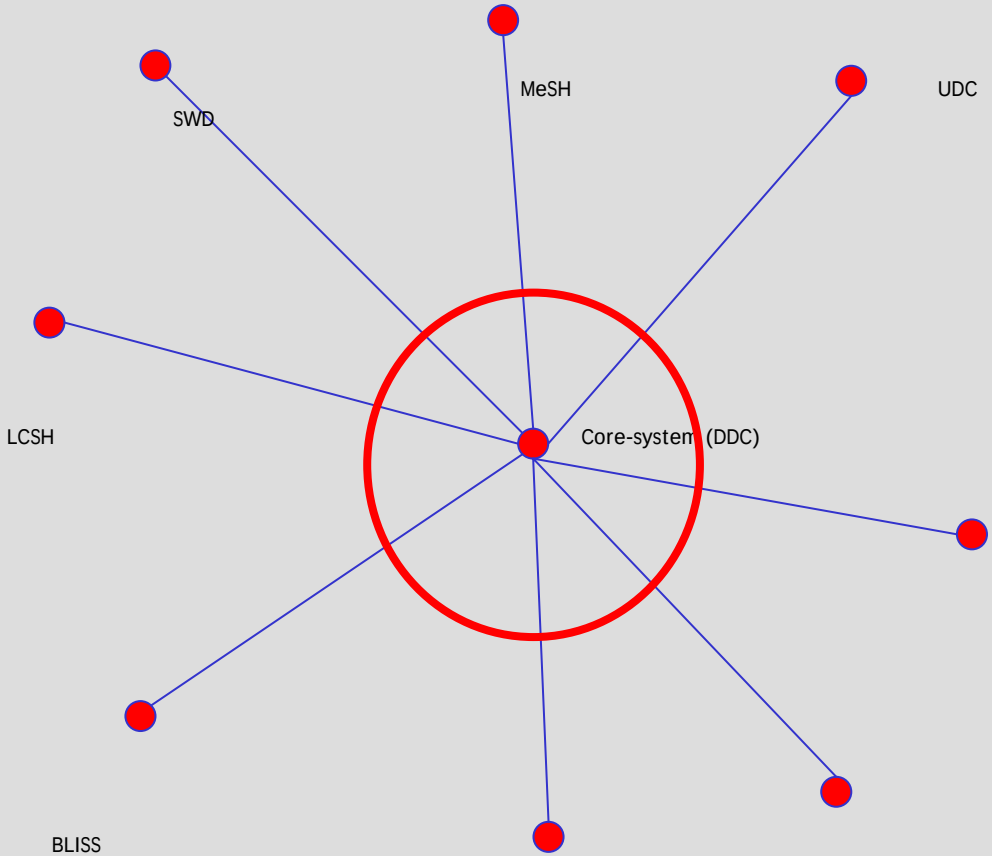
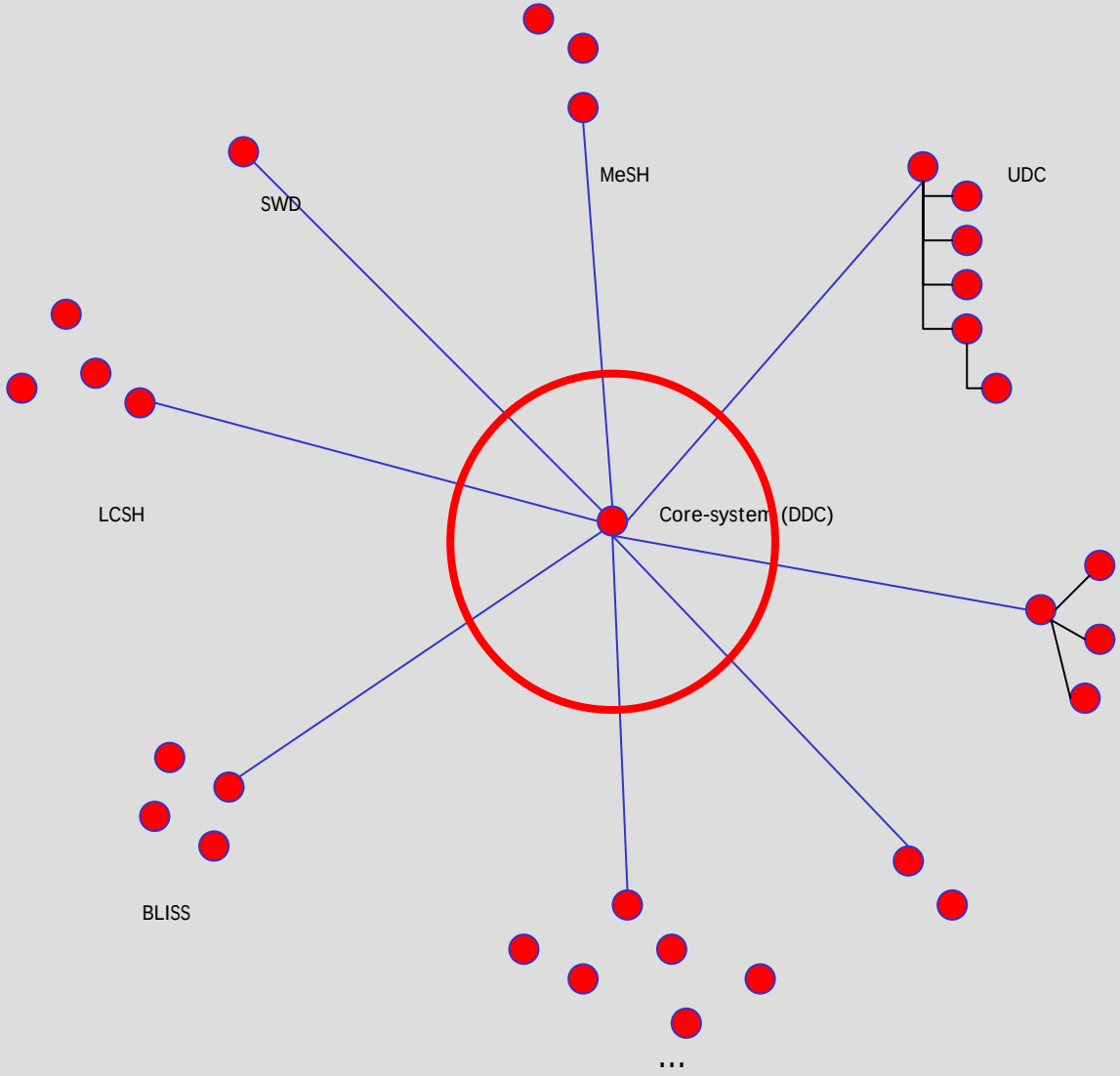

MeSH
UDC
SWD
LCSH
Core-system (DDC)
BLISS

...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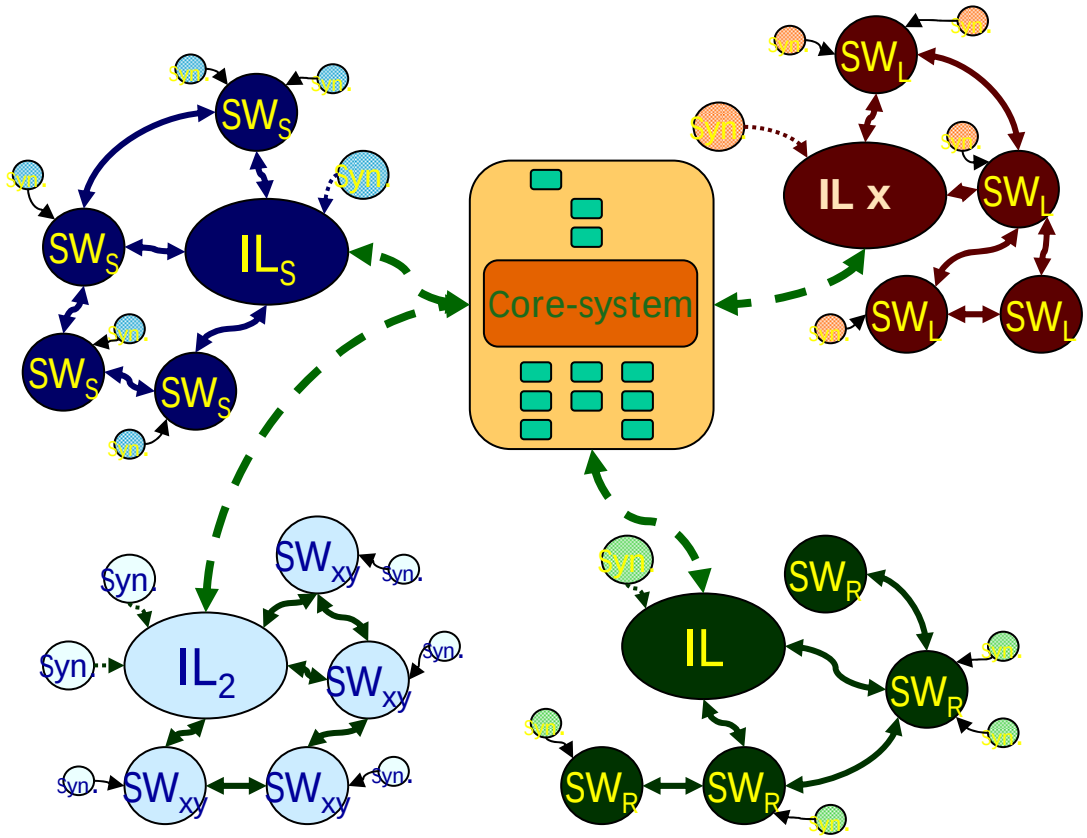

Core-system
IL x
SW_L
IL_S
SW_S
IL_2
SW_xy
IL
SW_R
Syn.

Strategies

- Providing semantic interoperability between all systems integrated in an international comprehensive KOS.
- Defining a detailed and expressive relational structure for all systems involved
- Enriching existing and established indexing languages

suggested approach:

- Creation of a "core system" designed to serve as an "ontological spine"

- Selective transfer of modeling strategies and functional principles from the field of semantic technologies.

A model for a comprehensive international KOS

Aims:

- Integration of structurally and typologically different systems
- Advanced semantic interoperability
- Strategies for retrieval and exploration in distributed systems

Features:

- Simple hierarchical „core system“
- Detailed bilateral mappings of all satellite systems involved
- Shared inventory of standard relations
- Expressive multidimensional definition of inter-system and inter-concept relations

Retrieval paradigms I

- Simple pattern matching

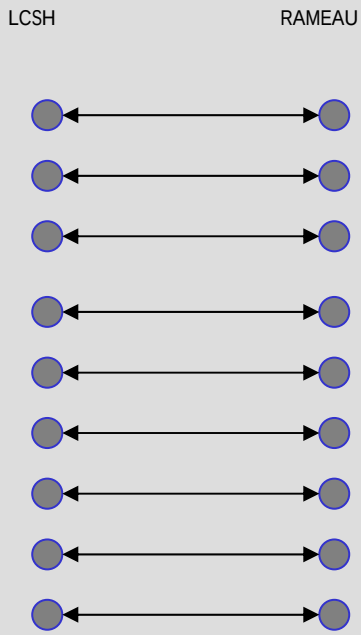
Features:

- Easy implementation
- No indexing languages required
- No modification / expansion possible
- Limited access

Method:

- Semantic interoperability can be provided by unspecified one-to-one equivalences represented in a simple cross-concordance.

N°	SWD	LCSH	RAMEAU
001	Abgang		
002	Agitproptheater	Agitprop theater	Théâtre d'agit-prop
003	Alternatives Theater		
004	Amphitheater	Amphitheaters	Amphithéâtres
005	Antitheater		
006	Arbeitertheater	Workers' theater	Théâtre prolétarien
007	Arenabühne	Arena theater	Théâtre en rond
008	Aufführung		Représentations [Subd.]
009	Aufführungspraxis		
010	Auftritt		
011	Bauchreden	Ventriloquists	Ventriloques
012	Bauerntheater		
013	Berufsschauspieler		
014	Berufstheater		
015	Bewegungstheater		
016	Boulevardtheater		Théâtre de boulevard
017	Bühne		
018	Bühnenanweisung	Stage directions	Indications scéniques
019	Bühnenaussprache		Théâtre -- Diction
020	Bühnenbearbeitung	Stage adaptations	Adaptations théâtrales
021	Bühnenbeleuchtung	Stage lighting	Éclairage de scène
022	Bühnenbild	Theaters -- Stage-setting and scenery	Scénographie Théâtre -- Décors
023	Bühnenbildner	Set designers	Décorateurs de théâtre
024	Bühnenkünstler		
025	Bühnenkünstlerin		
026	Bühnentechnik		Machines de théâtre
027	Bühnentechniker	Stagehands	Machinistes (théâtre)
028	Bühnenwerk		
029	Bunraku	Bunraku	Bunraku
030	Burleske	Burlesque (Theater)	Burlesque (théâtre)
031	Café-théâtre	Music-halls (Variety-theaters, cabarets, etc.) [UF Cafe theater]	Cafés-théâtres



Retrieval paradigms II

- Conceptual queries

Features

- Focus on the conceptual level
- Multiple access points
- Structural transparency

Retrieval paradigms II

- Conceptual queries

Requirements:

- Synonyms have to be represented as part of a well structured indexing language
- Structural and typological differences have to be taken into account.
- Conceptual interoperability is provided by mapping the concepts independently from their actual representation in the various indexing languages.

2 Browse Results Record 2 of 2

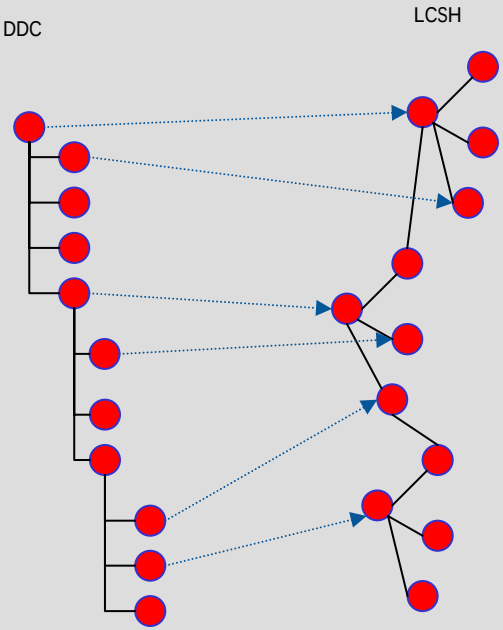
Built Class Number: 792.0973
Caption: Theater--United States

Main Classes

700 Arts & recreation
790 Sports, games & entertainment
792 Stage presentations
792.09 Historical, geographic, persons treatment
792.0973 **Theater--United States**
792.097309041 Theater--United States--1900-1919

Terms

Relative Index Terms	LC Subject Headings	EM	PPT	SM
Theater--United States	Group Theatre (U.S.)			•
	Theater--United States		•	•
	Theater--United States --Dictionaries			•
	Theater--United States --History		•	•



Retrieval paradigms III

- semantic exploration and enhanced conceptual interoperability

Features:

- Modification /expansion of queries
- Conceptual exploration of subject field
- Query-clarification as a useful pre-search mechanism
- Adequate strategy for knowledge exploration

Method:

- Interpretation of conceptual coherences
- Relations between concepts have to be specified

Retrieval paradigms III

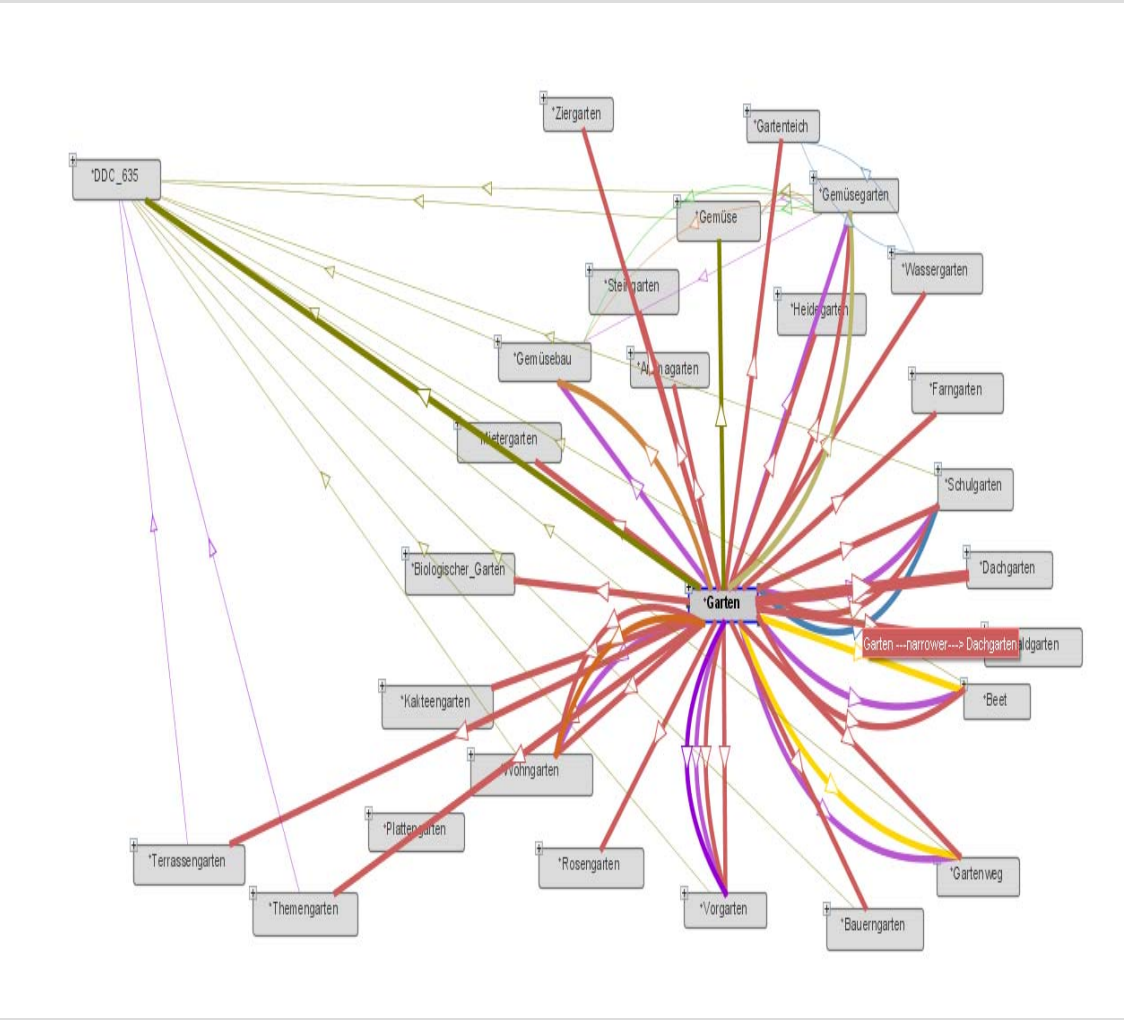
- semantic exploration and enhanced conceptual interoperability

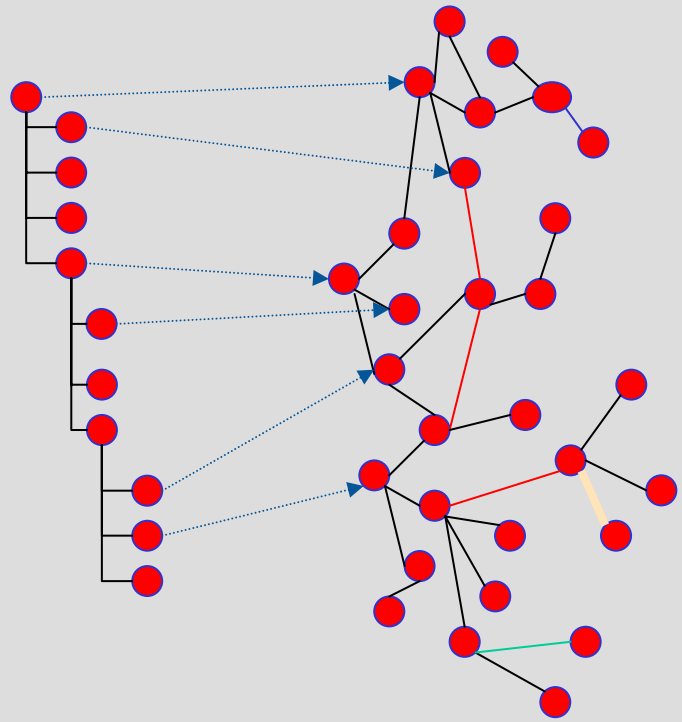
  Requirements:

  - A model of enhanced conceptual interoperability has to specify the various types of semantic relations constituting the relational structure:

  - Well-structured relational inventories

  - Control- and selection-mechanisms to handle the complexity of the relational structure.


*Ziergarten
*Gartenteich
*DDC_635
*Gemüsegarten
*Gemüse
*Wassergarten
*Steingarten
*Heidegarten
*Gemüsebau
*Farngarten
*Schulgarten
*Biologischer_Garten
*Dachgarten
*Garten
Garten ---narrower---> Dachgarten
*Beet
*Kalkteengarten
*Wohngarten
*Terrassengarten
*Rosengarten
*Gartenweg
*Themengarten
*Vorgarten
*Bauerngarten



Retrieval paradigms IV

- knowledge exploration and advanced thematic interoperability

Features:

- thematically driven knowledge exploration
- Advanced thematic interoperability to facilitate the access, exploration and interpretation of highly expressive indexing languages.

Method:

- definition, representation and interpretation of conceptual and thematic coherences.

Retrieval paradigms IV

Requirements

- Advanced thematic interoperability

- High semantic expressiveness of relational structures
- Logical validity of relational structures
- Inventories of specified relation-types

- Relations between concepts must be specified regarding

  - Semantic content
  - Logical characteristics
  - Formal specification

Defining relations I

- Defining formal specifications
  - Typological differences between various systems have to be made explicit.
  - Appropriate strategies for interpreting individual concepts and concept relations may differ in verbal and classificatory systems.
  - Different relational structures and relation types require different strategies for orientation, navigation and searching.
  - Formal specifications are particularly important for inter-system relations.

Defining relations II

- Defining logical characteristics
  - Small set of logical characteristics of semantic relations is relevant for retrieval and knowledge exploration.
  - Logic is the basis for all inferential reasoning.
  - The claim to logical validity may render the entire model contestable.
  - The logical validity of the modelled structures is limited.

Defining relations III

- Defining semantic content
  - Unlike the inventory or the description of the logical characteristics of inter-concept and inter-system relations, the inventories for the semantic relations can be quite large.
  - Relations asserted between concepts must provide relevant information for the subject area.
  - The semantic content of the relations should reflect a relevant aspect of the subject area.
  - The definition of *a priori* relations provides an objective externalisation of the propositions on a subject area.
  - Hierarchically structured inventories of specified relation-types allow for further functionalities.

Types of specified relations

Inter-concept relations

- Semantic content → conceptual orientation and navigation
- Logical characterists → inferences

Inter-system-relations

- Formal specification containing information about the characteristics of the interconnected systems.

Inventories for semantic relations

- Specifying semantic relations results in a larger amount of more complex relations.

Suggestion:

- Hierarchically structured inventories
- Semantic content and logical characteristics can be inherited
- Interdependencies between semantic content, logical characteristics and formal specifications can be defined and represented appropriately

Prospects

- Technical implementation and the design of functional user interfaces that allow the user to handle the complexity of the systems.
- Decision for a suitable core-system
- Agreement on a common set of inter-system and inter-concept relations.
- standardisation of relational inventories
- Relational enrichment of the individual indexing languages and KOS

Resumée

- The combination of inter-concept and inter-system relations with minutely specified semantic content, logical characteristics and the necessary formal specifications can provide neatly structured and expressive indexing languages.

- If the inventories of the indexing languages are coordinated and matched to the main inventory of the core system this model offers good foundations to implement semantic interoperability as an important feature for information retrieval and knowledge exploration in an comprehensive international knowledge organisation sysytem.

Thank you for your attention.

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