



International Symposium on BIOMEDICAL INFORMATICS IN EUROPE

26-27 June, 2007



European Commission
Information Society and Media





Towards interoperable eHealth systems

Two core challenges of
SemanticMining



- ... to bridge gaps in the European research infrastructure and to facilitate cross-fertilisation between disciplines ...





- Google search
 - “semantic mining” ~ 20.000 hits
 - semanticmining ~ 1.000 hits
- FP7 call 1: “Emerging technologies like **semantic mining** and semantic information integration should be validated on multimedia databases.”



Core challenge #1: semantic interoperability

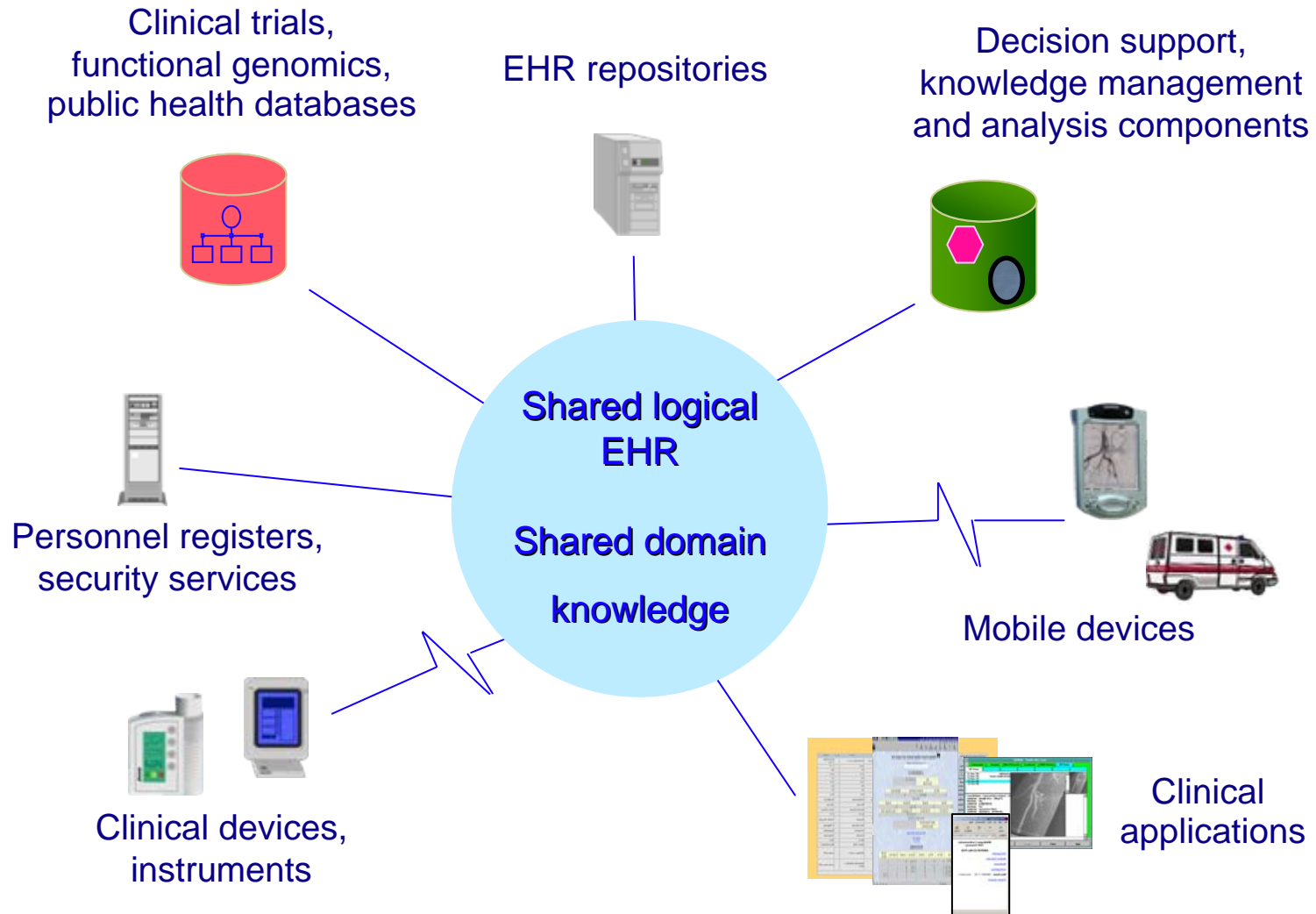


- The challenge of reuse and pooling of information is often addressed, and sometimes expressed as the problem of *semantic interoperability*, which simply means that semantics is preserved in communication between information systems ...

... a condition which should be natural but has proven to be very hard to achieve, especially in the **complex application area of health care** and at a time when combined advances in life sciences and information technologies are increasingly modifying the practices of the domain.



The semantically well-defined EHR





Choice of reference models?



- EHRcom (EN 13606) / openEHR vs. HL7 CDA
- SNOMED CT + ICD10, ICF ...



Core challenge #2: language barriers



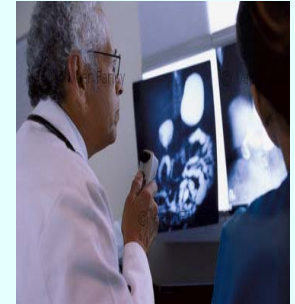
**Medically
empowered
patients**



Prevention



Consultation



Analysis



Care



Procedure

Improved healthcare process



- Mobility in Europe across language borders
 - access to patient information, EHR extracts (based on the semantically well-defined record + language technology)
- Medical and biomedical disciplines
 - between medical specialties
 - integration of clinical medicine and life science (bioinformatics)
 - “personalised medicine”
- Professional and laymen terminology
 - patient empowerment
 - “personalised medicine”



Cross language retrieval



Morphosaurus-Search DIMDI - Mozilla Firefox

http://morphine.coling.uni-freiburg.de/suitSearch/index.php?from=1&to=20&os=20&query=risikofaktoren+schuppenflechte&db=All&qlang=guess&language=f

MORPHOSAURUS

risikofaktoren schuppenflechte

Select database: All Select query language: German Select target language: All

Found 11 results in 247 msec.

Psoriasis: familial predisposition and environmental factors

Author(s): Kavli G; Foerde OH; Arnesen E; Stervold SE
Journal: British Medical J. -- Page: 291 (1985) S. 999-1000
Term(s): **Psoriasis**; Hautkrankheit; Genetik; Praevalenz; Geschlecht; **Risiko**; Norwegen
Abstract: In survey for coronary **risk factors** 14.667 adult men and women answered questionnaire on lifestyle, diet, and health, including whether they had **psoriasis**. The overall prevalence of **psoriasis** was 4.79% in men and 4.85% in women. The data showed an increasing incidence of **psoriasis**. The association with family history, lifestyle, diet, and health was explored by multiple regression analysis. The occurrence of **psoriasis** in first degree relatives contributed to more than 90% of the explained variance for both sexes. Of the other variables, only the positive association with rheumatoid arthritis was significant in both sexes. It is concluded that the examined environmental **factors** have only minor effects on the prevalence of **psoriasis**. (Speicher-Nr.468033)

Database: SOMED Document Number: SM468033 Score: 50

Predisposing factors in occupational skin diseases

Author(s): Shumes E
Journal: Dermatologic Clinics -- Page: 6 (1988) Nr. 1, S. 7-13
Term(s): Disposition; **Risikofaktor**; Berufsdermatose; Dermatitis; **Psoriasis**
Abstract: Work-related skin disorders do not appear randomly, they are the result of certain predisposing **factors** in the environment and the host. These **factors** can be isolated and recognized, and awareness of these **factors** by employers and affected employees should have significant impact on work-related skin disease. The role of dermatologist in providing this information is essential.

Database: SOMED Document Number: SM519032 Score: 32

Korrosions- und Biokompatibilitaetspruefung dentaler Legierungen Therapieansetze bei Amalgamtraegern mit atopischer Dermatitis und Psoriasis vulgaris

Author(s): Ionescu G
Journal: Aertz. Naturheilverfahren -- Page: 38 (1997) Nr. 2, S. 119-139
Term(s): Zahnersatz; Zahnmedizin; Legierung; Quecksilber; Kupfer; Palladium; Amalgam; Korrosion; Neurodermitis; **Psoriasis**; Materialpruefung; Allergie; Toxikologie
Abstract: Die potentiellen gesundheitlichen **Risiken** verschiedener Dentallegierungen und Amalgame sind auf **multifaktorielle** Ursachen zurueckzufuehren. Die Freisetzung einzelner Metallkomponenten in situ wird sowohl vom Korrosionsverhalten, von der Phasentransformation und von der Abrasion der verwendeten Legierung als auch von dem pH-Wert, der Temperatur, dem mikrobiellen Belag und der Zusammensetzung des Speichels und der Nahrung bestimmt. Solche Prozesse, die zu lokalen oder Fernwirkungen fuehren koennen, lassen sich durch entsprechende Korrosions-, Mobilisations- und Biokompatibilitaets tests wie die Epikutan-, Lymphozytensensibilisierungs- oder Zelltoxizitaetsuntersuchungen belegen und durch die richtige Materialauswahl vermeiden. Der definitive Nachweis der Metallbelastung, gefolgt von entsprechenden wiederholten Ausleitungsverfahren mit Chelatstoffen unter antioxidativem Schutz bewirkt in den schwierigen Neurodermitis- und **Psoriasisfaellen** eine signifikante Symptomverbesserung.

Database: SOMED Document Number: SM624995 Score: 27

Fertig

More than 650.000
Multilingual
Documents
Indexed

Medical dictionary
with ~ 100.000 entries
Engling, German,
French, Swedish,
Spanish ...



Primary column:
Uniprot/Swiss-Prot protein

All Medline abstracts

All terms, all pairs

By the Rebholz group



Wnt Search

[Advanced Search](#) [Query Syntax](#)

Summary

184.514 seconds



3888 Medline Abstracts



Type	Hits	HitPairs
Protein/Gene	3003	49058
Cellular component	119	3350
Biological process	351	8490
Molecular function	58	1356
Drug	114	1262
Species	251	8396
Total	3896	71912

Secondary columns:
Biological concept associated
To protein in primary column

HitPair table

- You can explore a total of 49058 permutations for this HitPair table arrangement. Click on the secondary columns' headers to rearrange the table.
- Rows 1 to 5 (out of 2926).

first << 1/586 >> last

Protein/Gene	Protein/Gene	Cellular component	Biological process	Molecular function	Drug	Species
beta-catenin <small>(score: 7829)</small>	APC or APCs (252/448) GSK-3beta or glycogen synthase kinase-3beta (188/290) axin or axins (148/264) E-cadherin (103/176) cyclin or cyclins (100/166) wnt-1 or Wnts 1 (78/145) Lef or	nucleus (146/197) cytoplasm (87/95) intracellular (69/83) membrane (44/56) plasma membrane or cell membrane or cytoplasmic membrane (41/53) adherens junctions (29/36) extracellular or extracellular regions (16/18) cytoskeleton (14/14) transmembrane (13/13)	transcription (376/496) development (219/275) phosphorylation (170/256) localization (139/193) transduction (107/124) cell adhesion (73/90) cell-cell adhesion (47/52) apoptosis (45/80) cell proliferation or cells proliferation (44/51) pathogenesis (26/27) embryogenesis (21/24)	binding (200/261) DNA-binding (19/22) kinase activity (5/5) cadherin binding (3/4) protein binding (3/3) mitogen-activated kinase (2/2) MMP-9 or MMPs-9 (2/2) E2 (2/2) GPCR (2/2) PKA (1/4)	Lithium (26/38) thyroid (10/32) chondrocytes (10/24) retinoic acid (7/7) Diclofenac or anti-inflammatory drugs or indomethacin (6/16) etodolac or sulindac or ibuprofen (4/13) monomeric or modular (4/6)	cancer (275/471) human or man or Homo sapiens (216/283) Xenopus (122/162) Mouse or nude mice or transgenic mice or Mus musculus (112/156) armadillo (108/156) axis (91/133) Drosophila (76/81)



www.semanticmining.org

12 EC applications

>60 co-authored scientific publications

Public deliverables

Educational material

Tools, models and services:

- information retrieval, text mining

- multi-lingual medical dictionary

- openEHR components

- contribution to standards

- upper level ontologies

... ..



Personalised and patient centered care



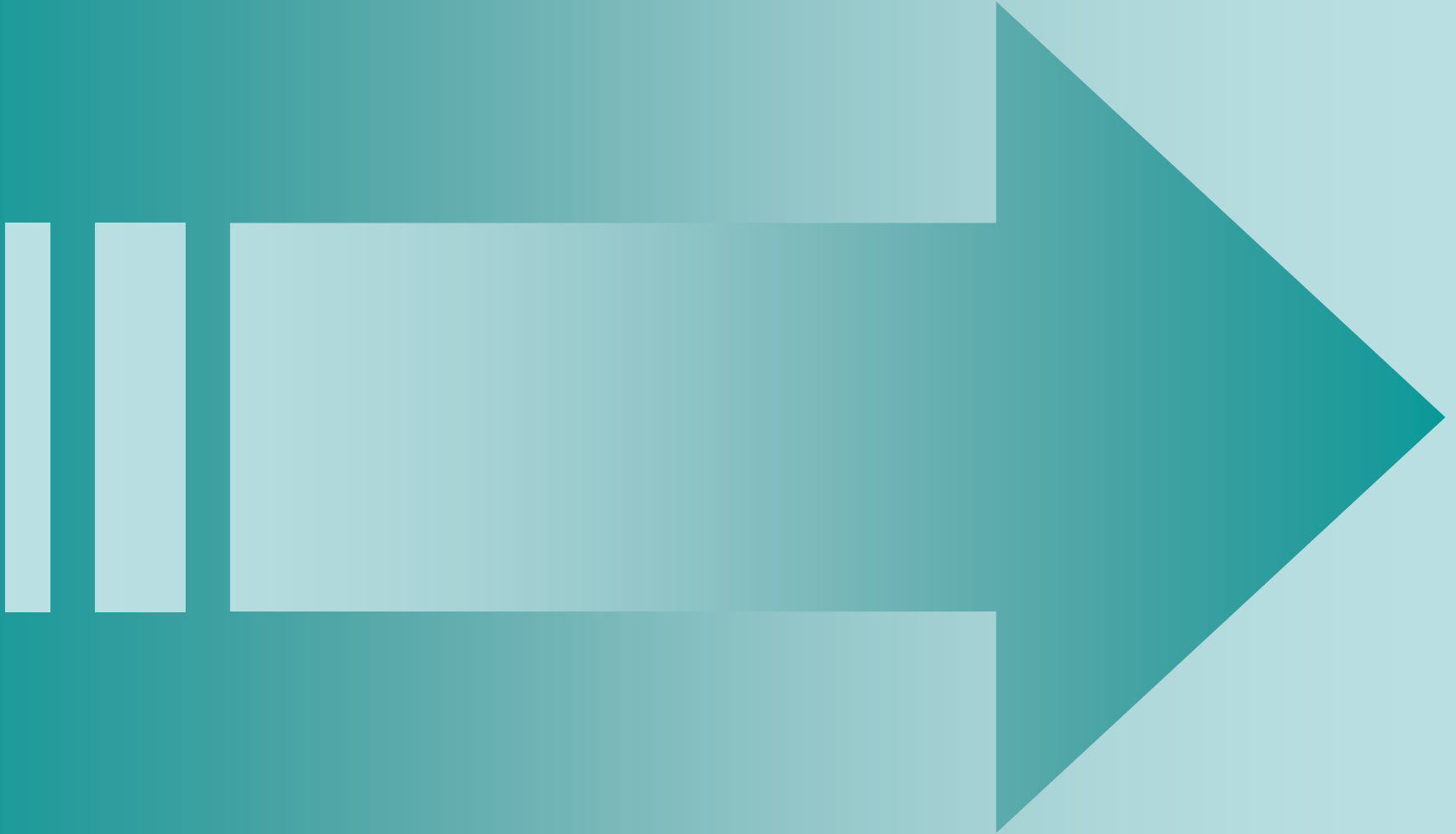
Best practice



Evidence based medicine



Patient safety







- **Technical**
 - communication protocols, message formats
- **Functional**
 - human understandable
- **Semantic**
 - automatic processing, reasoning with patient data
 - common use of reference models (information model, terminology model)