

Khresmoi – Towards improved medical information access

Allan Hanbury
Vienna University of Technology, Austria

- Knowledge is produced increasingly **quickly**
 - Medical literature has an explosion in publications
 - Not all clinicians have access to new information with the same speed
- Clinicians search for information frequently
 - Physicians have an unmet information need for 2 of every 3 patients seen [3]
 - PubMed search takes long (30+ minutes instead of 5 available) [4, 5]
 - Imaging and other exams create information overload
- We want **empowered** patients but no Cyberchondria
 - But can they access information of high quality? [6, 7, 10]

The Google problem

The image is a screenshot of a Google search results page for the query "cancer treatment". The search bar at the top shows the query and the number of results (70,700,000). Below the search bar, there are several search results. The first result is "Cancer Management" from www.gehealthcare.com/esmo. The second result is "Cancer Treatment - National Cancer Institute" from www.cancer.gov/cancertopics/treatment. The third result is "Types of Treatment - National Cancer Institute" from www.cancer.gov/cancertopics/treatment/types-of-treatment. The fourth result is "Management of cancer - Wikipedia, the free encyclopedia" from en.wikipedia.org/wiki/Management_of_cancer. The fifth result is "ScienceDirect - Cancer Treatment Reviews, Volume 36" from www.sciencedirect.com/science/journal/03057372. The sixth result is "Cancer Treatment and Symptoms : Doctor-Reviewed Info" from health.yahoo.net/channel/cancer.html. The seventh result is "HERBAL CANCER TREATMENT" from www.lifepositive.com, which is highlighted with a red box. This result includes a snippet: "This has shown potential as a treatment for AIDS and cancer. ... Some available in cancer treatment centers or hospices, ...". To the right of the search results, there is a large advertisement for "HERBAL CANCER TREATMENT" from www.lifepositive.com. The advertisement features a banner with the text "HERBAL CANCER TREATMENT" and "***Check out our section on Holistic Cancer Cure***". Below the banner, there is a section titled "INTRODUCTION" which discusses the use of herbs in traditional Chinese medicine. The advertisement also includes a "STOP" sign graphic. On the left side of the page, there is a sidebar with various links and tools, including "Tutto", "Notizie", "Più contenuti", "Nel Web", "Qualsiasi data", "Visual. standard", and "Più strumenti".

Google

cancer treatment

Cerca

Circa 70.700.000 risultati (0,17 secondi)

Ricerca avanzata

Cancer Management www.gehealthcare.com/esmo Multidisciplinary **Cancer** management GE HC @ ESMO 2010. Learn More

Link sponsorizzato

Cancer Treatment
The leading European oncologists
Center of Oncology Spizhenko
www.CyberClinika.com

Visualizza il tuo annuncio qui »

Suggerimento: [Cerca risultati solo in Italiano](#). Puoi specificare la lingua di ricerca su [Preferenze](#)

Cancer Treatment - National Cancer Institute ☆ - [Traduci questa pagina]
Information on standard, complementary, and alternative methods of **cancer treatment**, on specific anticancer drugs, and on drug development and approval.
www.cancer.gov/cancertopics/treatment - Copia cache - Simili

Types of Treatment - National Cancer Institute ☆ - [Traduci questa pagina]
Information on chemotherapy, radiation therapy, surgery, and other methods.
www.cancer.gov/cancertopics/treatment/types-of-treatment - Copia cache - Simili

Management of cancer - Wikipedia, the free encyclopedia
Chemotherapy is the **treatment** of **cancer** with drugs ("anticancer drugs") to kill **cancer** cells. In current usage, the term "chemotherapy" usually ...
en.wikipedia.org/wiki/Management_of_cancer - Copia cache - Simili

ScienceDirect - Cancer Treatment Reviews, Volume 36
The online version of **Cancer Treatment** Reviews on ScienceDirect, the platform for high quality peer-reviewed full-text publications in ...
www.sciencedirect.com/science/journal/03057372 - Simili

Cancer Treatment and Symptoms : Doctor-Reviewed Info
Treatment also varies based on the type of **cancer** and its stage. The **Info** refers to how much it has grown and whether the tumor has spread from ...
health.yahoo.net/channel/cancer.html - Copia cache

HERBAL CANCER TREATMENT ☆ - [Traduci questa pagina]
This has shown potential as a treatment for AIDS and cancer. ... Some available in **cancer treatment** centers or hospices, ...
www.lifepositive.com/cancer/herbal-cancer-treatment - Copia cache

Life POSITIVE
Your Complete Guide To Holistic Living

REGISTER NOW
Location : Hotel Four Seasons: St. Joseph's church road, Juhu, Mumbai-400049.
Oct. 2010

Workshop : The healing power of herbs
By Ketan Shah
13th Nov. 2010 to 14th Nov. 2010

Subscribe NOW** [Print Edition](#)
Life is nothing but a struggle. Life is posed by the great challenges. Often, it is the vexing everyday life that stymies your few spiritual and practical solutions. your hassles **More>>**

Home Events Products Practitioners Body Mind Spirit Ask our experts Writers Greetings Archives About us

HERBAL CANCER TREATMENT
Check out our section on Holistic Cancer Cure

HERBAL CANCER TREATMENT
Herbal Therapies

INTRODUCTION
Many **herbs** (including astragalus, dong quai, echinacea, and Asian ginseng) supposedly "boost" the immune system and so shore up the body against future or existing cancer. Extremely small studies suggest that shiitake or maitake mushrooms, mistletoe, extracts of the Venus flytrap, and various botanical therapies used in traditional Chinese medicine may help treat certain forms of cancer. But until better evidence is in, we cannot completely rely on them. Ginger, and maybe some other herbs, may help relieve some of the side effects of chemotherapy and radiation therapy.


Before a Prostate Biopsy
Know your potential prostate cancer risk before an invasive biopsy.
www.ProstateHealthIndex.org

All Natural Products
Use Alone or with Chemo & Radiation
Peer-Reviewed

Username:
Password:
☐ Remember my password
[Sign in](#) [Forgot Password](#)
[Register here](#) | [Why should I register?](#)


INTERACTIVE FEATURES
[GET YOUR TAROT READ](#)
[ASK THE LAUGHING BUDDHA](#)

The PubMed problem



U.S. National Library of Medicine
National Institutes of Health

Search: PubMed

 RSS [Save search](#) [Limits](#) [Advanced search](#) [Help](#)

head trauma

Search

Clear

[Display Settings:](#) ☒ Summary, 20 per page, Sorted by Recently Added

[Send to:](#) ☐

Results: 1 to 20 of 111340

<< First < Prev Page 1 of 5567 Next > Last >>

- ☐ [Admission hyperglycemia is a reliable outcome predictor in children with severe traumatic brain injury.](#)
1. Aşlıoğlu N, Turna F, Paksu MS.
J Pediatr (Rio J). 2011 May 19;87(4). [Epub ahead of print]
PMID: 21597650 [PubMed - as supplied by publisher] **Free Article**
[Related citations](#)
- ☐ [Pediatric Sensorineural Hearing Loss, Part 2: Syndromic and Acquired Causes.](#)
2. Huang BY, Zdanski C, Castillo M.
AJNR Am J Neuroradiol. 2011 May 19. [Epub ahead of print]
PMID: 21596810 [PubMed - as supplied by publisher]
[Related citations](#)
- ☐ [Axonal Injury in Young Pediatric Head Trauma: A Comparison Study of \$\beta\$ -amyloid Precursor Protein \(\$\beta\$ -APP\) Immunohistochemical Staining in Traumatic and Nontraumatic Deaths*](#)
3. Johnson MW, Stoll L, Rubio A, Troncoso J, Pletnikova O, Fowler DR, Li L.
J Forensic Sci. 2011 May 19. doi: 10.1111/j.1556-4029.2011.01814.x. [Epub ahead of print]
PMID: 21595698 [PubMed - as supplied by publisher]
[Related citations](#)
- ☐ [Successful prevention of oral self-mutilation using a lip guard: a case report.](#)
4. Kumar P, Bhojraj N.
Spec Care Dentist. 2011 May;31(3):114-8. doi: 10.1111/j.1754-4505.2011.00188.x.
PMID: 21592166 [PubMed - in process]
[Related citations](#)
- ☐ [Treatment Outcomes of Chronic Post-Traumatic Headaches After Mild Head Trauma in US Soldiers: An Observational Study.](#)
5. Erickson JC.
Headache. 2011 May 17. doi: 10.1111/j.1526-4610.2011.01909.x. [Epub ahead of print]
PMID: 21592097 [PubMed - as supplied by publisher]
[Related citations](#)

Filter your results:

All (111340)

[Free Full Text \(9833\)](#)

[Review \(10265\)](#)

[Manage Filters](#)

Also try:

[abusive head trauma](#)

[pediatric head trauma](#)

[minor head trauma](#)

[kuppermann head trauma](#)

[head trauma children](#)

Titles with your search terms

Identification of children at very low risk of clinically-important brain injuries : [Lancet. 2009]

Incidence and predictors of intracranial hemorrhage after minor head t [J Trauma. 2011]

Cranial nerve injury after minor head trauma. [J Neurosurg. 2010]

[See more...](#)

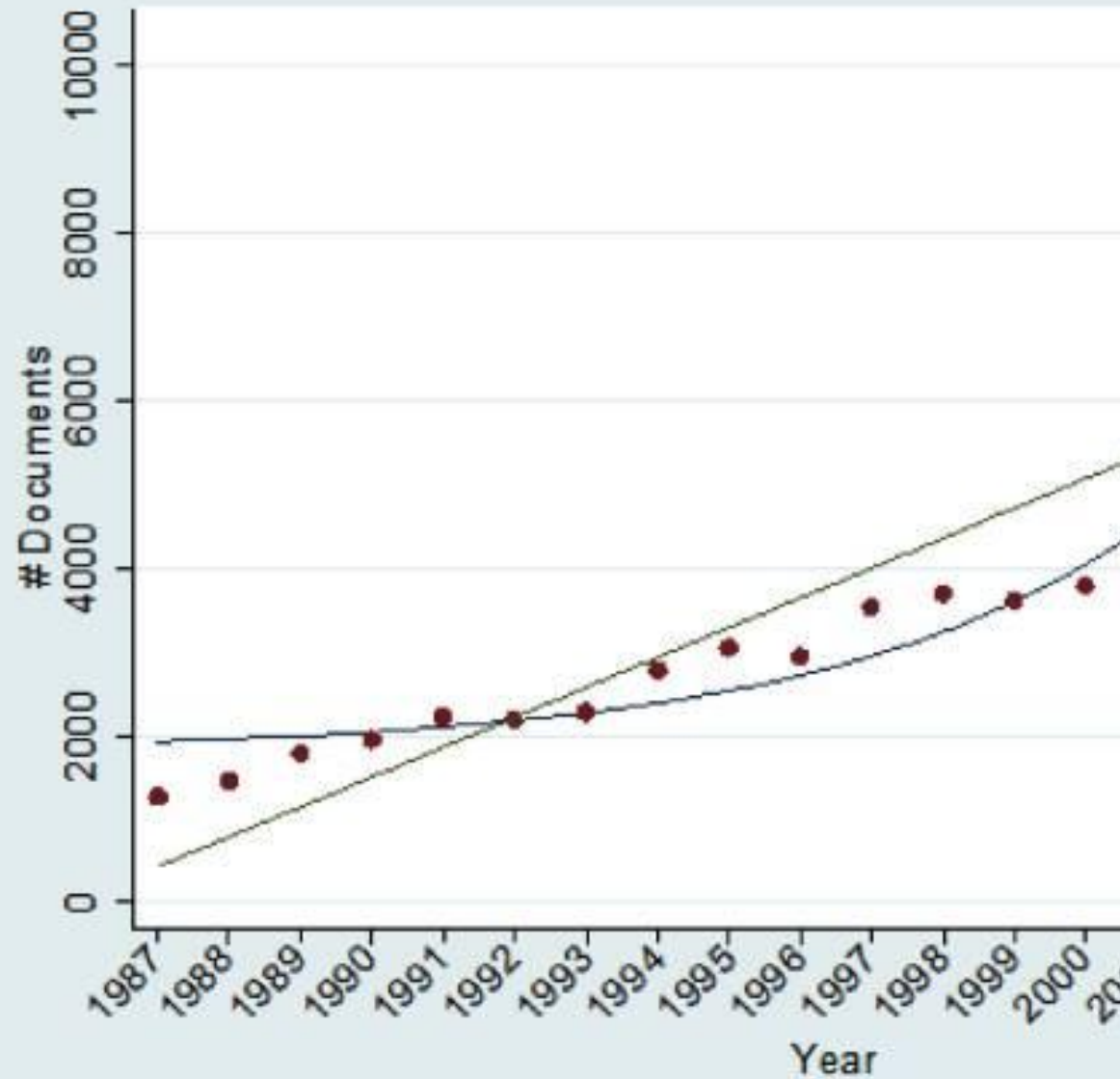
4717 free full-text articles in PubMed Central

Median Nerve Palsy following Elastic Stable Intramedullary Nailing : [Case Report Med. 2011]

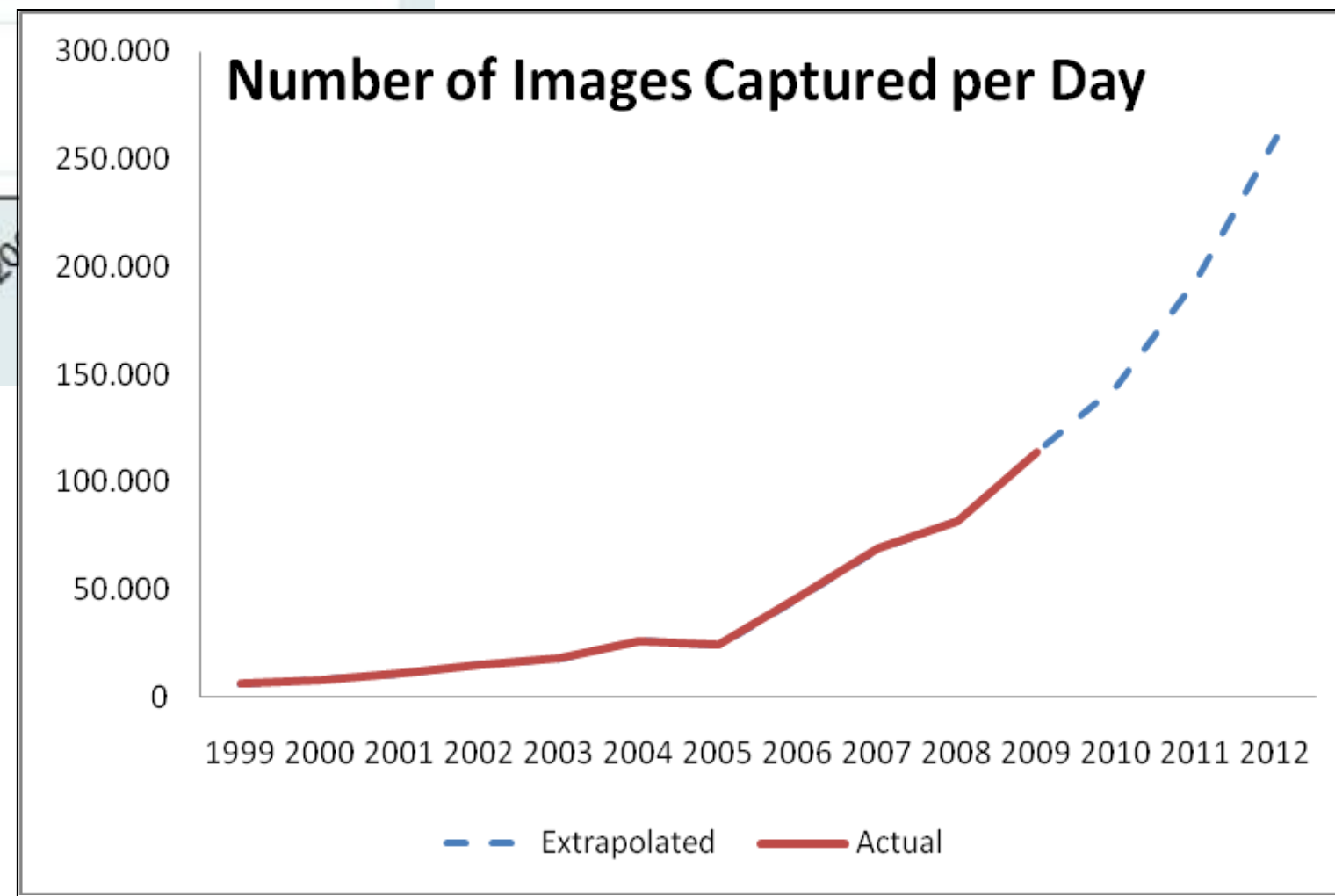
Congenital cleft of anterior arch and partial aplasia of the p [J Korean Neurosurg Soc. 2011]

Acoustic trauma increases cochlear and hair

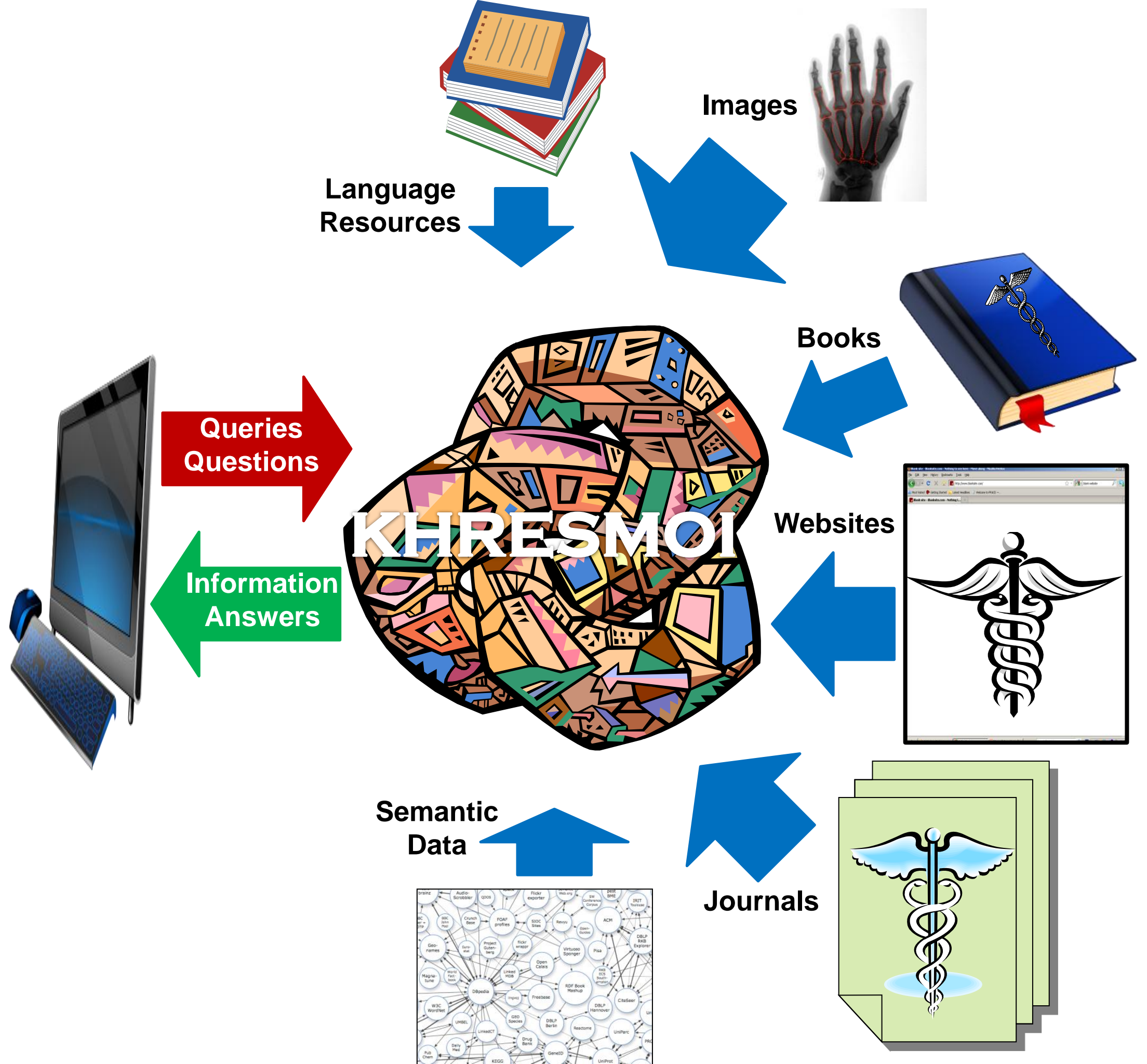
Growth ...

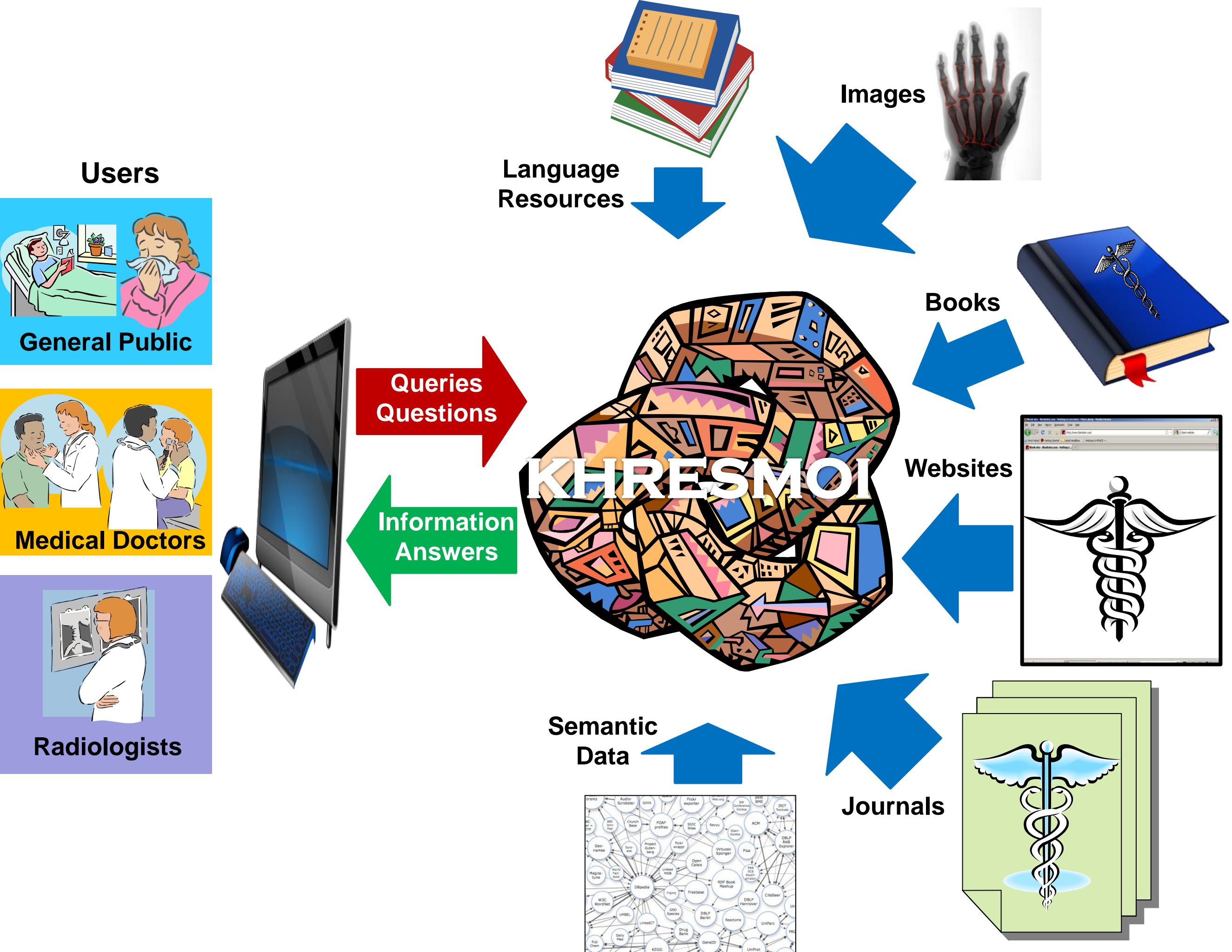


[9]

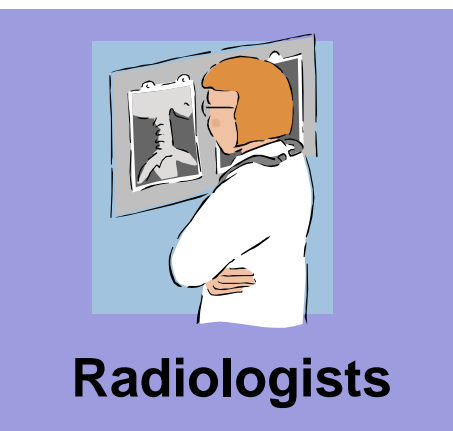
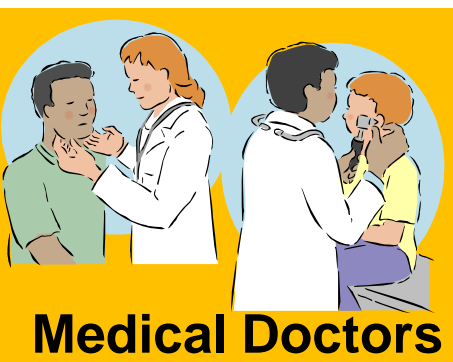
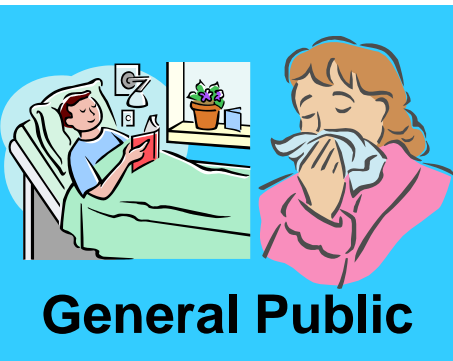


- A **multi-lingual, multi-modal** search and access system for biomedical information and documents
- Data from **many sources**
- **Multi-dimensional medical images** (2D, 3D, 4D)
- **Improved search capabilities** through natural language processing, information extraction, supervised and unsupervised categorization, linking text to knowledge base facts, ...
- **Trustable results** at a **level of understanding** adapted to the users





Use Cases



Use Case 1:
Medical Information for
European Citizens and
Medical Professionals

Focus on Text

Use Case 2:
Medical Information for
Radiologists

Focus on Images

- Information should be:
 - Easy to find
 - In the **language** of the user
 - At the **level** required by the user
 - **Trustworthy** and **reliable**
- End users:
 - Health on the Net
 - Society of Physicians in Vienna



**Wie verbinden Sie sich mit dem Internet?
(Mehrfachantworten möglich)**

- 1 Mittels Modem/Kabel/DSL
- 2 Mittels WIFI/Standleitung
- 3 Mittels USB Modem
- 4 Über ein Mobiltelefon/Smartphone
- 5 Sonstiges; bitte angeben: _____
- 6 Ich weiß es nicht

Welche(s) Gerät(e) nutzen Sie um sich mit dem Internet zu verbinden?

- 1 PC zuhause oder in der Arbeit
- 2 Laptop, Netbook
- 3 Mobiltelefon
- 4 Smartphone (z.B. iPhone, Blackberry)
- 5 Tablet (z.B. iPad, Samsung Galaxy)
- 6 Sonstiges; bitte angeben: _____

Wie oft verbinden Sie sich während einer ärztlichen Beratung oder Visite mit dem Internet?

- 1 Nie
- 2 Selten
- 3 Manchmal
- 4 Oft
- 5 Immer
- 6 Ich berate keine Patienten/mache keine Visiten

Nach welchen Informationen suchen Sie im Rahmen Ihrer täglichen ärztlichen Praxis/Tätigkeit?

- 1 Abkürzungen/Definitionen
- 2 Diagnostische Hilfe
- 3 Krankheitsbeschreibungen
- 4 Behandlungsspezifische Information
- 6 Medikationsinformation
- 7 Präventionsmaßnahmen
- 9 Krankheitsursachen und Risikofaktoren
- 10 Klinische Studieninformationen/Wissenschaftliche Artikel
- 11 Patientenressourcen: Patientenbroschüren und Informationen (z.B. Selbsthilfegruppen)
- 12 Stellenanzeigen/Karrieremöglichkeiten
- 13 Medizinische Ausrüstung (z.B. für Überweisungen von Patienten)
- 14 Information über andere Ärzte/Institution
- 15 Medizinische Fortbildungsveranstaltungen

Large-scale questionnaires
and interviews are
conducted with
medical professionals
and
the general population

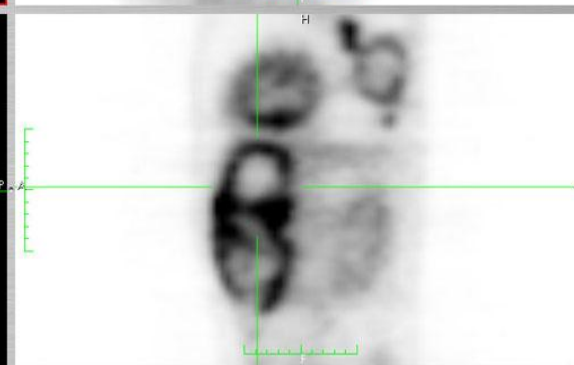
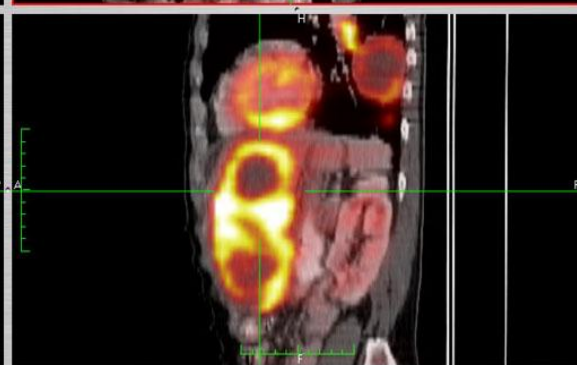
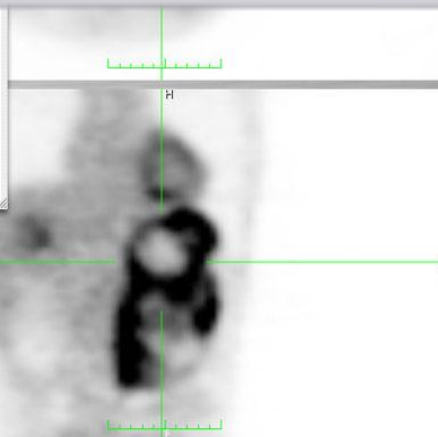
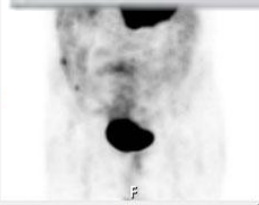
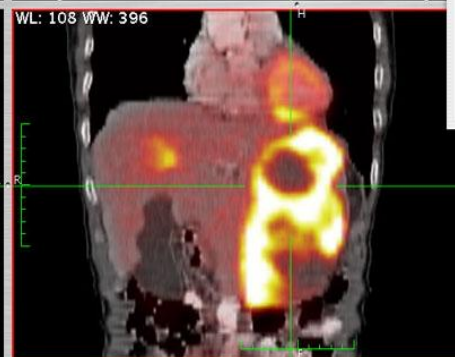
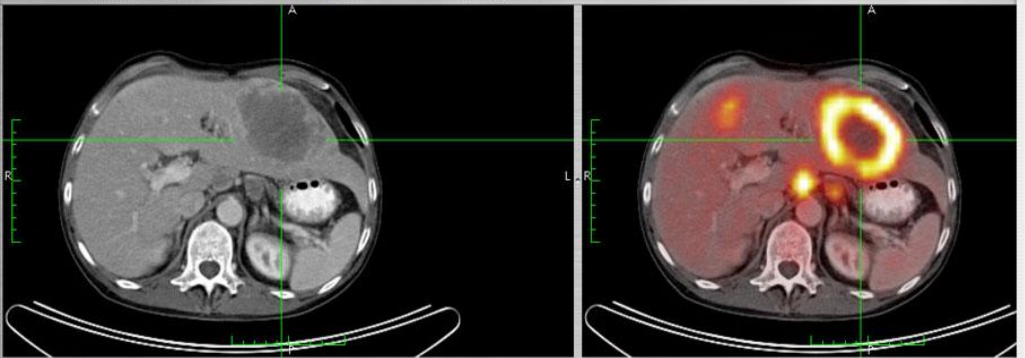
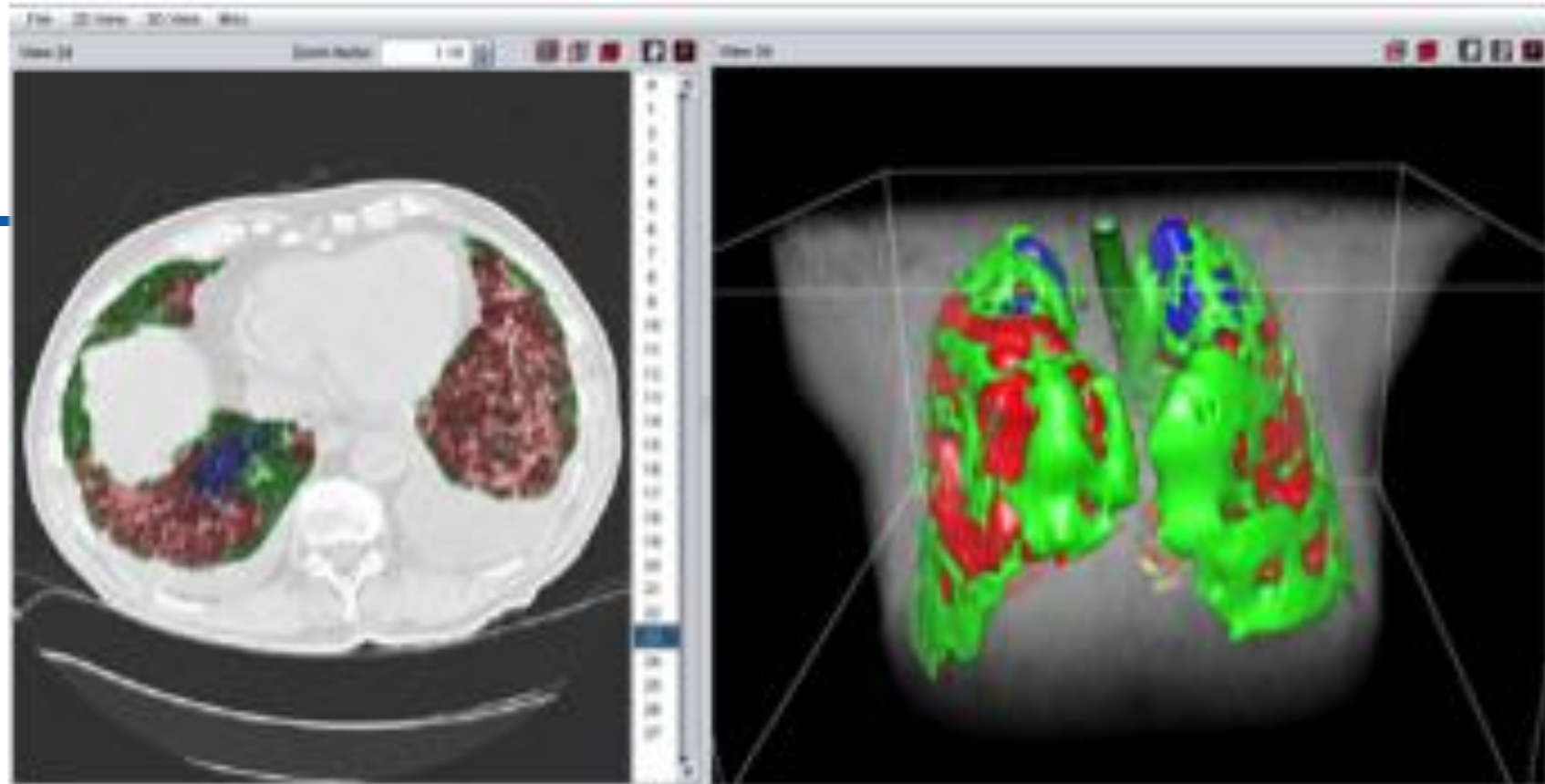
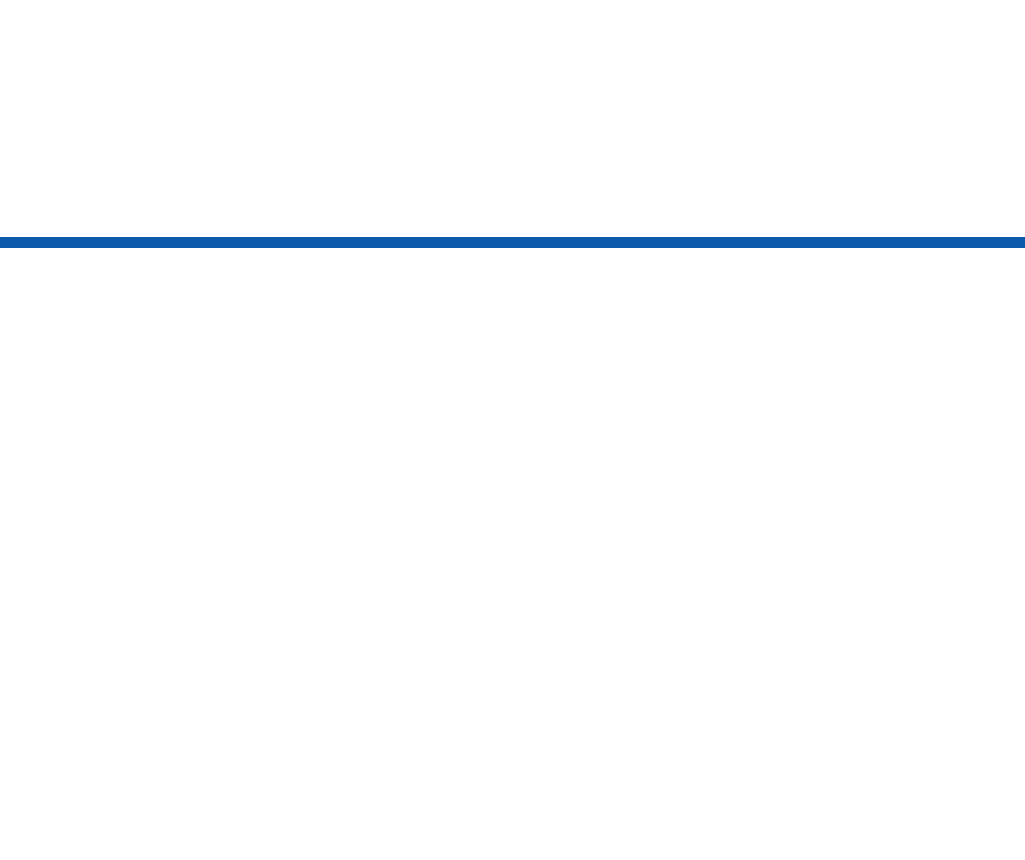
- See the results of the survey of the general public here:

<http://khresmoi.eu/assets/Deliverables/WP8/KhresmoiD811.pdf>

Use Case: Radiology

- Overcome the **flood of images** and their complexity
- (Semi) automatic analysis of radiological images (CT, MRI, fMRI, ...)
- Link images to literature and past cases (anonymised)
- End users:
 - Vienna Medical University
 - University Hospitals of Geneva





- See the results of the survey of the radiologists here:

<http://khresmoi.eu/assets/Deliverables/WP9/KhresmoiD91.pdf>

- GATE – information extraction
- Mimir – search
- ezDL – user interfaces
- GIFT – visual retrieval
- MOSES – machine translation
- ...

- Extremely **large** repositories

- 100s of Terabytes
- Zetabytes of Meta-Information

- **Open** access publishing is expanding

- BiomedCentral



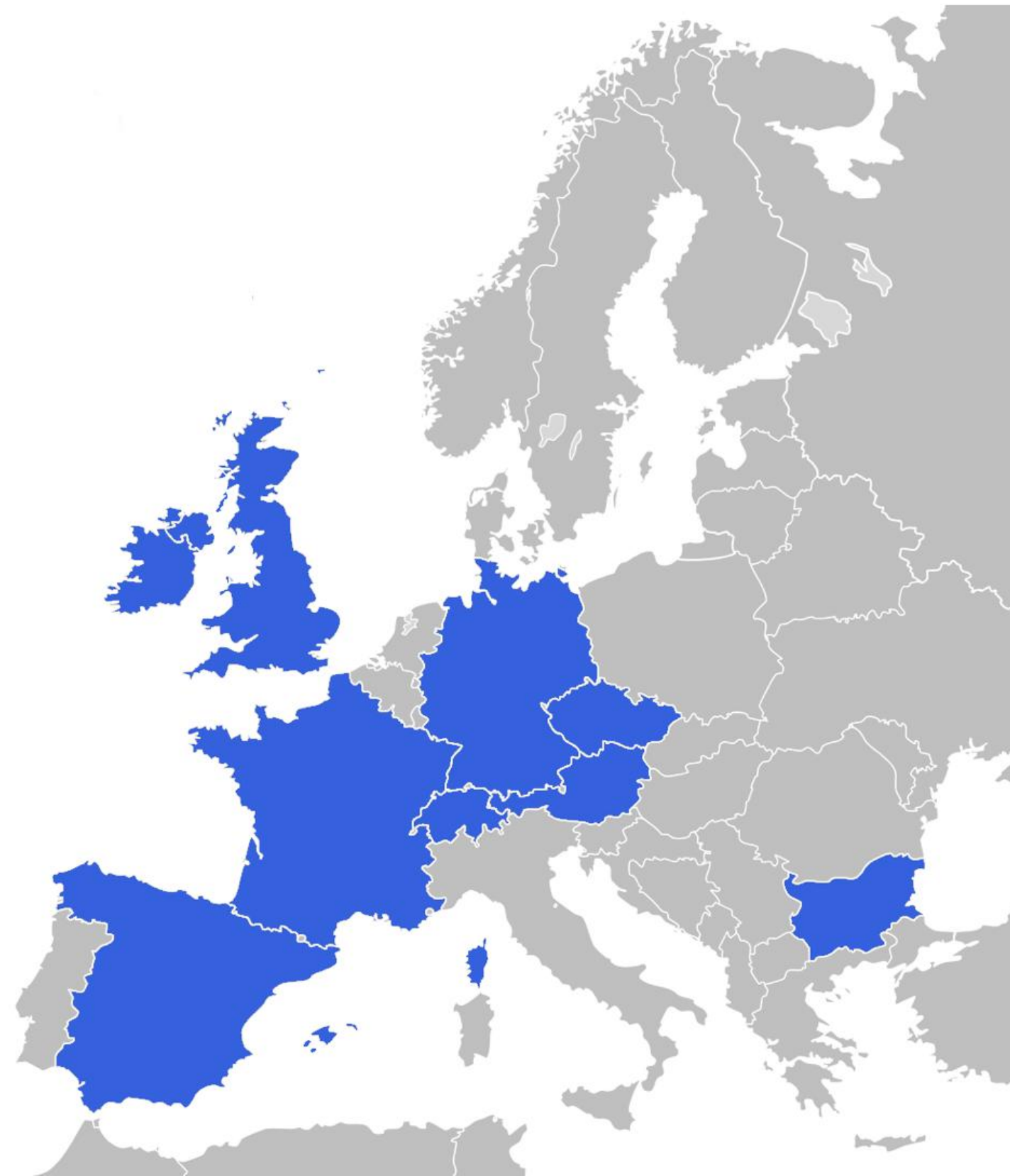
- Many closed access journals are available after 12 months, also through public pressure

- **Knowledge** bases exist

- UMLS, MeSH, SNOMED
- Linked Life Data



Khresmoi Consortium



References

- [1] Steven Bedrick, Improving Access to Medical Literature Using Multilingual Search Interfaces, page 1502, 2010.
- [2] Shane Reti, Michael Tierney, Henry Feldman, Celia Boyer and Charles Safran Comparing Diabetes Search Engines: HON vs Google, MEDINFO, world congress on medical informatics, Cape Town, South Africa, page 1436, 2010
- [3] W. R. Hersh, D. H. Hickam, How Well Do Physicians Use Electronic Information Retrieval Systems? A Framework for Investigation and Systematic Review, Journal of the American Medical Association, Vol 280, No. 15, 1998,
- [4] A Hoogendam, A. F. H. Stalenhoef, P. F de Vries Robbé, A. J. P. M. Overbeke, Answers to Questions Posed During Daily Patient Care Are More Likely to Be Answered by UpToDate Than PubMed, J Med Internet Res, Volume 10, Number 4, 2008.
- [5] W. R. Hersh, D. H. Hickam, How Well Do Physicians Use Electronic Information Retrieval Systems? A Framework for Investigation and Systematic Review, Journal of the American Medical Association, Vol 280, No. 15, 1998
- [6] Pew Internet and American Life Project, 2009.
- [7] S. Wangberg, H. Andreassen, P. Kummervold, R. Wynn and T. Sørensen, Use of the Internet for health purposes: trends in Norway 2000-2010, Scandinavian Journal of Caring Sciences, 2009
- [8] P. López-Jornet, F. Camacho-Alonso, The quality of Internet sites providing information relating to oral cancer, Oral Oncology, 2009.
- [9] Deshazo JP, Lavallie DL, Wolf FM., Publication trends in the medical informatics literature: 20 years of "Medical Informatics" in MeSH.
- [10] R. White, E. Horvitz, Cyberchondria: Studies of the Escalation of Medical Concerns in Web Search, Microsoft Research Technical Report, MSR-TR-2008-177, 33 pages, 2008.