The Abdus Salam
International Centre for Theoretical Physics

United Nations
Educational, Scientific and
Cultural Organization

IAEA
International Atomic Energy Agency

2166-Handout

College on Medical Physics. Digital Imaging Science and Technology to Enhance Healthcare in the Developing Countries

13 September - 1 October, 2010

e-Learning in Medical Physics and EMITEL e-Encyclopaedia with Dictionary

Slavik Tabakov
King's College London
United Kingdom

EMITEL e-Encyclopaedia of Medical Physics and Multilingual Dictionary of Terms

Leonardo da Vinci | KING'S College LONDON Founded 1829 | King's College Hospital NHS | Universitetssjukhuset i Lund | LUND University | IOMP

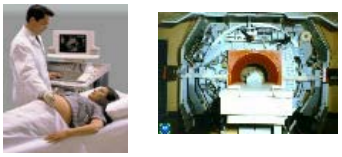
ENCYCLOPEDIA | DICTIONARY | COMBINED | Project | Contributors | User Guide | Copyright | Disclaimer

e-Learning in Medical Physics

and EMITEL e-Encyclopaedia with Dictionary

S Tabakov, EMITEL Consortium

King's College London; International Organization for Medical Physics (IOMP); University of Florence; University of Lund; Lund University Hospital; King's College Hospital; AM Studio, EMITEL Network of 270+ specialists (for contact: slavik.tabakov@emerald2.co.uk)



The delivery of contemporary healthcare is impossible without medical technology - one of the most advanced technologies of our time.

Education and Training in the field is complex, demanding and difficult to organise.

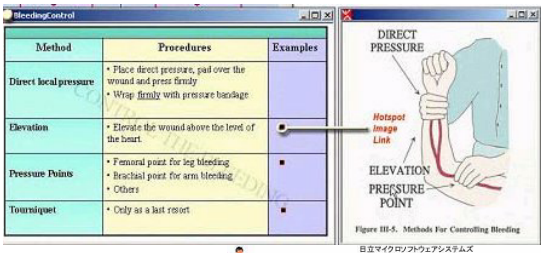
1.The biggest e-L advantage is the easy explanation of contemporary science. Adding computer simulations, interactive diagrams or just digital images increases enormously the effectiveness of teaching.

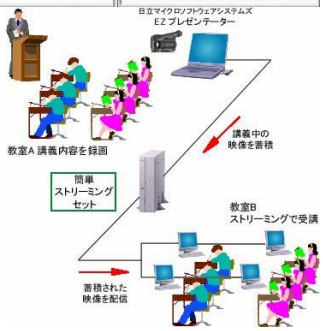
2.The easy upgrade of e-L materials is additional advantage, imperative for dynamic profession as Medical Physics and Engineering.

Effectiveness of learning

- Pedagogical effectiveness (better learning)
- Economic efficiency (more students per teacher)

Management of learning (administrator+assessor tools)





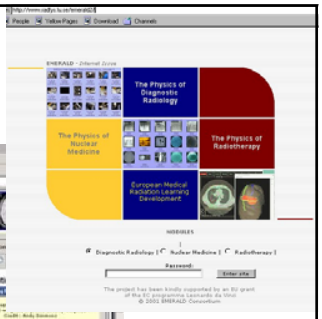
e-University
A New Frontier at UTHSCSA

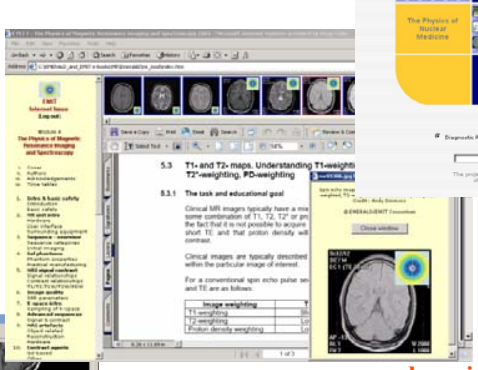
Main e-Learning layers:

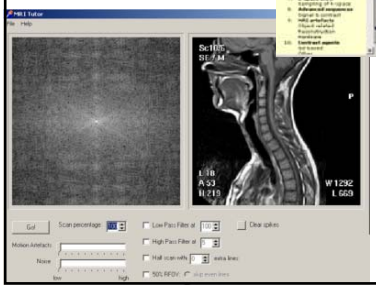
-Building simulations

-Developing modules

-Structuring programs

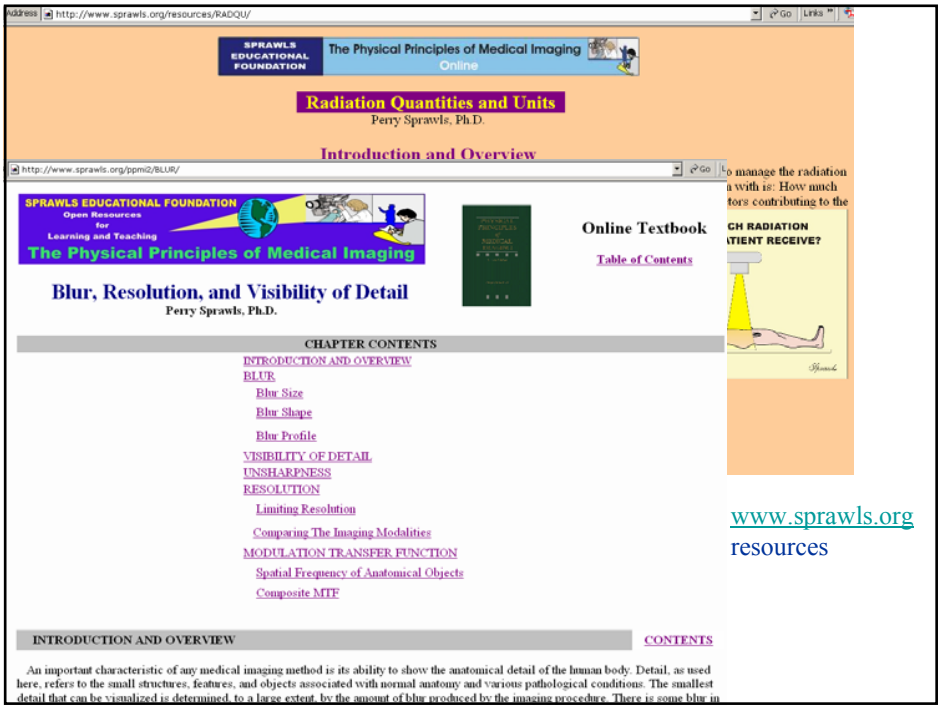




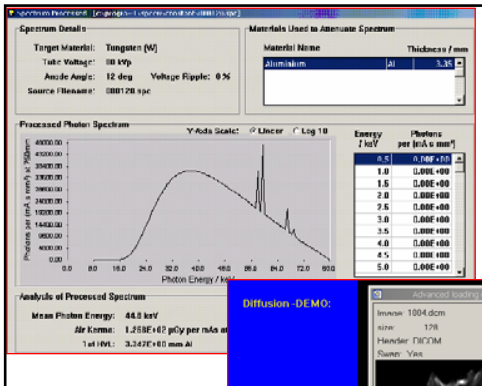


e-learning production:

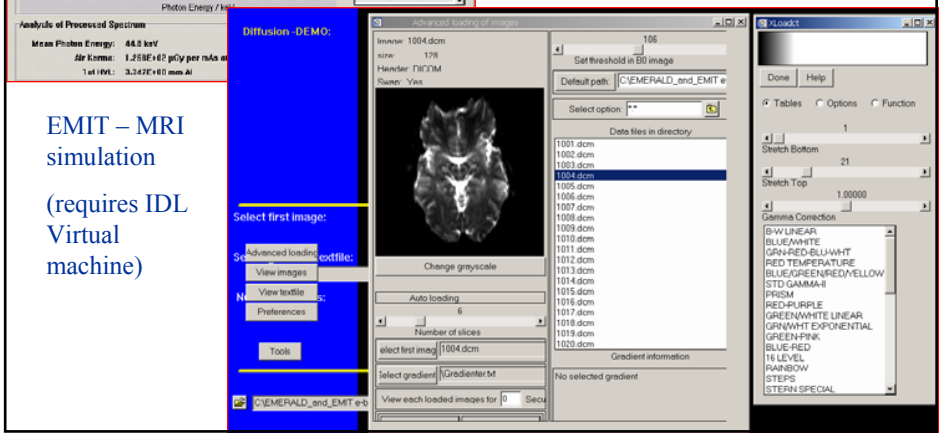
- field knowledge
- paedagogical approach
- e-developer



www.sprawls.org resources

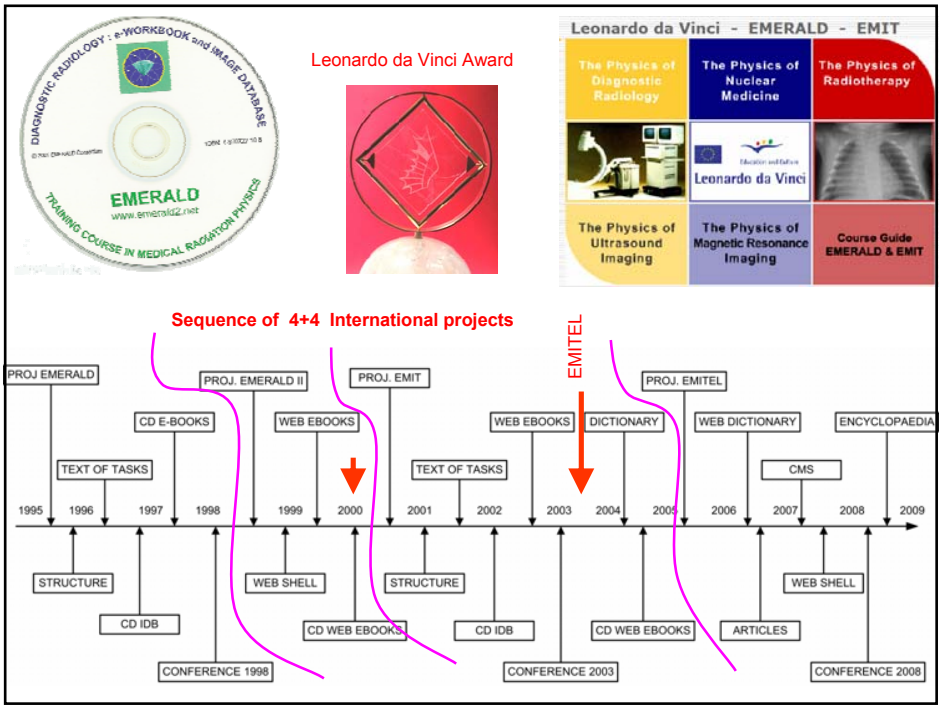


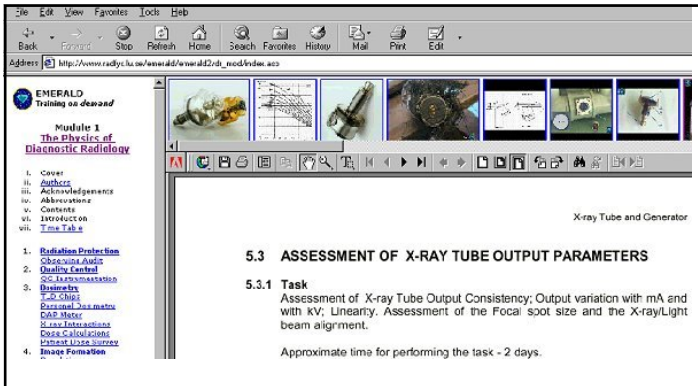
IPEM – X-ray Spectrum processing tool (independent)



EMIT – MRI simulation

(requires IDL Virtual machine)



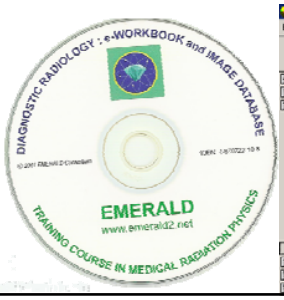


EMERALD and EMIT modules

(5 volumes)

Text hyperlinked with images + Educational Image Database + Timetables (training)

www.emerald2.eu



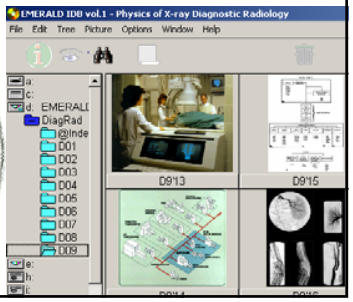
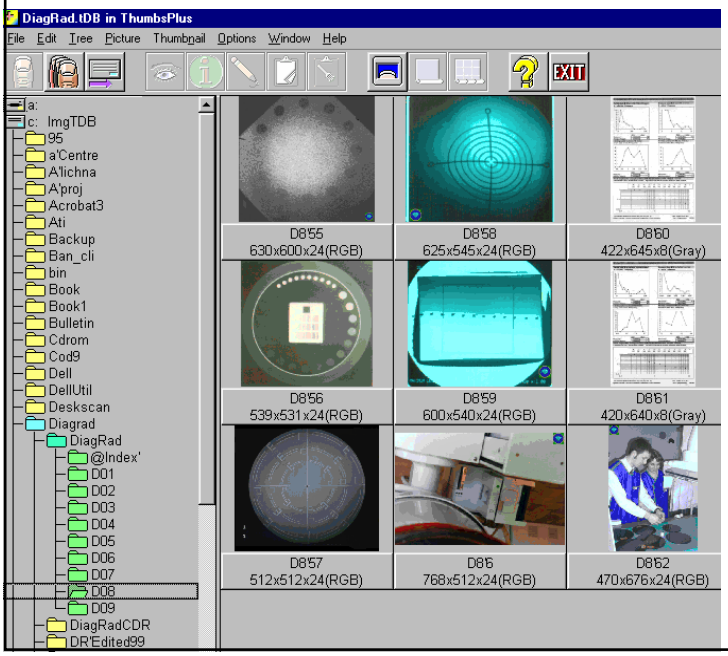


Image Database functions



Browsing

Keywords

Image Info

Annotations

Sorting

Visualisation (full image quality)

Image organisation follows workbook

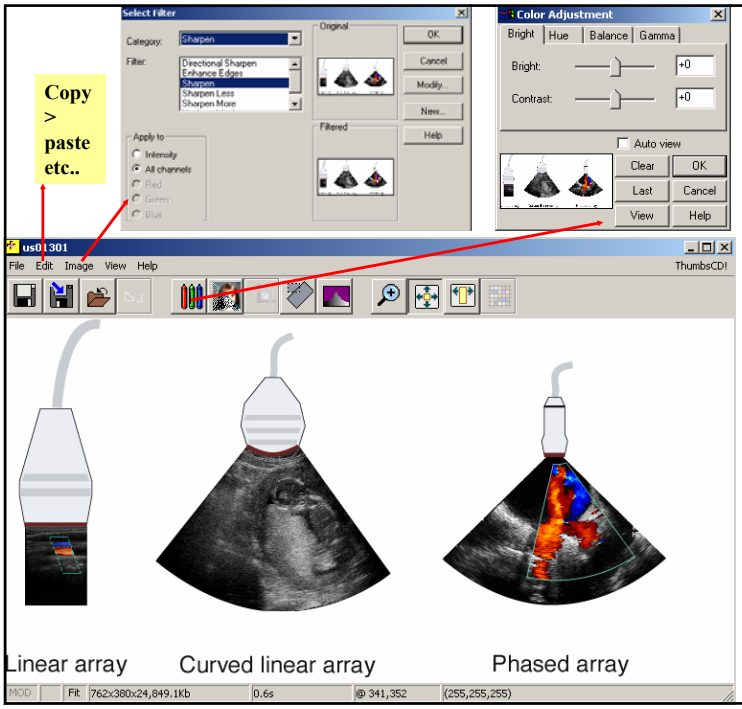


Image resolution

normally up to 800 horiz. px.

24 bits JPEG

Image Manipulation

Contrast

Brightness

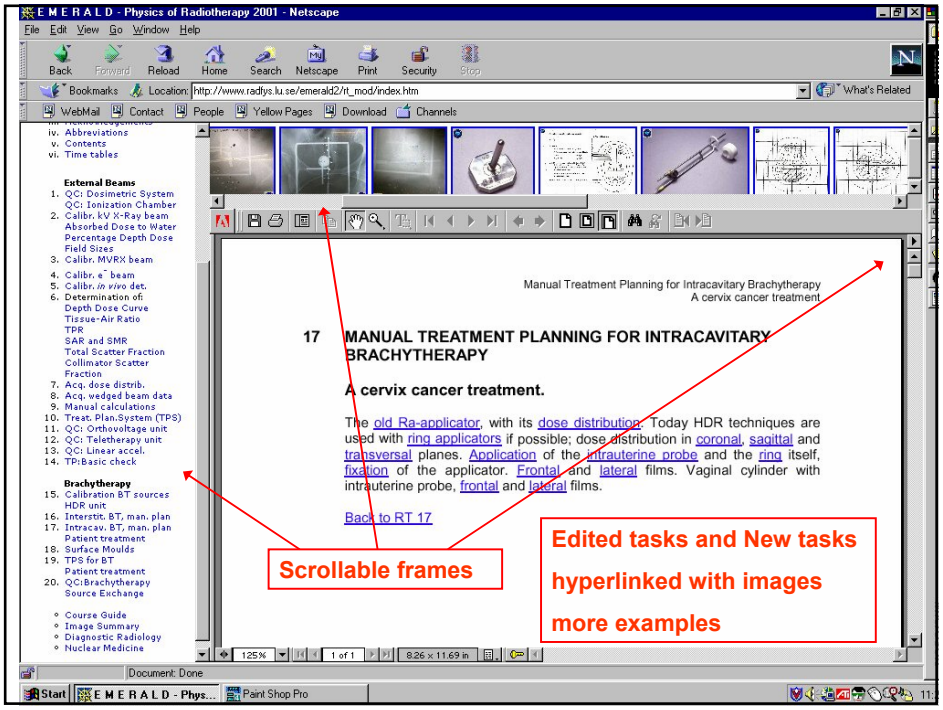
Gamma

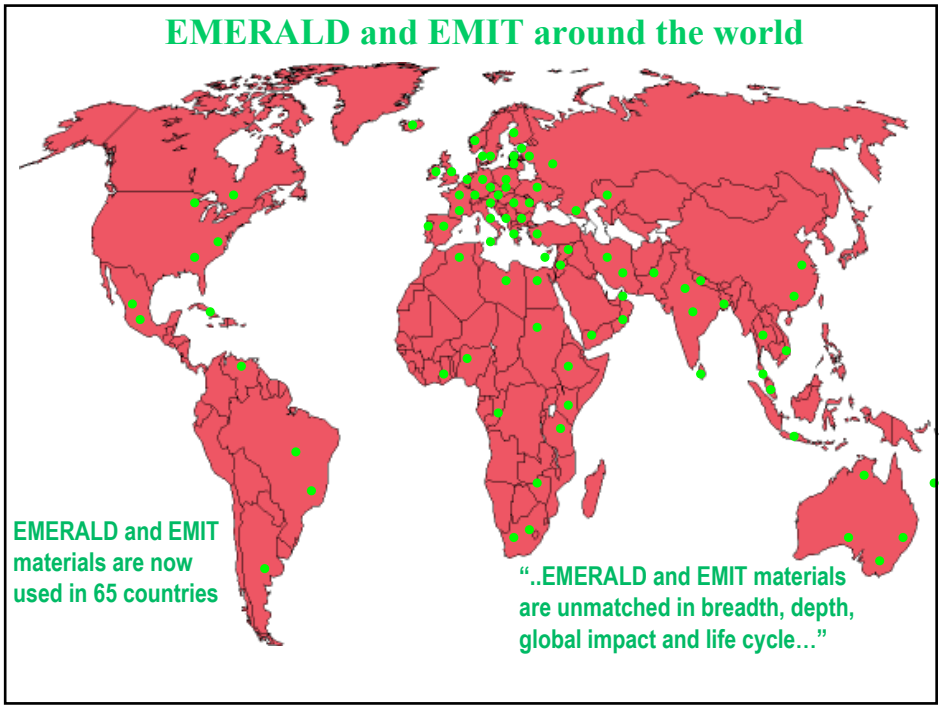
Filtering

Colour depth

Zoom +/-

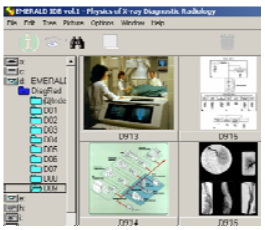
Captions


E M E R A L D - Physics of Radiotherapy 2001 - Netscape
Manual Treatment Planning for Intracavitary Brachytherapy
A cervix cancer treatment
17 MANUAL TREATMENT PLANNING FOR INTRACAVITARY BRACHYTHERAPY
A cervix cancer treatment.
Back to RT 17
Scrollable frames
Edited tasks and New tasks
hyperlinked with images
more examples


EMERALD and EMIT around the world
EMERALD and EMIT materials are now used in 65 countries
"..EMERALD and EMIT materials are unmatched in breadth, depth, global impact and life cycle..."

European Medical Imaging Technology
e-Encyclopaedia for Lifelong Learning (EMITEL)

EMITEL Encyclopaedia of Medical Physics



The encyclopaedic articles cover:

- Diagnostic Radiology (X-ray)
- Nuclear Medicine
- Radiotherapy
- Ultrasound imaging
- MR imaging
- Radiation Protection

It is planned to extend to other areas of medical physics in the future.

Funding and support:

-Partially funded by the European Union under Leonardo da Vinci Programme

-International Contribution from key professionals

-All previous EMERALD and EMIT project materials included

Project Partners: King's College London and King's College Hospital (UK), University of Lund and Lund University Hospital (Sweden), University of Florence (Italy) and AM Studio, Plovdiv (Bulgaria), IOMP as an international partner, ICTP as supporting partner (Conference 2003).

EMITEL CONCEPTS:

-Filling an educational gap

-Educational value – first priority

-Reliable reference tool

-Allows easy update of the materials

-Minimum learning curve

-Maximum life cycle of the product

-Includes imaging material, diagrams and examples

-Use of simple software without compromising the content

-Useful for a broad audience of colleagues (use of dictionary)

-EU + International collaboration through IOMP

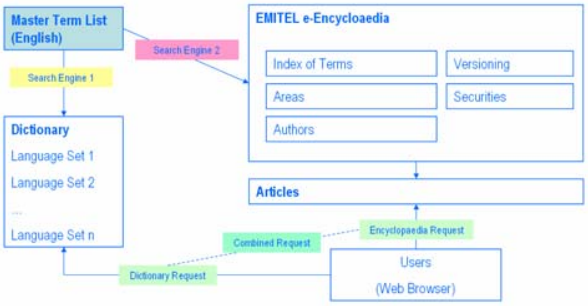
-Supported both for on-line and off-line use

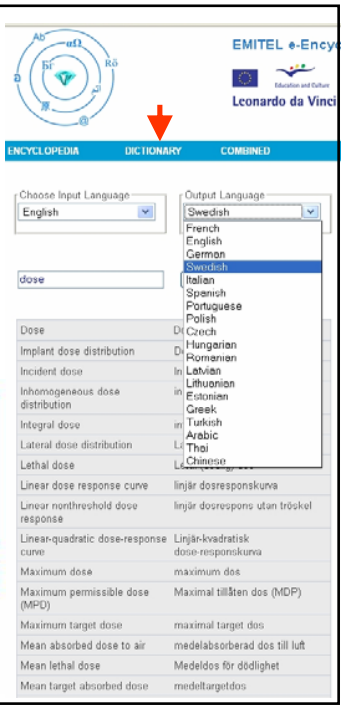
RESULTS Languages in the DICTIONARY:

Dictionary – 27 languages (in 8 alphabets), each with ~3400 terms:

English, French, German, Italian, Swedish, Spanish, Portuguese, Bulgarian, Czech, Greek, Hungarian, Lithuanian, Polish; Estonian, Romanian, Turkish, Latvian, Russian, Thai, Arabic, Persian, Bengal, Slovenian, Malay, Chinese, Japanese, Croatian

WEB DATABASE





DICTIONARY (Translator)

Available both at: www.emitdictionary.co.uk and with the Encyclopaedia

Gratefully acknowledged contributors (details at www.emitel2.eu) :

Dictionary: Slavik Tabakov (Coordinator); Farida Bentayeb; Rachida El Meliani; Nagi Hussein; Ibrahim Elyasseery; Golam Abu Zakaria; Hasin Azhari Anupama; Md Akhtaruzzaman; Safayet Zaman; Jenia Vassileva; Venceslav Todorov; Petar Trindev; Slavik Tabakov; Borislav Konstantinov; Anastas Litchev; Andy Zhu; Dai Liyan; Dai Xiangkun; Fu Guishan; Geng Hui; Wang Jianhua; Wang Yunlai; He Zhengzhong; Xu Xiao; Xu Zhiyong; Yin Yong; Zhang Jiutang; Zhang Yue; Ivana Horakova; Anna Kindlova; Simona Trampotova; Daniela Kotalova; Vaclav Husak; Jaroslav Ptacek; Josef Pacholik; Pavel Dvorak, Libor Judas, Irena Novotna; Kalle Kepler; Sigrid Kivimae; Kalju Meigas; Juri Vedru; Alain Noel; Jean-Yves Giraud; Helene Bouscayrol; Louis Blache; Markus Buchgeister; Gunther Helms; Stefan Delorme; Stelios Christofides; Prodromos Kaplanis; George Christodoulides; Charalambos Yiannakkaras; Nicolaos Papadopoulos; Demetrios Kaolis; Georgiana Kokona; Georgios Menikou; Christos Papaefstathiou; Yiannis Gerogiannis; Demetra Constantinou; Spyros Spyrou; Andreas Mikelides; Anastasia Sissou; Christodoulos Christodoulou; Pal Zarand; Istvan Polgar; Tamas Porubszky; Janos Martos; Geza Safrany; Tamas Daboczi; Jozsef Varga; Franco Milano; Yuri Dekhtyar; Alexei Katashev; Marite Chaikovska; Emzinsh Dzintars; Sergei Popov; Lada Bumbure; Juris Rauzins; Plaude Sandija; Arunas Lukosevicius; Algidas Basevicius; Dovile Serenaite; Diana Adliene; David Bradley; Alireza Binesh; Ali Asghar Mowlavi; Azam Niroomand-Rad; Marta Wasilewska-Radwanska; Zenon Matuszak; Katarzyna Matusiak; Aleksandra Jung; Ana Pascoal; Nuno Teixeira; Paulo Ferreira; Nuno Machado; Daniela Andrei; Cristina Petroiu; Aurel Popescu ; Octavian Duliu; Raducu Popa; Constantin Milu; Valery Kostylev; Nina Lutova, Boris Narkevich, Tatiana Ratner; Ervin Podgorsak; Bozidar Casar; Vili Kovac; Damijan Skrk; Petra Tomse; Ana Millan; Ignacio Hernando; Alejandro García Romero; Inger-Lena Lamm; Monica Almquist; Ronnie Wirestam; Sven-Erik Strand; Bo-Anders Jonsson; Michael Ljungberg; Freddy Stahlberg; Thomas Jansson; Anchali Krisanachinda; Sivalee Suriyapee; Tanawat Sontrapornpol; Panya Pasawang; Chotika Jumpangern; Taweap Sanghangthum; Isra Na Ayuthaya; Sornjarod Oonsiri; Perihan Unak; Turgay Karali; Serap Teksoz; Zumrut Biber Muftuler; Fatma Yurt Lambrecht.

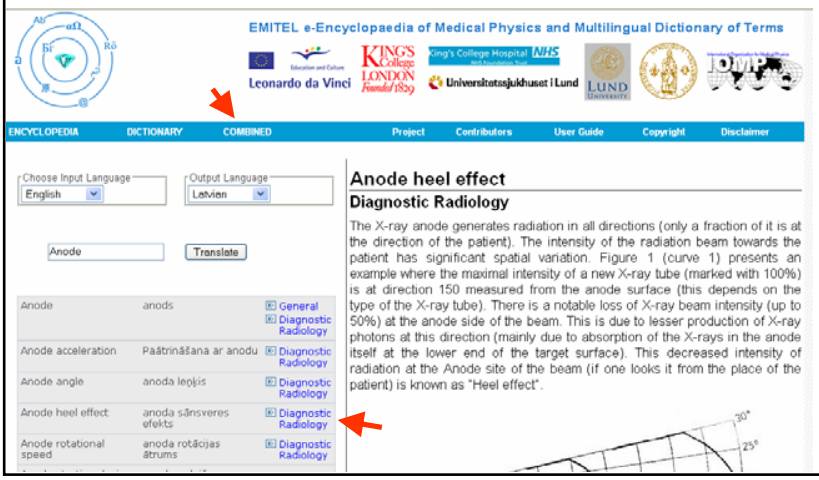
RESULTS Web Software: **WWW.EMITEL2.EU**

Web site – Database + Encyclopaedia web site with 2 Search engines (fully open)

Three modes: Encyclopaedia / Dictionary / Combined

Tested to work with all major Internet browsers

Materials tested by project members and by MSc students



AMstudio

RESULTS Articles (Encyclopaedic entries) :

Completed c. 3400 articles - with c. 2500 images and diagrams

Volume approx. 2100 A4 pages (size of articles varies, median 300 words)

Language: English

Largest Work Pack – developed by 7 Groups working in parallel

Diagnostic Radiology (X-ray): Nuclear Medicine; Radiotherapy;

Ultrasound imaging; MR imaging; Radiation Protection; General

Includes: synonyms, acronyms and abbreviations;

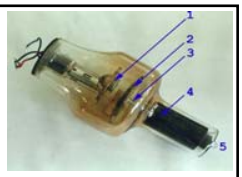
Some articles written by 2 parallel Groups;

Articles' content and use tested (by experts and students);

System for editing and updating applied to each article;

Search for part of the word (in case of misspelling)

Types of articles:



1. Very Short (not many) - example

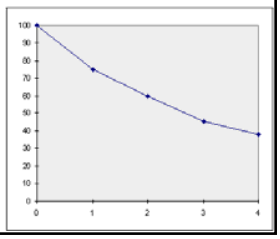
Unshaprness

Unshaprness is a characteristic of an image resulting from blurring. In such an image structures, objects, and edges appear to be "unsharp".

2. Short articles (often related to other articles) - example

Line focus principle

The line focus principle, first described by Dr. O. Goetze, in 1918, is found in most x-ray tubes. The usual cathode consists of a helical heated filament mounted in a focusing electrode. The resulting electron beam focused on the anode surface forms a focal spot that is an image of the elongated (line shaped) heated filament. The length is generally the largest dimension of the focal spot and is highly dependent on the angle of the anode surface and the direction from which the focal spot is being observed. For more information see article on Stationary anode.



3. Typical articles (majority)

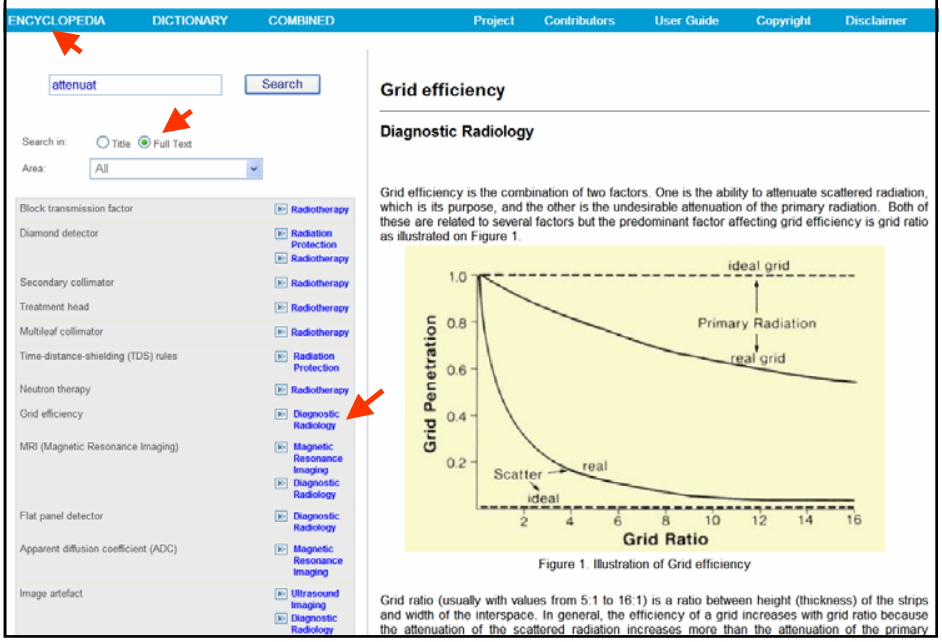
200-400 words plus one diagram or image

4. Very long articles (not many)

3-4 pages with 4-6 diagrams/images

5. Internally linked (no text at all) < 10%

Full text search - (inside article text in English – only in Encyclopaedia mode)



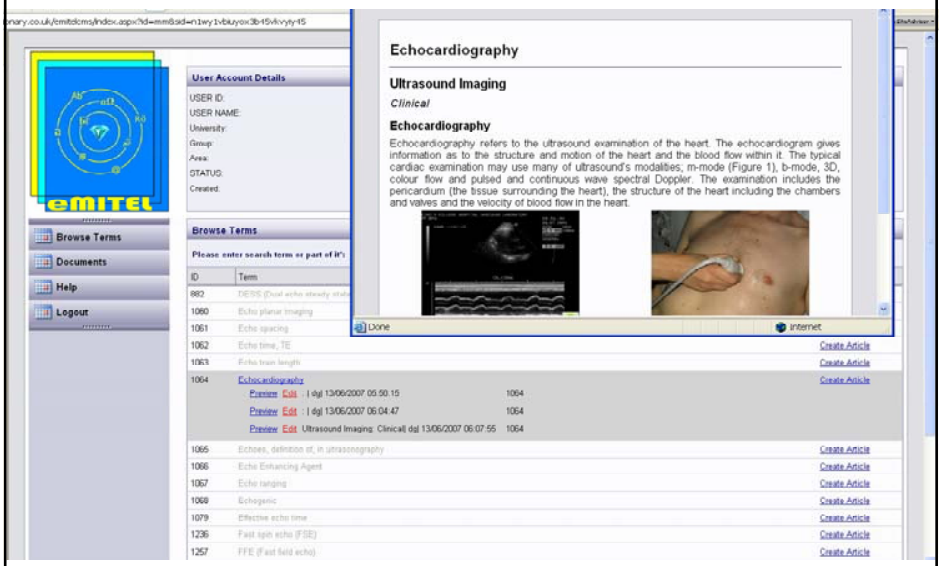
ENCYCLOPAEDIA

Gratefully acknowledged contributors (details at www.emitel2.eu) :

Encyclopaedia: Slavik Tabakov (Coordinator); Perry Sprawls; Graeme Taylor; Maria Lewis; Elizabeth Morris; Magdalena Stoeva; Asen Cvetkov; Mario Dedenaro; Niko-las Pallikarakis; Kalle Kepler; George D Frey; William Hendee; Ratko Magjarevic; Vassilka Tabakova; Alain Noel; Paola Bregant; Justine Calvert; Tracy Underwood; Stephen Wastling; Michelle Footman; Hannu Escola; James Clinch; Hamish Richardson; Navneet Dulai; Sven-Erik Strand; Bo-Anders Jonsson; Mikael Peterson; Michael Ljungberg; Gillian Clarke; George Mawko; Anchali Krisanachinda; David Bradley; Ana Millan; Franco Milano; Inger-Lena Lamm; Fridtjof Nuesslin; Phil Evans; Charles Deehan; Joan Coward; Mark Grattan; Brendan McClean; Ruth McLauch-lan; Paul Zarand; Barry Allen; Markus Buchgeister; Ivana Horakova; Ervin Podgorsak; Jean-Yves Giraud; Freddy Stahlberg; Ronnie Wirestam; Andy Simmons; Stephen Keevil; Gerard Boyle; Nicola Harris; Emil Nordh; Adnan Bibic; Anders Nilsson; Anna Rydhog; Jimmy Latt; Johan Olsrud; Linda Knutsson; Peter Mannfolk; Sarah Brockstedt; Jonathan Siikanen; Mattias Nickel; Karlin Bloch; Markus Nillson; Martin Leach; Mario Secca; Tobias Schaeffter; Ewald Moser; Gunter Helms; Jacques Bittoun; Cornelius Lewis; Jim Thurston; Peter Smith; Elizabeth Chaloner; Marta Radwanska; Anna Benini; Stelios Chris-tophides; Cari Borras; Kjeld Olsen; David Platten; Ignacio Hernando; Bruce Walmsley; Colin Deane; David Goss; Tomas Jansson; Monica Almqvist; Victoria Aitken; Lorna Sweetman; Fernando Schlindwein; Crispian Oates; Tony Evans; Heikki Terio; Luciano Bertocchi; Colin Roberts.

Dedicated Content Management System (CMS) for upload to the Database

CMS web site for regular updates and editing of content (open for Editorial Board)



Included in 2010 through CMS – 2 languages and 100+ new and updated articles

EMITEL summary and future:

- The largest International project in the profession developed the first dedicated Medical Physics e-Encyclopaedia with Multilingual Dictionary
- Incremental build-up methodology (*iterations*):

  Initial articles > Refereeing > Editing > Web publishing > Web update > Print
- Parallel Web update and paper print preparation (final pre-print editing by 2011)
- Web site will continue to be updated in future with the Network support
- Additional future international support (IOMP, IFMBE)
- Expanding the articles and including new articles and themes (CMS)
- Expanding EMITEL Network

EMITEL International Network

- Objective: Regular update and support of EMITEL
- Coordination from King's College London (with dedicated administrator)
- Currently 250+ specialists from 35 countries (expected to grow in future)

All members are professional experts, the majority officers of their National Societies (of those 21 are Current and Past Presidents);

Many thanks to all supporters and contributors!

European Medical Imaging Technology
e-Encyclopaedia for Lifelong Learning (EMITEL)
Pilot Project of EU Leonardo da Vinci Programme

- Lack of a main information source point (reference material)
- A plethora of synonyms, acronyms and similar terms
- Lack of Multilingual professional dictionary

- This is the first dedicated e-Encyclopaedia in the profession
- Extremely large project (incremental build-up)
- Input from many international experts (also from MSc students)

ARTICLES (Encyclopaedic Entries) BUILD-UP AND PRESENTATION:

- **Main objectives – high quality reference material with max. life cycle**
- **Guide for Contributors and Guide for Referees**
- **Master English file**
- **Template with easy to see font and layout**
- **Images in 2 resolutions (on the Web – colour; on paper mainly B/W)**
- **Limited references, but possibility for external web links**
- **Database – robust, updatable, fast and not complicated**
- **Two main layers – Article titles & Article text**
- **Articles internal connections – by Search Engines, not hyperlinks**
- **Web interface – modern design and user friendly**
- **Web Preview code independent on the web software platform**
- **Use of reliable Web server (large business provider)**