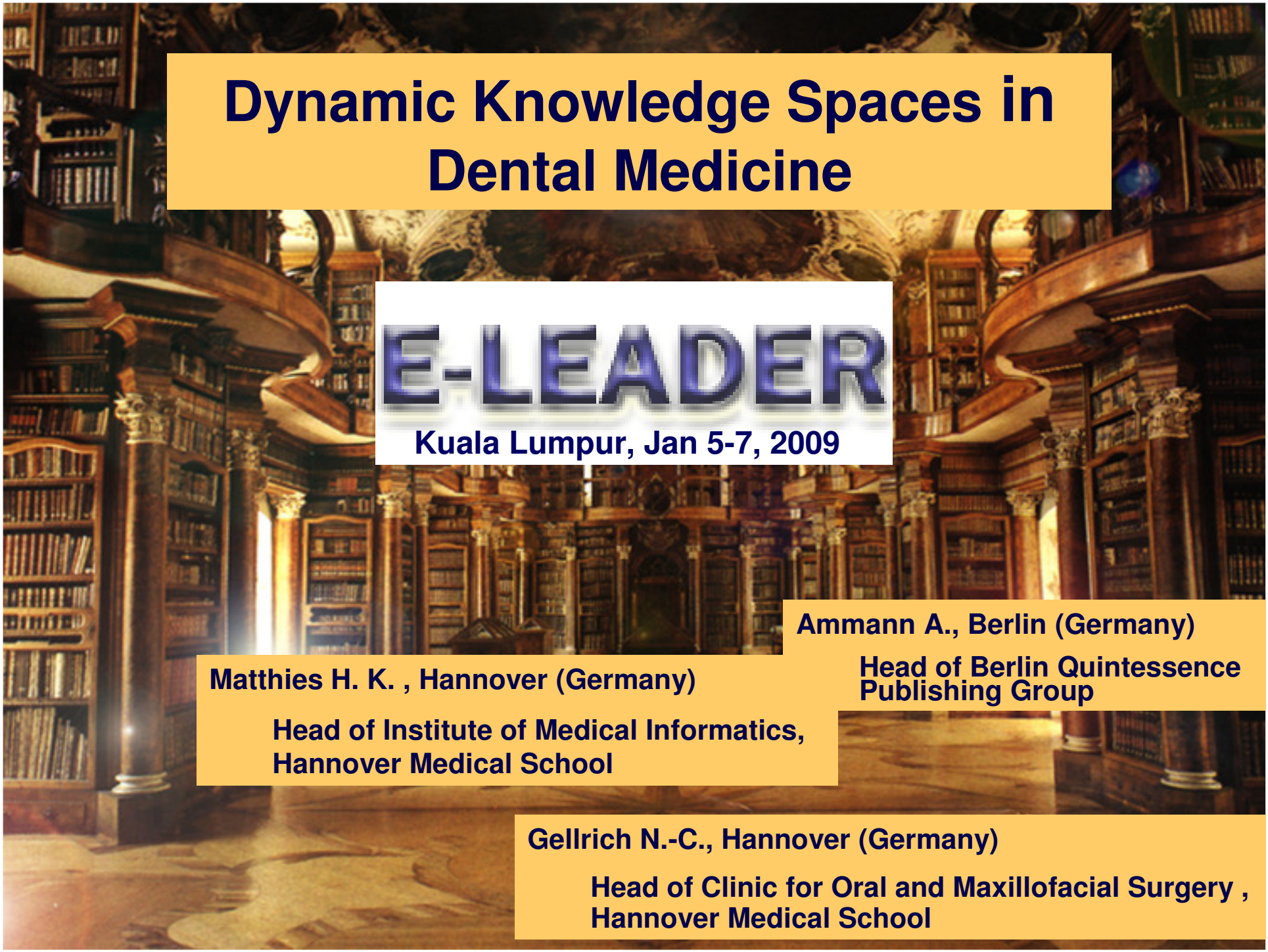


Dynamic Knowledge Spaces in Dental Medicine

E-LEADER

Kuala Lumpur, Jan 5-7, 2009

Ammann A., Berlin (Germany)

Head of Berlin Quintessence Publishing Group

Matthies H. K. , Hannover (Germany)

Head of Institute of Medical Informatics, Hannover Medical School

Gellrich N.-C., Hannover (Germany)

Head of Clinic for Oral and Maxillofacial Surgery , Hannover Medical School

Hannover Medical School, Germany

~ 1.400 clinic beds, ~ 7.500 employees,

~ 4.000 students of Medicine, ~ 500 students of Dental Medicine,

+ students of Public Health, Biomedicine, … ➔ http://**www.mh-hannover.de**

The cultural heritage - Libraries of the World

The Great Library of Alexandria,
Greece, 295 B.C.

Vaticane,
Rome, 4 AD

National Library of Russia,
St. Petersburg, 18 AD

Melk,
Austria, 18 AD

Library of Congress,
Washington, 18 AD

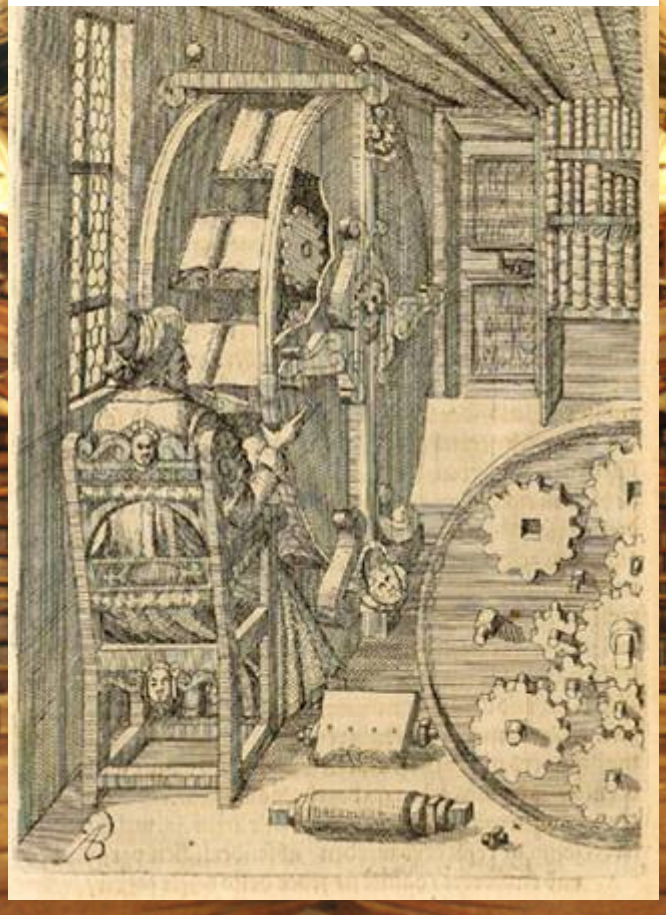
Alexandria,
Greece, 2002

Knowing where knowledge has been

Knowing where knowledge is now

„Internet Browser“ in ~1550

Library change cycle
1550 - Agostino Ramelli

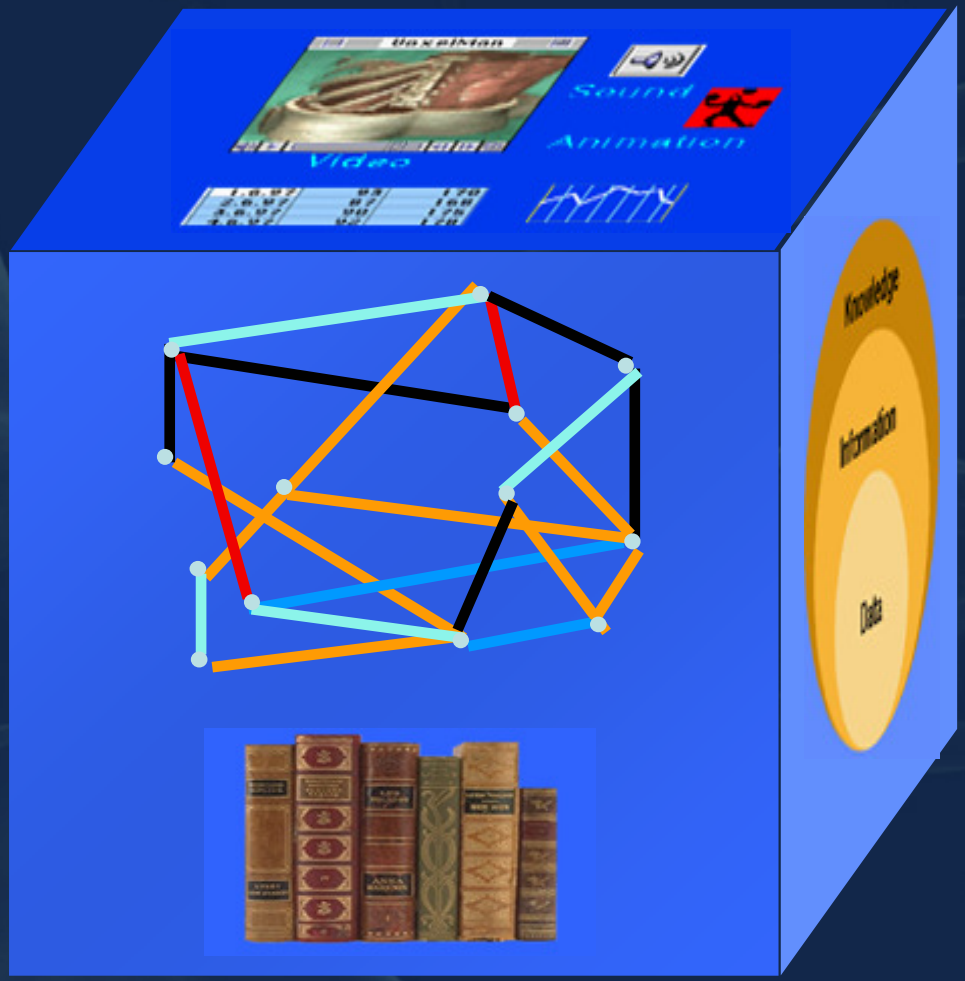


„The creation of methods to memorize is a must to handle the knowledge which is propagated in an inflationary way in university libraries“ (Conrad Gesner, 1545)

Paradigm Change: Linear vs. Non-Linear Data Management

Hyperspace

Linear Data Management



How much information ?

2000: 532.000.000.000.000.000 Bytes

(532 Peta Bytes, 1 PB ~125.000 DVD‘s)

Transfer of 1 PB from New York to Lulea (Sweden, 9000 km
SPRINT: 12 hrs)

2030:

1.079.000.000.000.000.000.000.000.000 Bytes

(1.079 Yotta- or 1,079 Quadrillards Bytes = 7.984.000 x Library of Congress)

Source : University of California, 2003

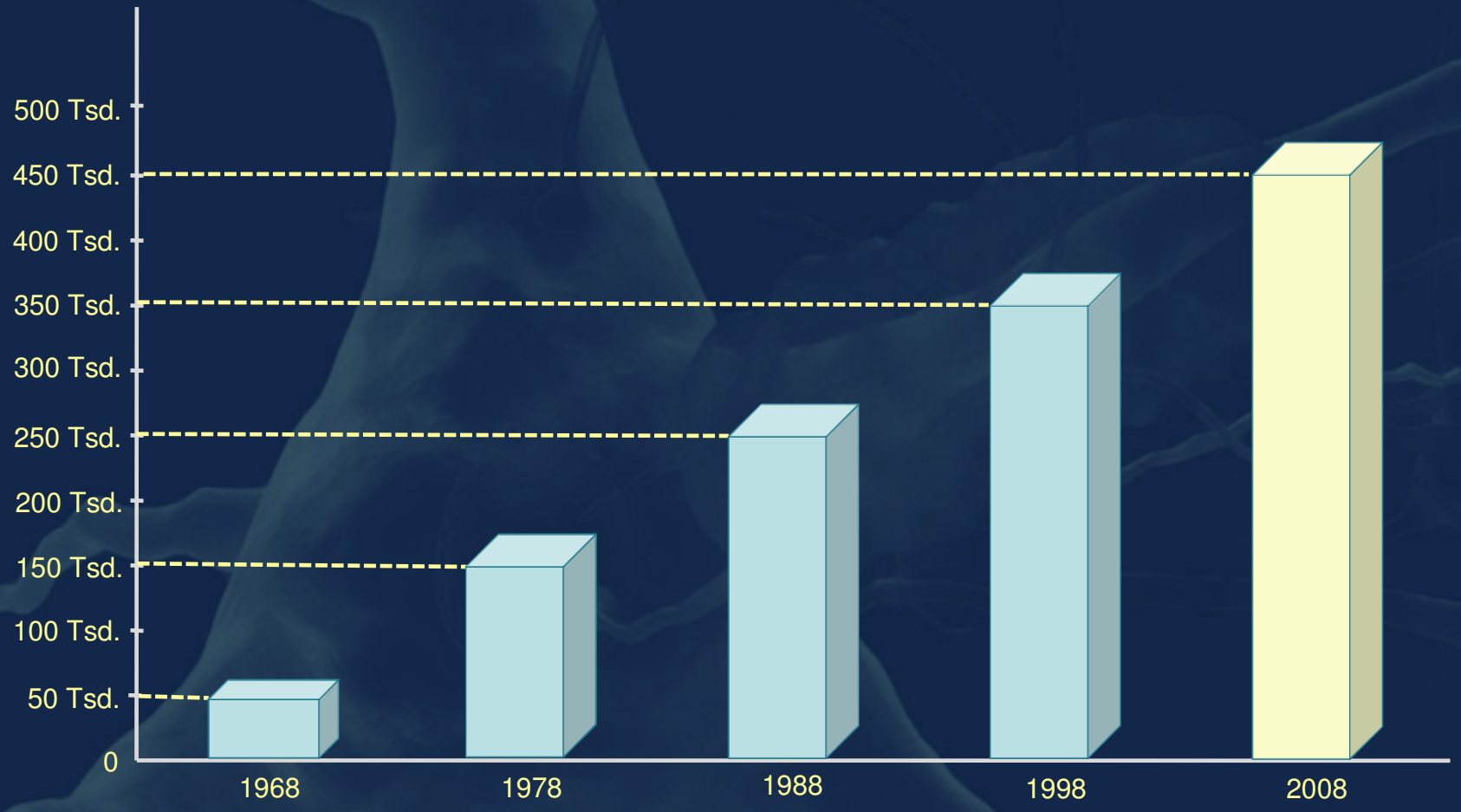
Journal Citation Reports (JCR) in 2007

7.528 Scientific journals

1.397 Section – Clinical Medicine (with an impact factor)

51 Section – Dental Medicine (with an impact factor)

Dental Papers



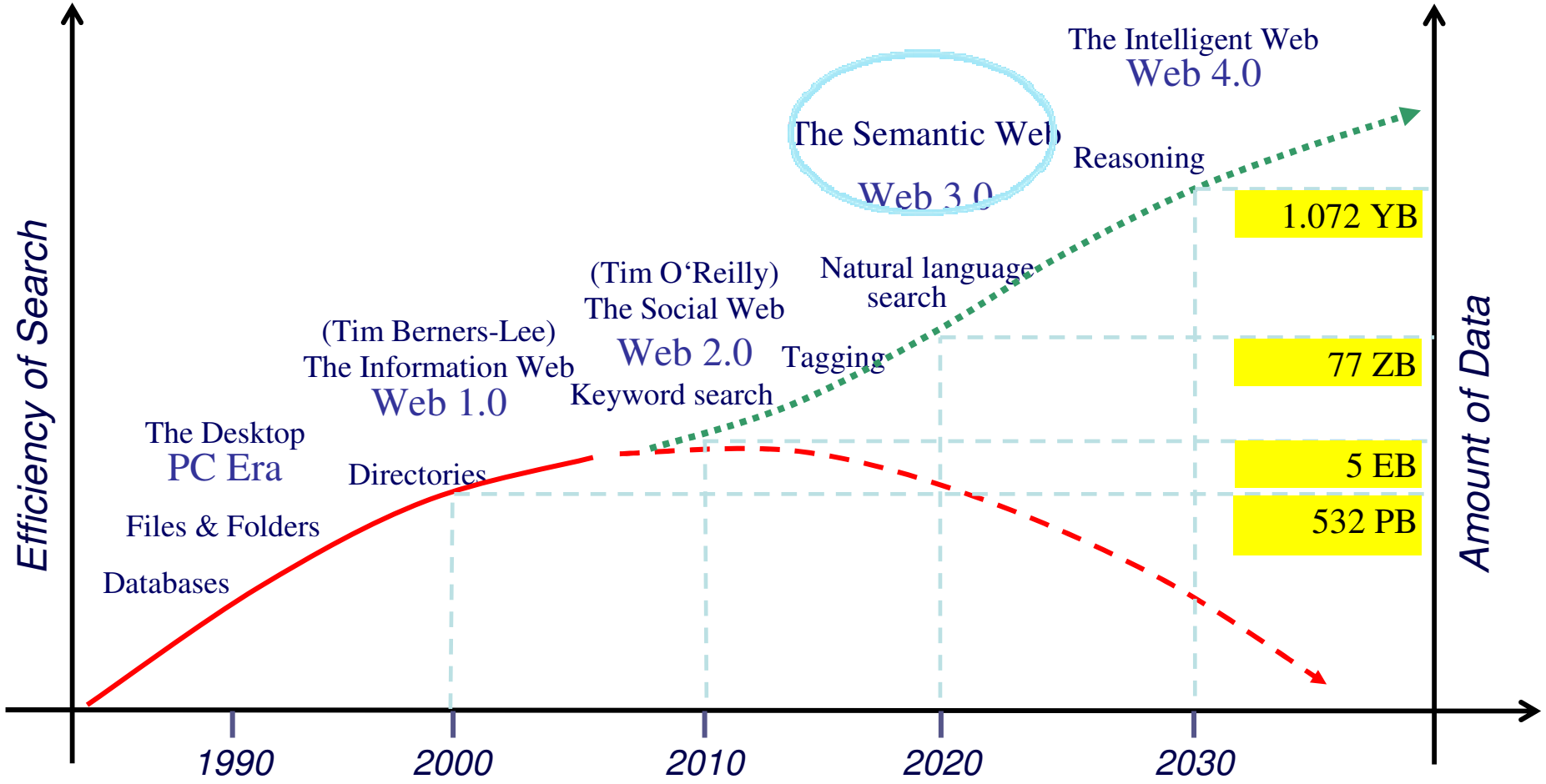
Source : Medline (PubMed) – Dental Journals

Knowledge Management

Knowledge Management stands for the entire process of identifying the implicitly and explicitly available knowledge,

- *knowledge acquisition,*
- *knowledge structuring,*
- *knowledge modelling,*
- *knowledge preparation,*
- *dynamic knowledge storage and*
- *knowledge utilisation.*

From the PC to the intelligent Web

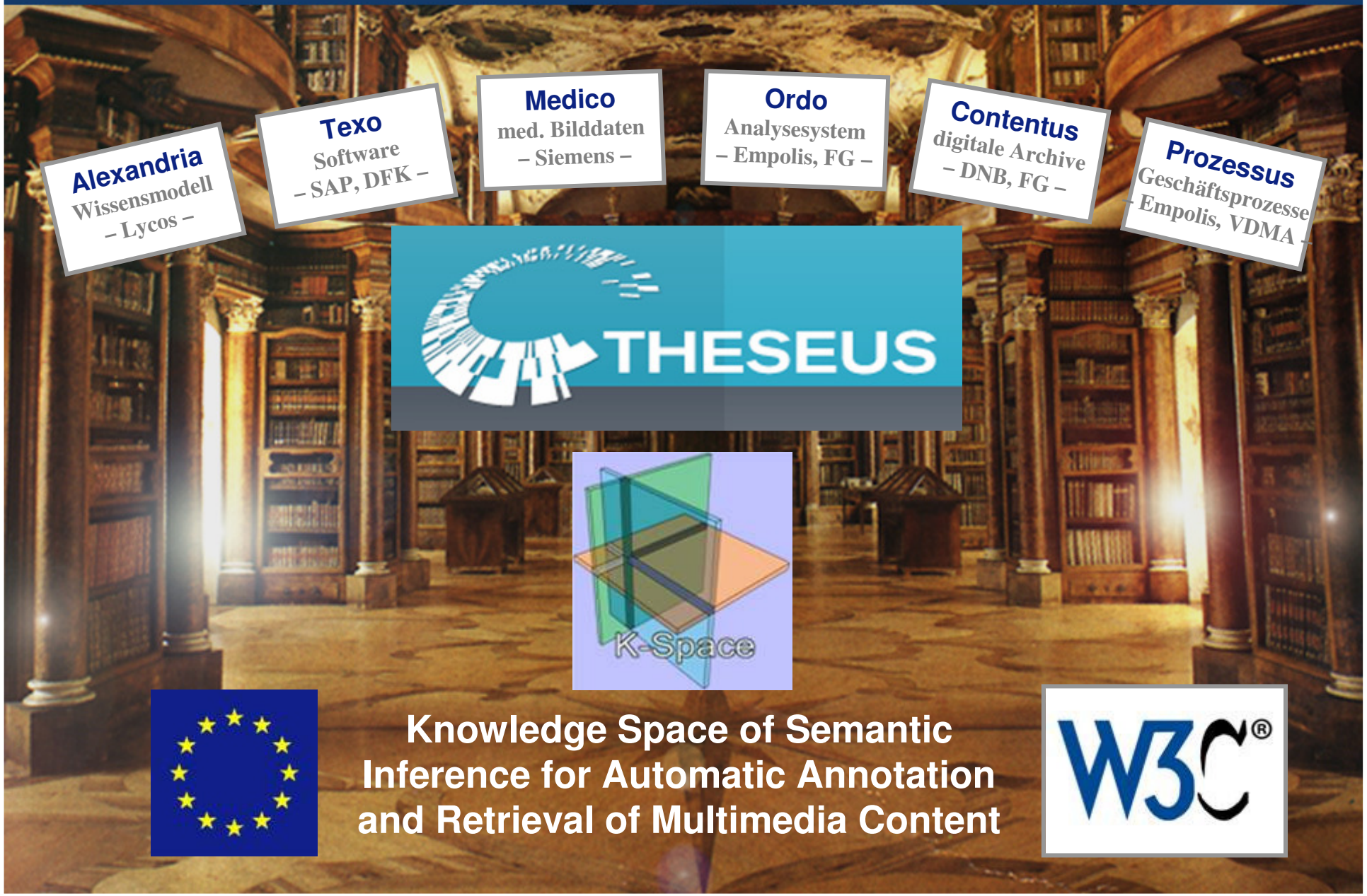


1 PB (Petabyte = 10^{15} Byte), *1 EB* (Exabyte = 10^{18} Byte), *1 ZB* (Zettabyte = 10^{21} Byte), *1 YB* (Yottabyte = 10^{24} Byte)

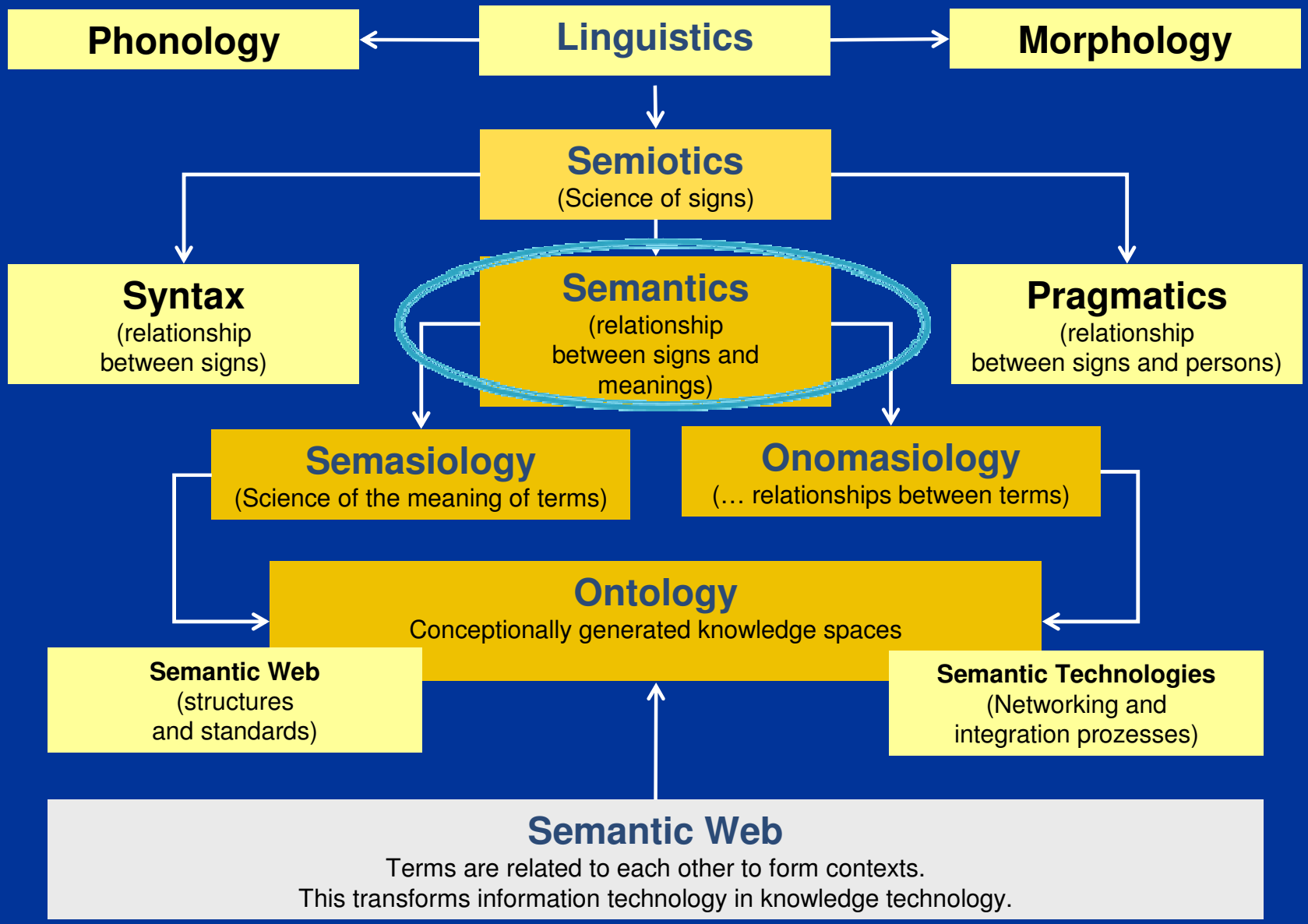
Source: University of Berkeley (2003), Radar Networks (2008), Quintessenz (2008)

Web 2.0 Generation – Virtual Communities

Web 3.0 Generation – Semantic Web



Semantic Web



Semantic relationships

Homonyms

Ambiguity without functional relationships for example: (river or money) bank

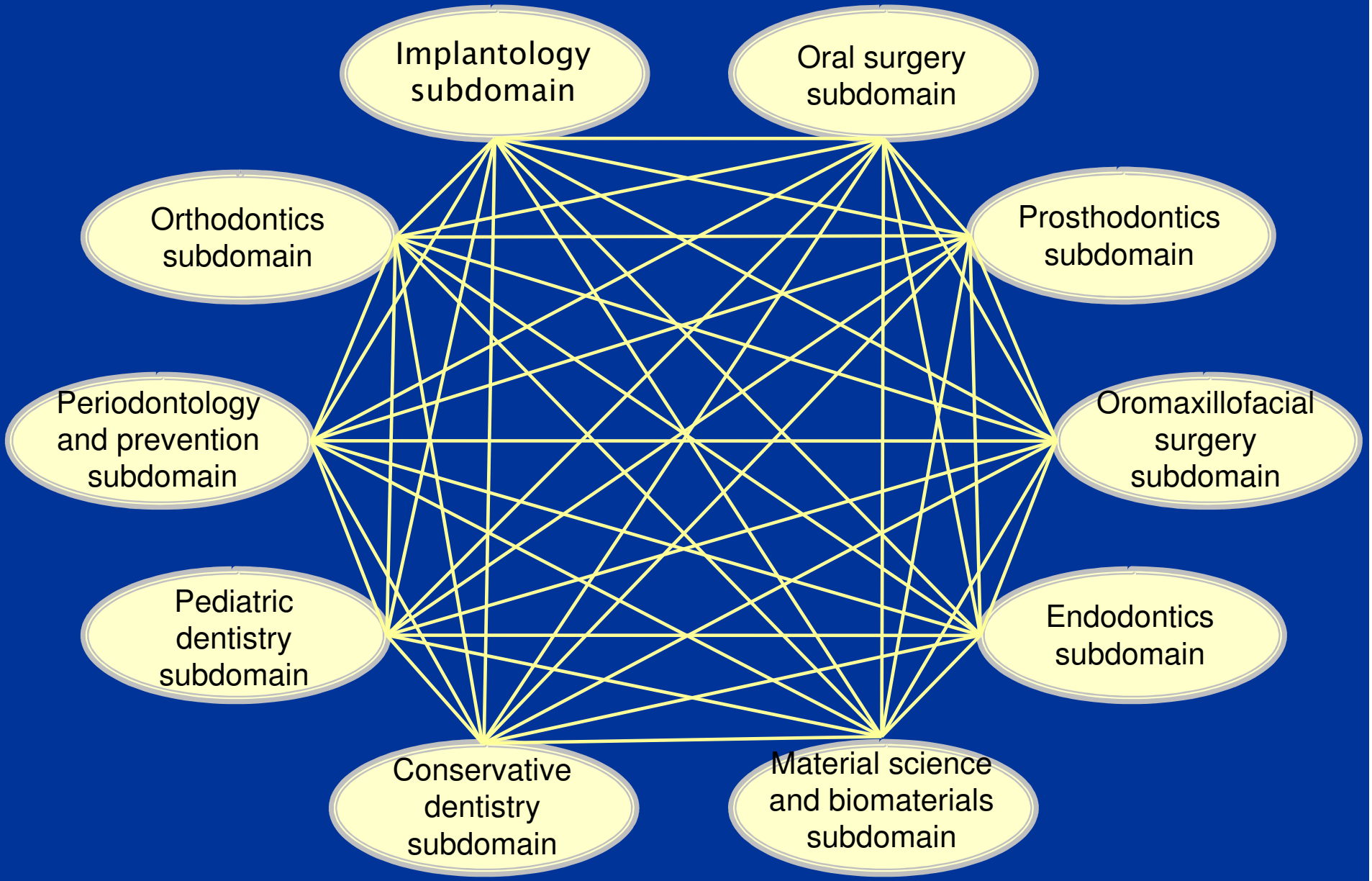
Polysems

Ambiguity with functional relationships for example: (dental or architectural) bridge

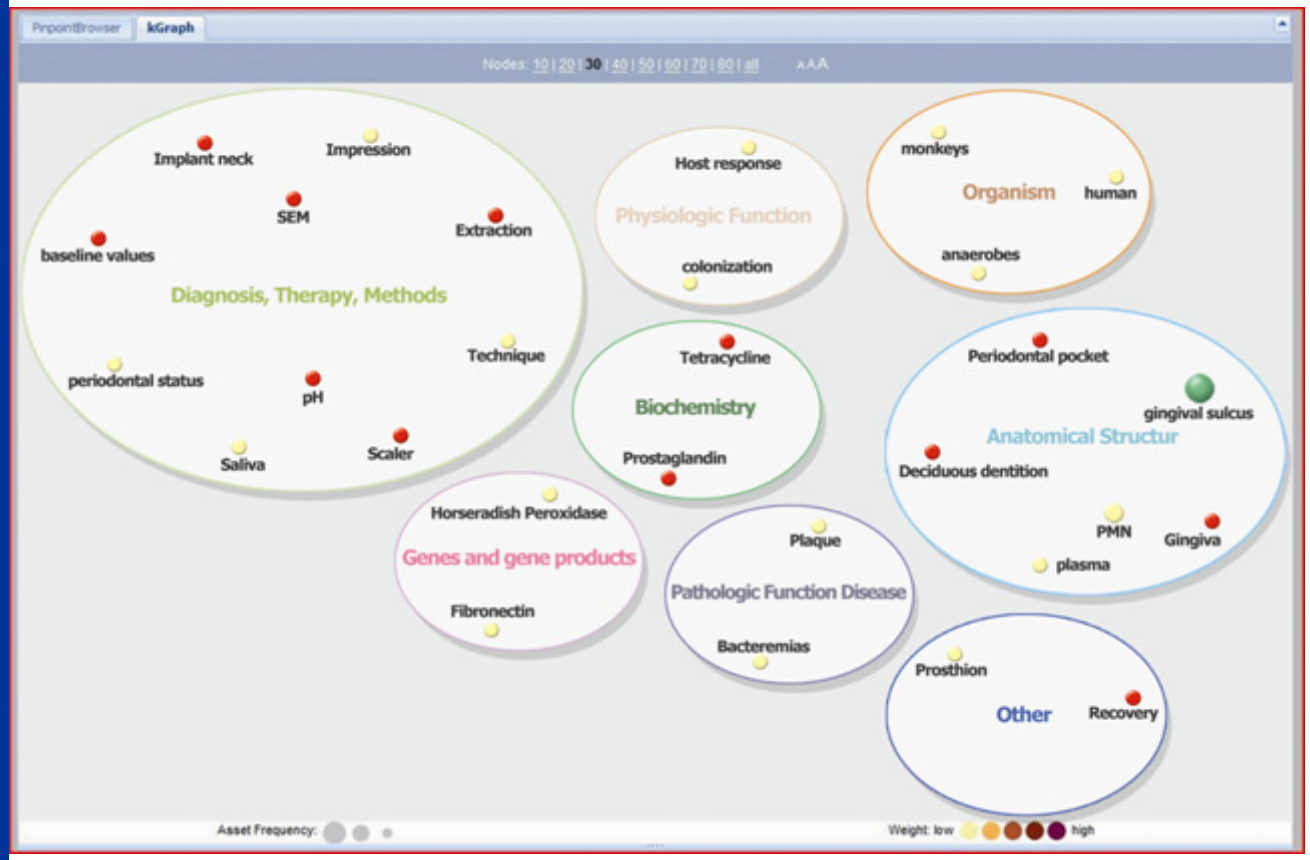
Synonyms

Unambiguity with conceptual terms
for example: Sinus list and sinus elevation

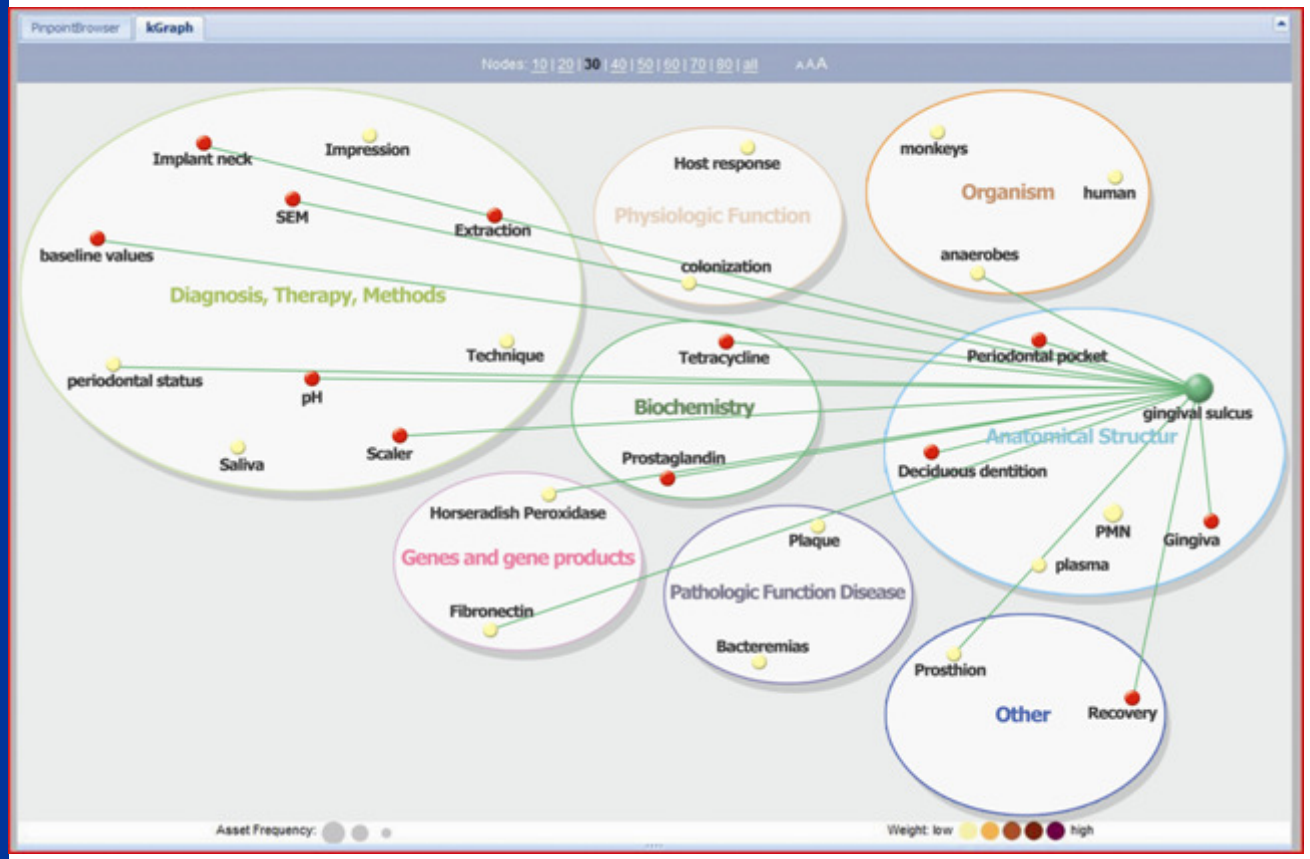
Simplified overview of the “dentistry” macro domain with subdomains



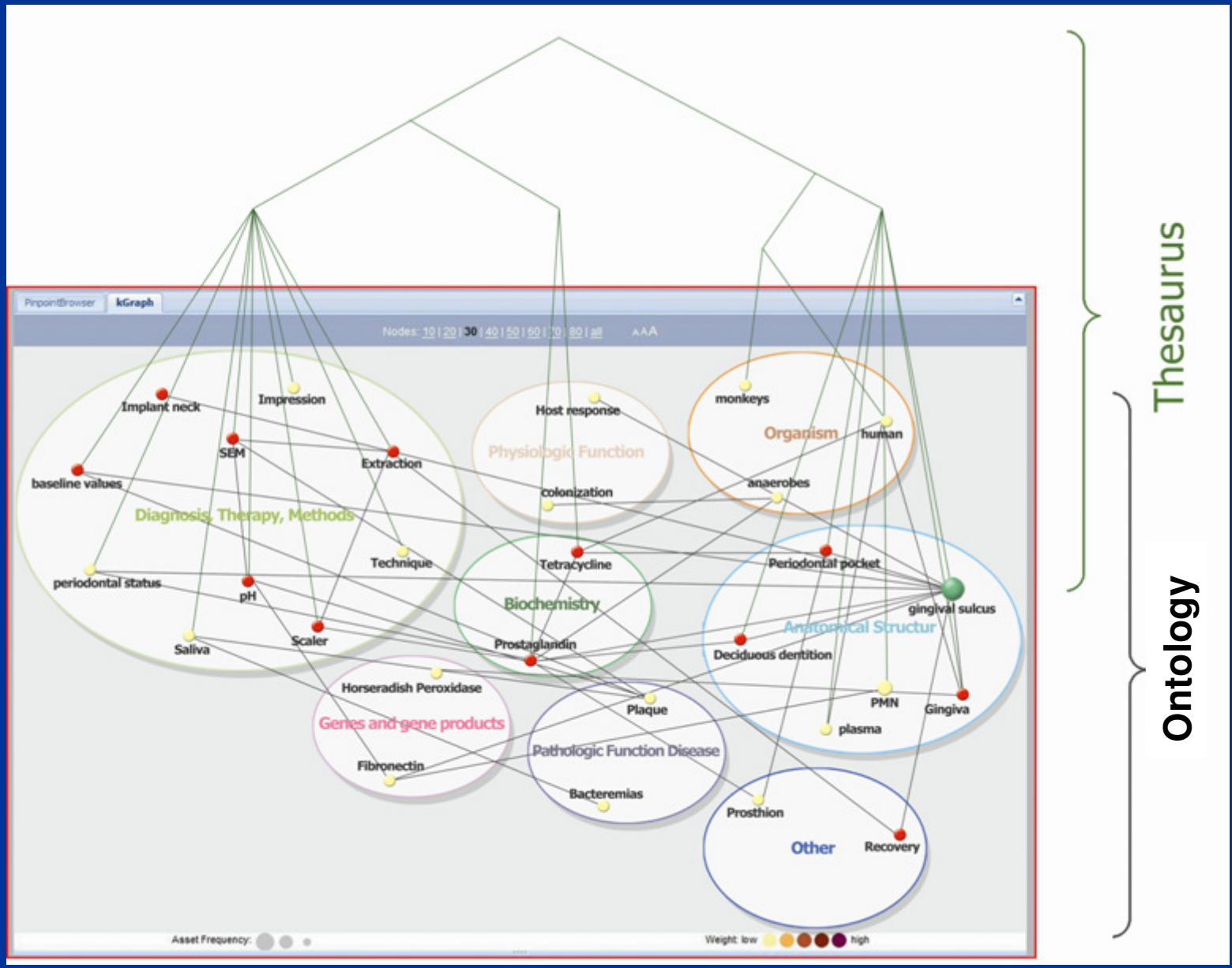
A thesaurus as a metastructure of domains with ontologically interconnected elements



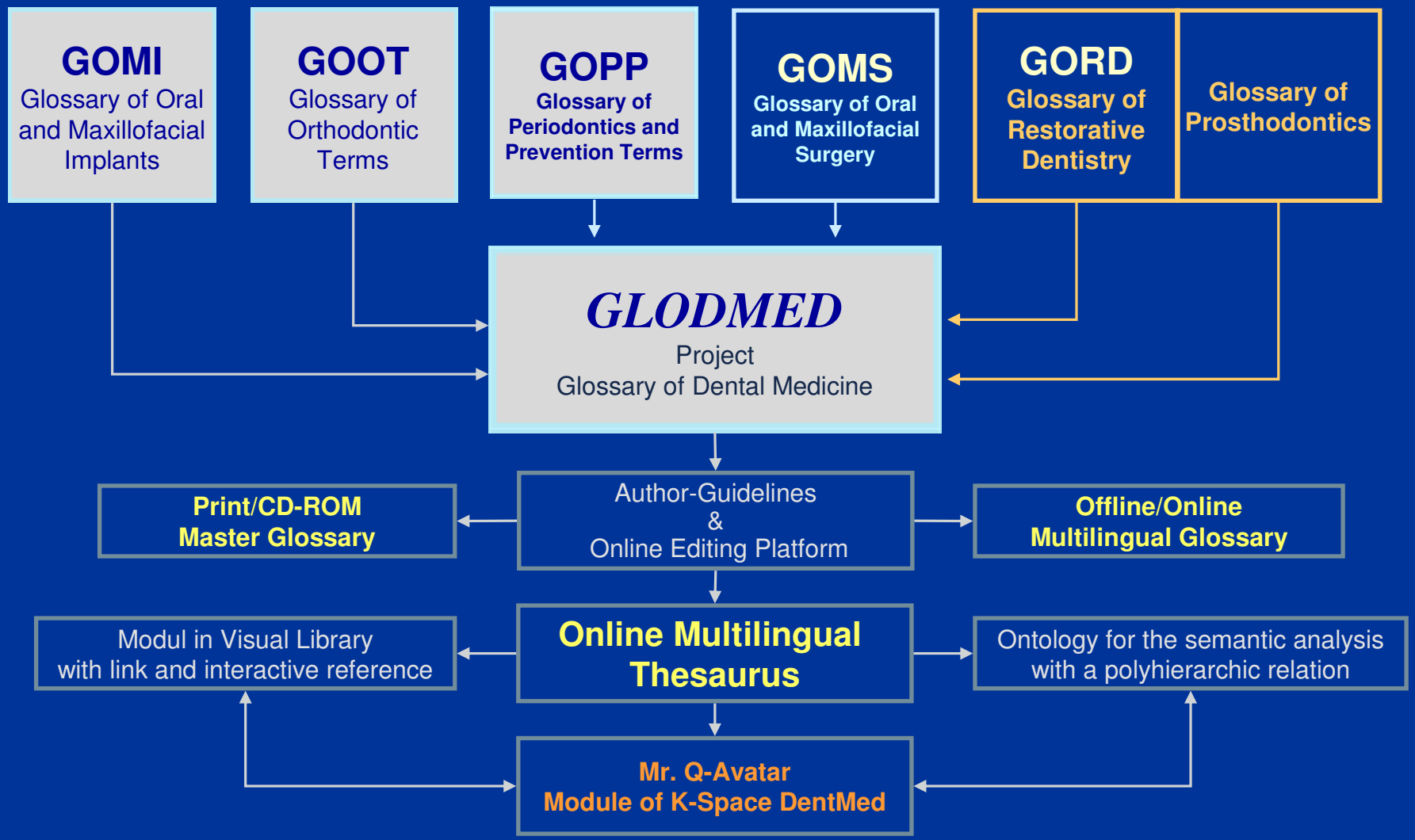
A thesaurus as a metastructure of domains with ontologically interconnected elements



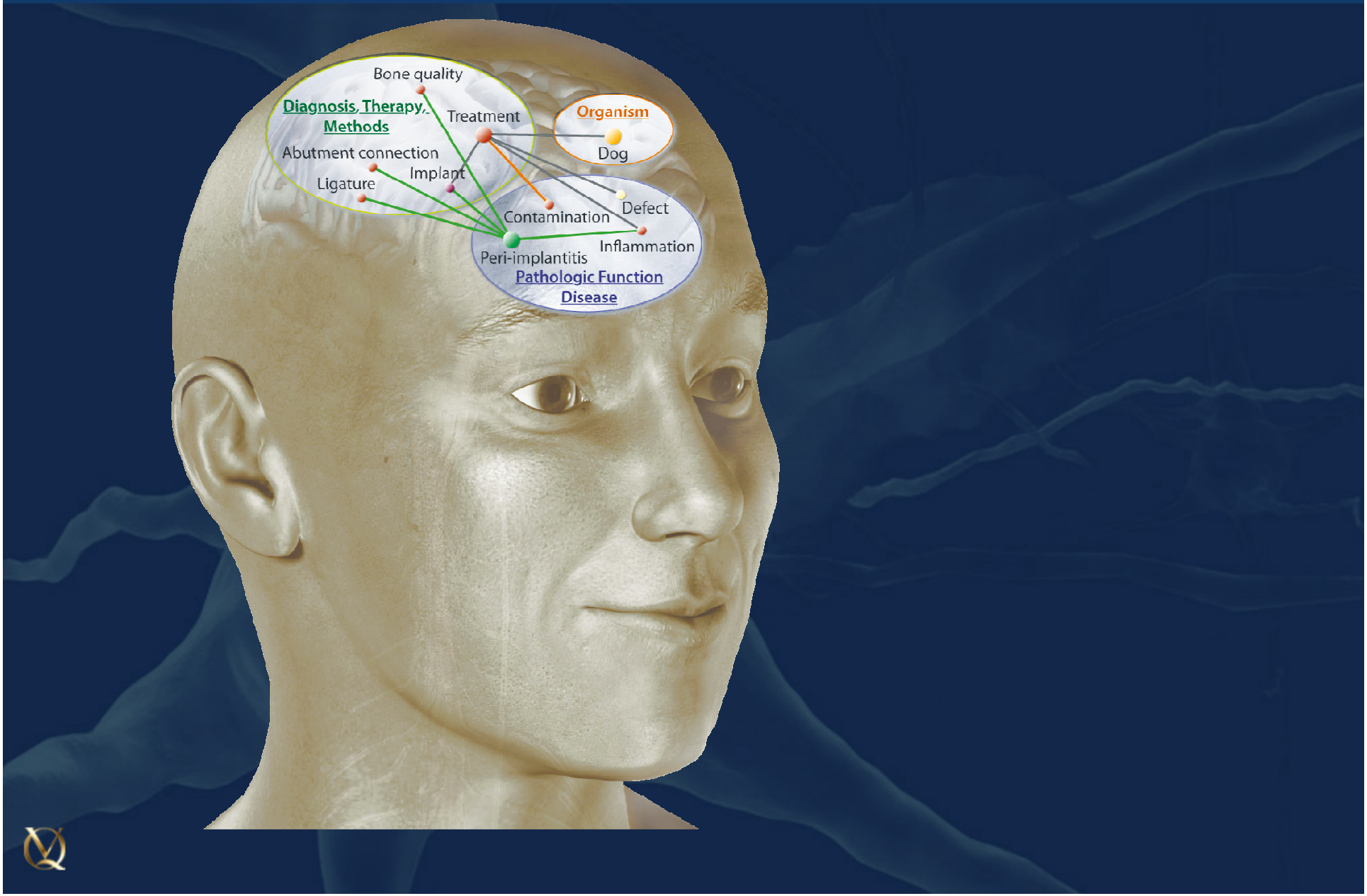
A thesaurus as a metastructure of domains with ontologically interconnected elements



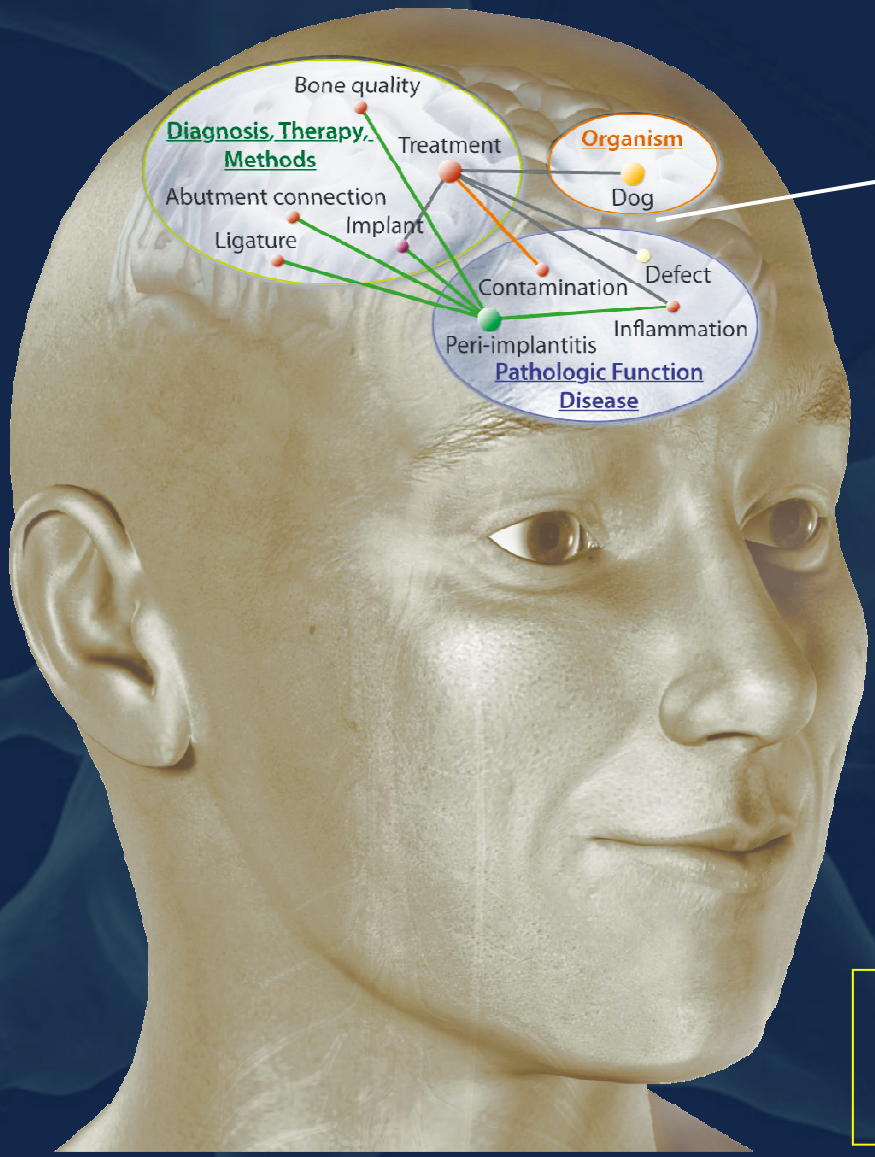
Thesaurus GLODMED



Mr. Q - your personal Web assistant



The Dental Medicine in the Web 3.0 Generation

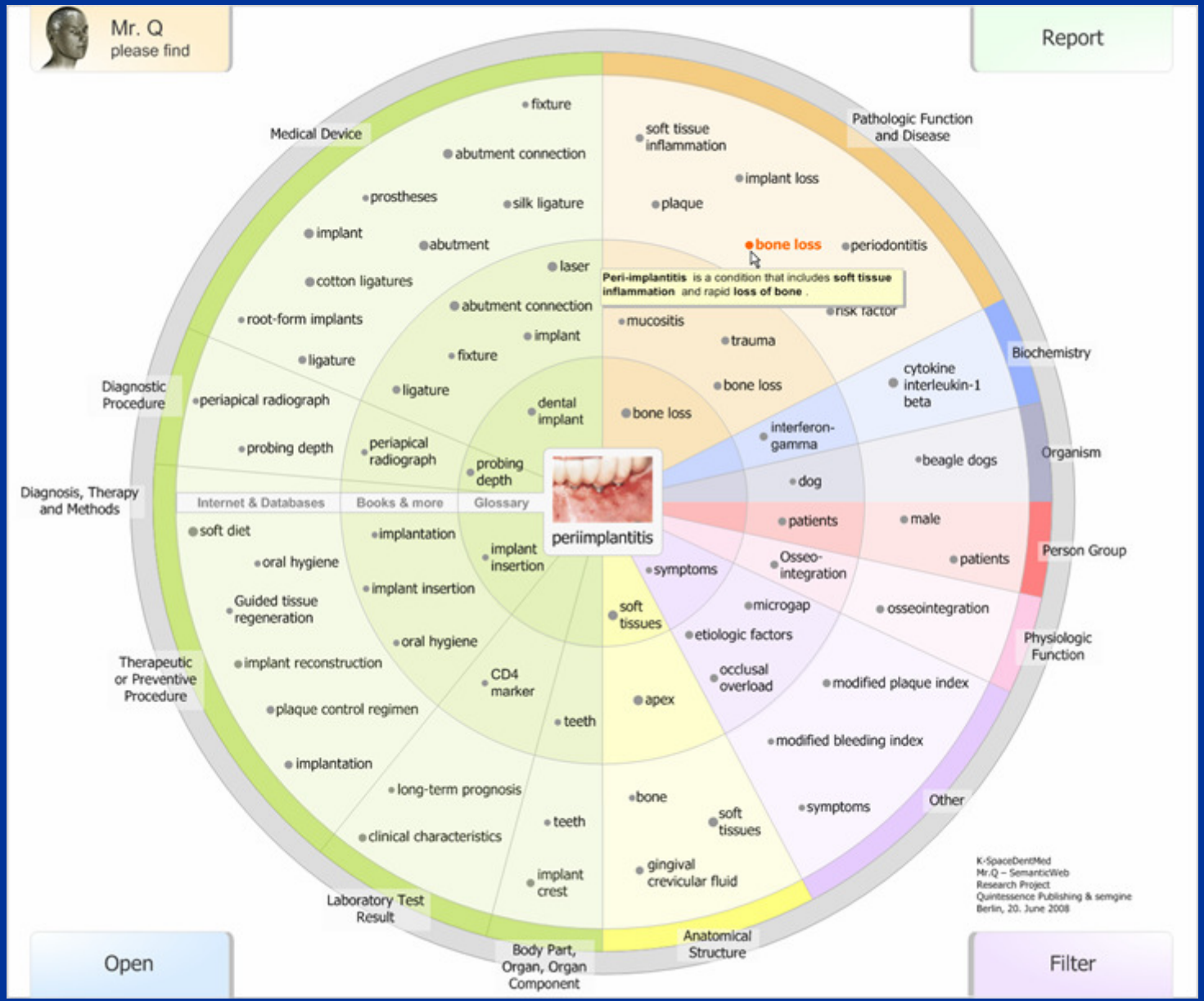


The brain of Mr. Q:

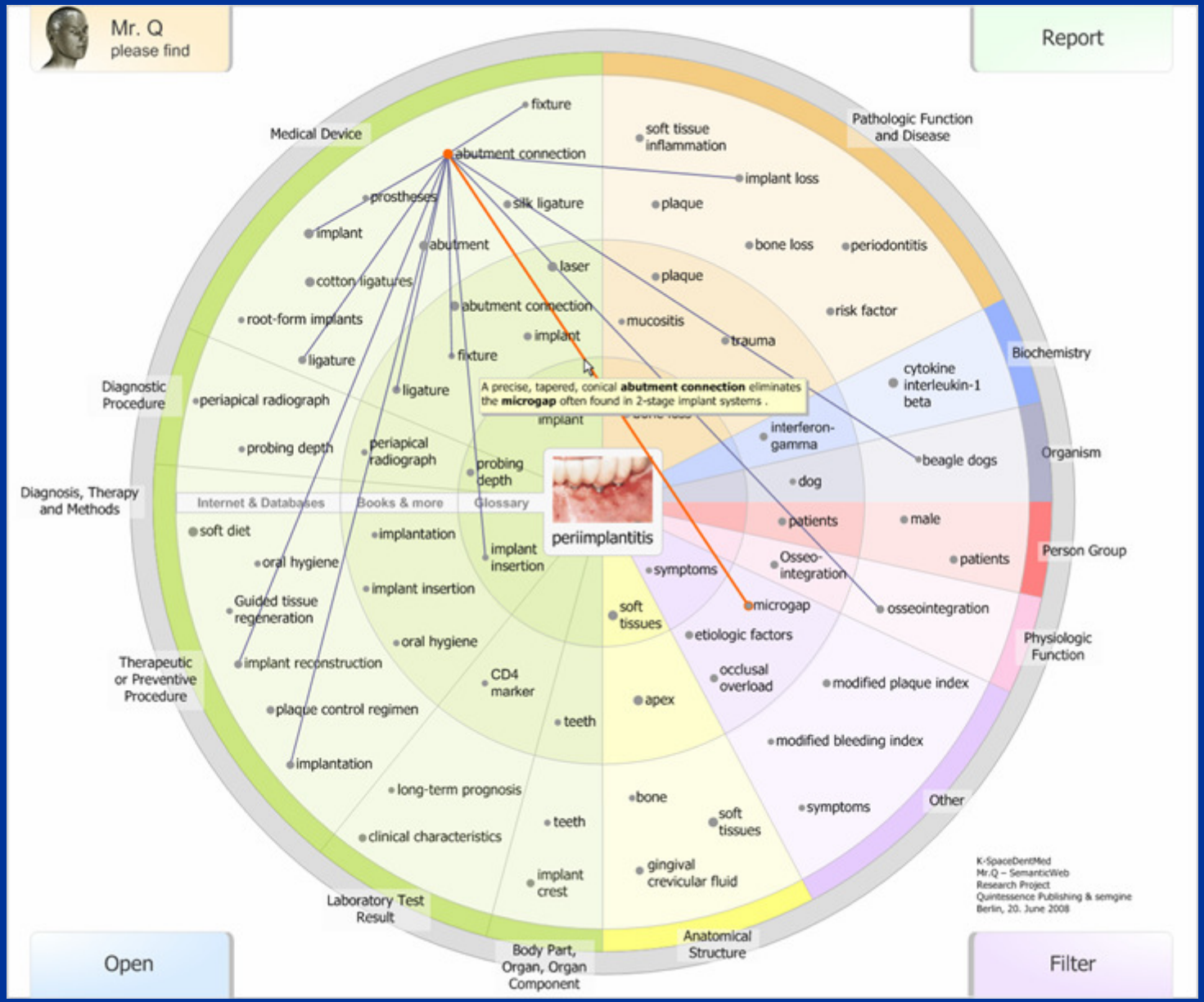
Networked knowledge spaces of the mental lexicon

Mr. Q - your personal Web assistant

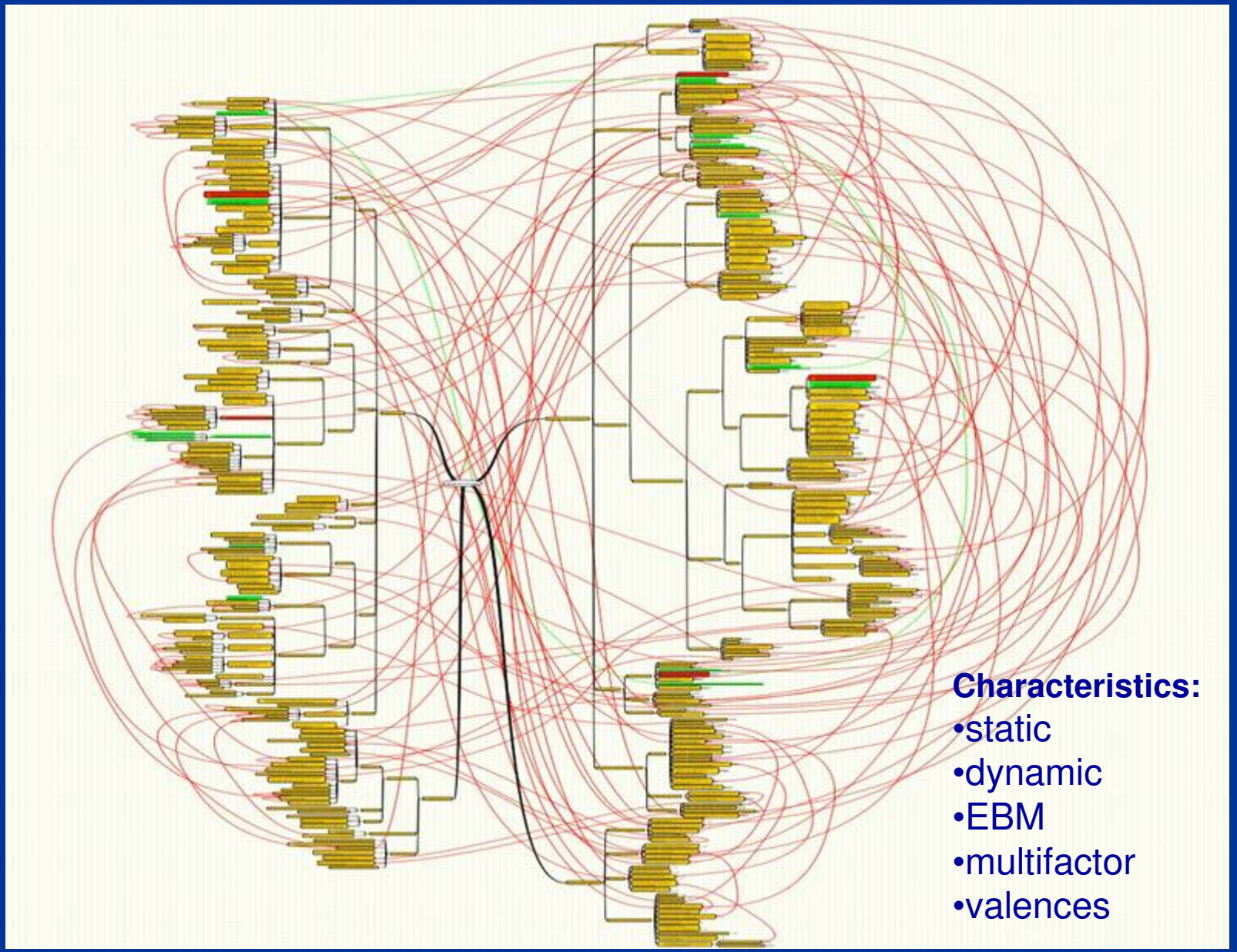
Mr. Q and the Semantic K-Graph



Mr. Q and the Semantic K-Graph



Ontology of Implant Surgery Knowledge Elements

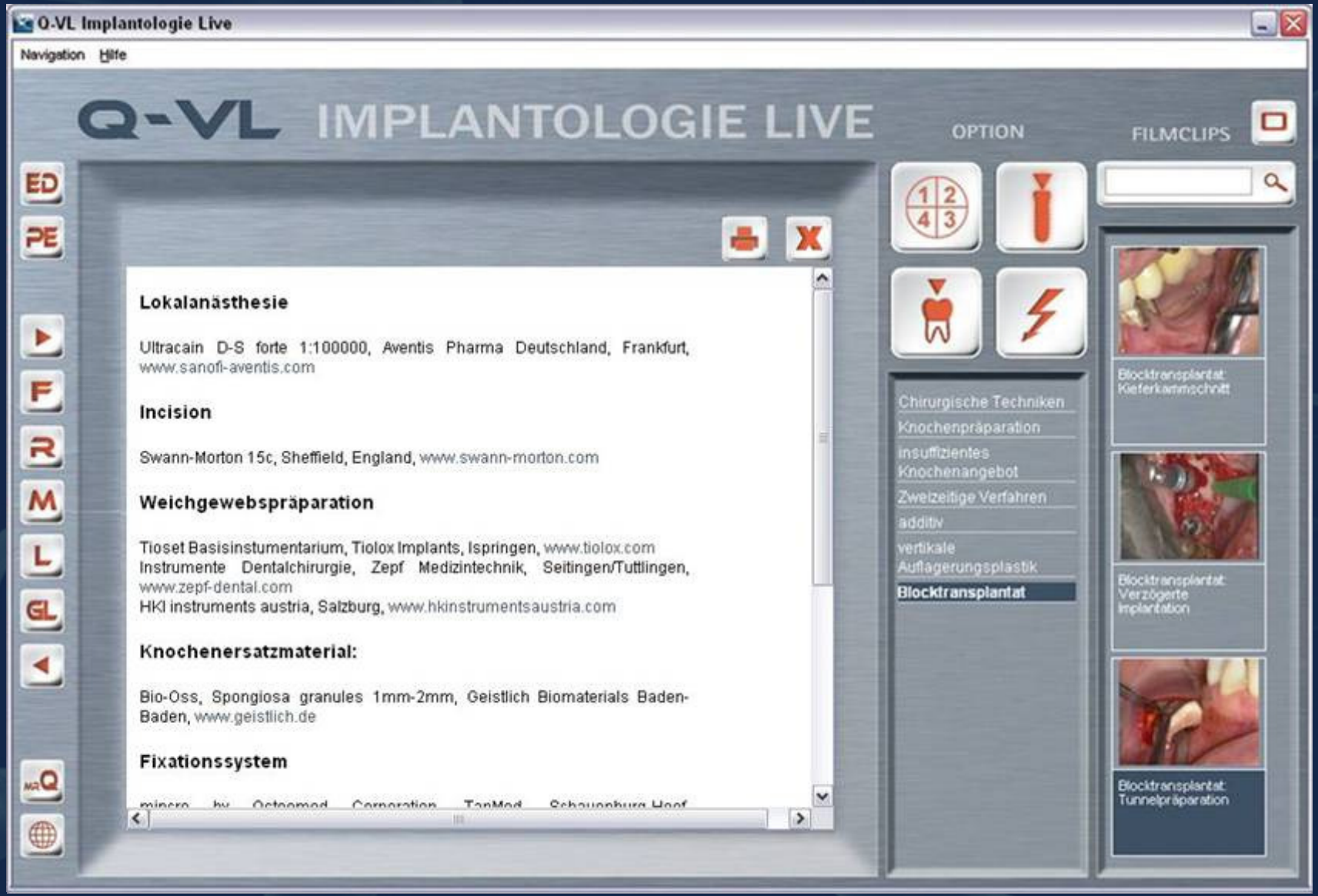


Characteristics:

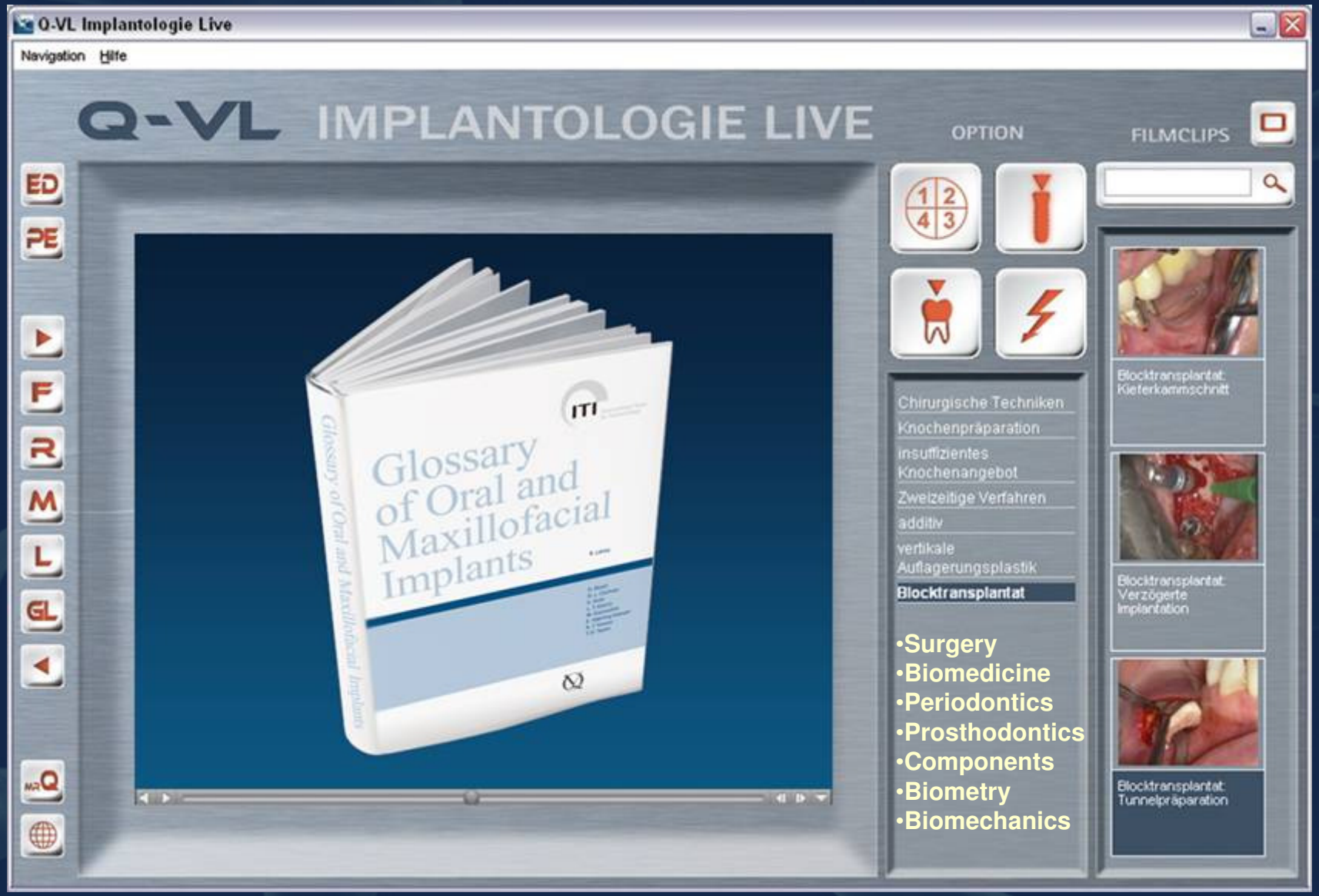
- static
- dynamic
- EBM
- multifactor
- valences

KM / VL – Structure of Knowledge Space

KM / VL – Structure of Knowledge Space



KM / VL – Exploring Knowledge Space



- Surgery
- Biomedicine
- Periodontics
- Prosthodontics
- Components
- Biometry
- Biomechanics

5 x Q Exploring Knowledge Space

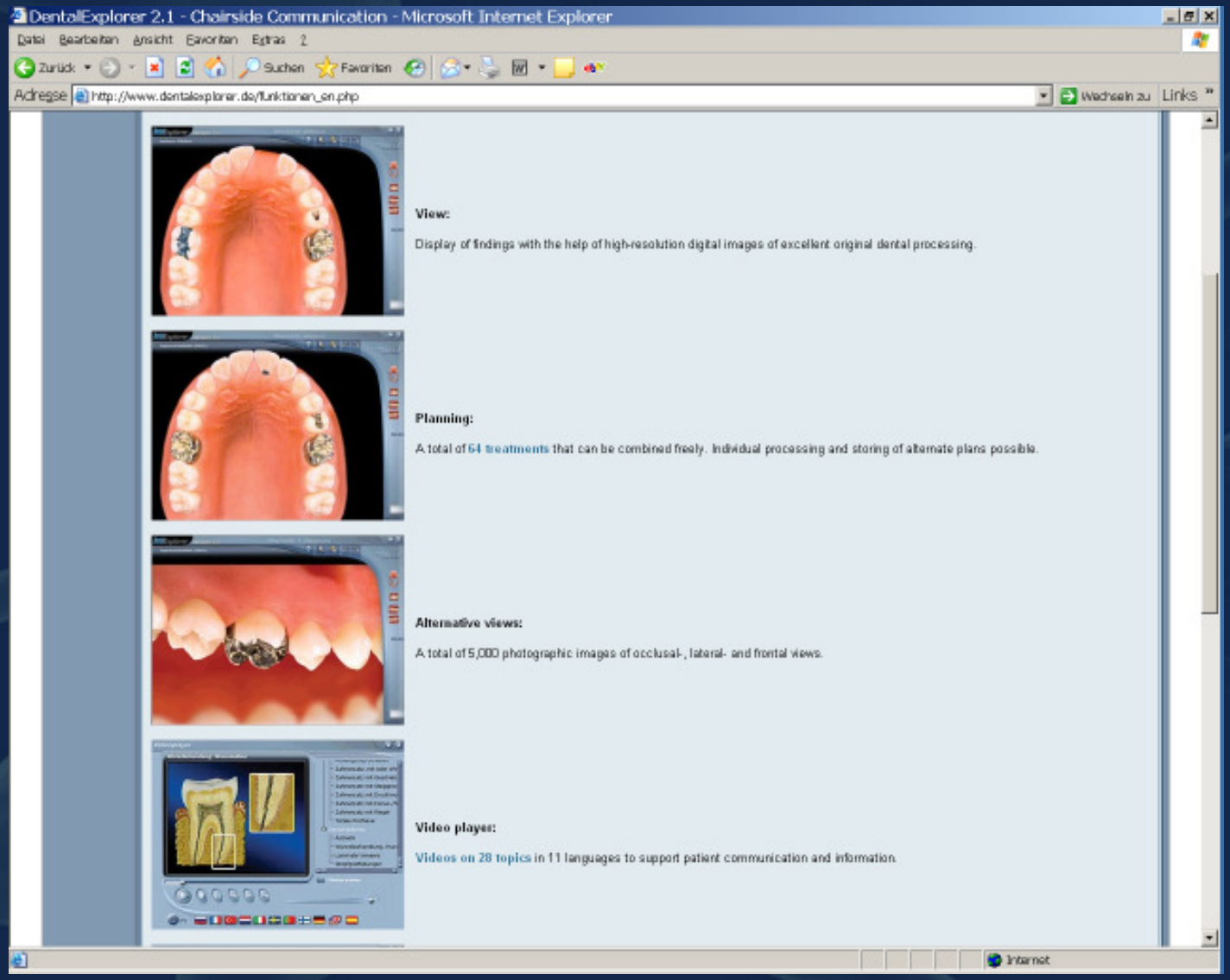
K-Space DentMed • Visual Library:
The Dynamic World of Knowledge in Dental Medicine

- Education Clips
- Courses & Training
- Guidelines

- Case Reports
- Video Clips
- Clinical Documentation

- Restorative Dentistry
- Periodontics
- Implant Dentistry
- Prosthodontics
- Oral Medicine
- Oral Surgery
- Dental Technology
- Orthodontics

multilingual

Universities and
Practice Network
of Competence
„K-Space Agent“

DentalExplorer in 11 languages