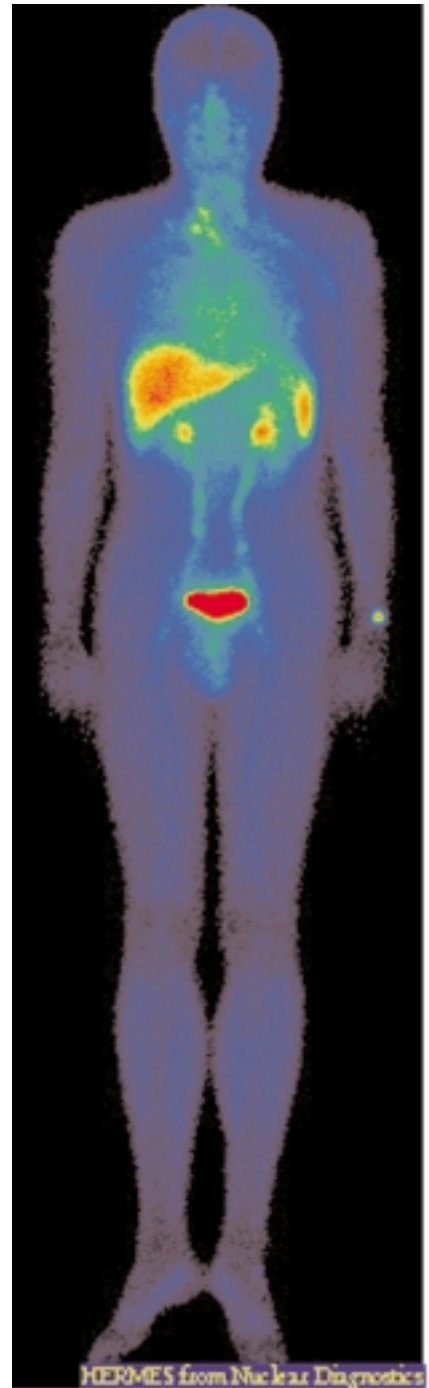


# VirRAD

*Virtual Radiopharmacy*



VirRAD IST project. IST-2001-32291  
[www.virrad.eu.org](http://www.virrad.eu.org)



## ***Mission statement***

The aim of the VirRAD platform is to create a virtual community to facilitate communication between all members of the worldwide Radiopharmaceutical community and by doing so, help them to:

- share ideas and disseminate best practice;
- surmount practical obstacles and solve everyday difficulties;
- develop innovative solutions to universal problems;
- create a remote learning resource;
- promote the continuing contribution of the specialty to science and health-care.

## ***VirRAD will:***

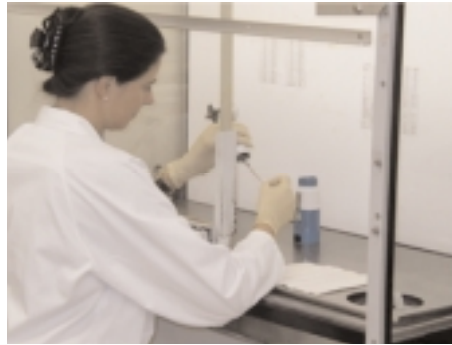
- create a Learning Environment that will address the needs of Student Radiopharmacists, through the provision of courseware to the syllabus agreed upon by the European Association of Nuclear Medicine;
- create a powerful Learning Environment capable of developing the Student's Meta-Cognitive abilities associated with "transferable skills" and "learning to learn";
- create the Community and Learning Environment in such a manner as to achieve the cost - learning effectiveness targets to be defined by the Expert User Group.



## Radiopharmacy

Radiopharmacy is a specialised field concerned with the preparation of radioactive drugs for imaging and therapy which is practised mainly in nuclear medicine departments in major hospitals but also in clinics, imaging centres and university departments around the world. It's a highly regulated area since the radiopharmaceuticals which are prepared must comply with internationally agreed requirements on pharmaceutical and radiological safety.

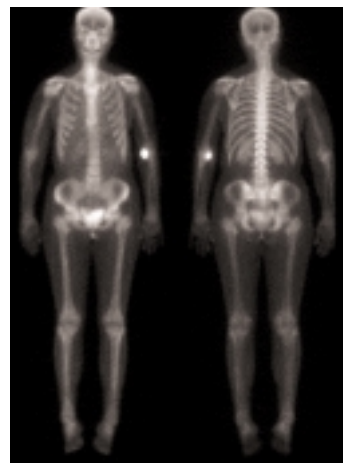
Good working practices are essential to ensure compliance with these requirements and those working in the field need to be well trained and up to date with the latest developments. The problem is that because of its highly specialised nature, the number of practitioners in any one locality is few. Even the largest centres will employ only a few people in the field and this means that basing training schemes on conventional classroom scenarios is logistically and financially difficult. Hence VirRAD – an attempt to take learning out of the classroom and into the workplace via the WWW. In the next few pages, we will try and show how we aim to do this and describe how we think this approach can revolutionise teaching in this and other similar specialised medical fields.



*Preparation of a radiopharmaceutical*



*Elution of a radionuclide generator*



*A Nuclear Medicine bone scan*



Examples of  
Community  
web pages

## Development of the Community

The virtual community is the "communication hub" of the VirRAD System and offers facilities for scientific and professional communication and information exchange amongst members of the worldwide Radiopharmacy community.

The VirRAD system provides information about the latest News and Events within Radiopharmacy. These modules provide synchronous and asynchronous ways of communication: for instance, by using the Private Message functionality, a Community member can send a strictly private message to another user. Communication can also be carried out via Chat and Virtual Conference which allows members to communicate and work in real-time via text chat, voice chat audio or using typical whiteboard applications. Through the asynchronous communication tool the Forum gives Community members the opportunity to discuss a wide range of different topics drawing on a global knowledge community.

The Library, the Glossary of Terms and the Adverse Reaction modules

capture the Community's knowledge pool. All Community members have the possibility to add content and are invited to do so. To help members find specific information, an advanced Search module allows users to define tailored queries to search in all modules. Help is provided by an extended Help / FAQ system.

Members can also undertake various roles in the Community; these can be active roles: being a moderator or an editor for a specific module; alternatively, they can participate as a standard member.

To achieve transparency of responsibilities and help, and allowing members to get to know each other, personal academic information is available as well as contact details. A bi-monthly Newsletter provides an overview of the latest happenings. Users can activate an email notification for Forum discussions and the group email functionality allows communication to specified sub-groups. Netiquette guidelines determine the expected online behaviour and special moderation guidelines help people to get started in Forum discussions.

## The Virtual Laboratory

The Virtual Laboratory of the VirRAD system is a 3D simulation of a radiopharmacy laboratory, where learners, represented by 3D avatars, can experiment on radiopharmacy equipment by carrying out specific learning scenarios. The Laboratory tries to simulate not only the spatial model of a real radiopharmacy laboratory but also the actions that take place in such an environment. Furthermore, by exploiting avatars, and avatars' gestures, we try to satisfy crucial functions such as perception, localization, identification and visualization of these actions.

The user can access the Virtual Laboratory in (a) study mode, and (b) multi-user mode. In the study mode the user can interact with the environment without the presence of other users; whilst in the multi-user mode the user can see other users that are present and interact with them by gestures, text chat and audio chat.

By using the arrow buttons of the keyboard the avatar can navigate within the virtual environment to carry out specific radiopharmacy scenarios and activate and manipulate objects within the laboratory. Each object has its own range of movements controlled by the right

mouse click; this generates a menu that contains a list of possibilities to activate the object. If the user chooses an incorrect action a warning message appears on the screen. This functionality indicates that the Virtual Laboratory environment surpasses the framework of a native environment and is characterized by the interaction between the end user and the system.

Special attention in the design of this Virtual Laboratory has created an easy and friendly interface that can be used by anyone!



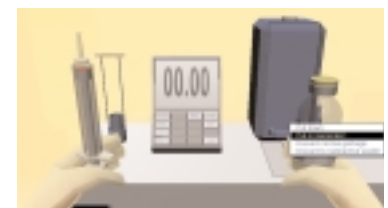
Viewing another user using the Laminar Airflow



Gesture example



Partial view of the Virtual Lab

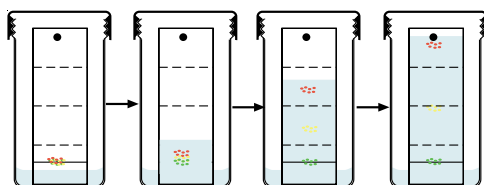


Object manipulation in the Virtual Lab

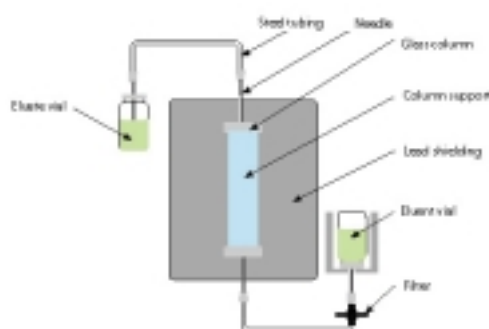
A video clip showing part of a practical procedure



Frames in an animated graphic showing chromatographic separation



Detailed graphic of a radionuclide generator



An interactive animation showing entry into a Radiopharmacy hot-lab



## Courseware

The main issue relating to courseware is not what to include, but how to present it. We already have an internationally agreed curriculum of theoretical concepts and practical training to work from, but we have to present this material in such a way that it is visually attractive, easy and enjoyable to work with and effectively assimilated and retained by the student.

We have been influenced in this by the theory of Mindful Learning proposed by Ellen Langer and plan to explore some of her concepts in the way we deliver the courseware. So, for example, the use of different viewpoints employing different modes of multimedia will be used whenever possible. We plan to explore the use of video to describe many of the practical competencies needed in this field and to link this with text, graphics and interactive animations to support the visual information presented.

At the same time, we need to develop an approach for uploading this courseware which combines the need for accurate classification and recording of the learning objects and associated metadata, with a user-friendly interface suitable for a group of domain-expert teachers which are not especially expert in IS technologies.

## ***Video Development and Learner Modelling***

Instructional sequences on technical and procedural aspects of radiopharmacy have been captured on the latest digital video recording technology. The edited sequences are used to form video clips which can be used alone or in conjunction with other courseware materials. However, VirRAD video technology is not limited to instructional film. Combined with a range of multimedia resources in VirRAD's constructivist learning environment, the video sequences offer users control of their own learning, enabling them to stop sequences to examine other information in other formats as they wish. Video sequences, coupled with multimedia and a learner advice system (learner modelling) provide trainee radiopharmacists with a powerful learning tool which they are able to control and interact with, at a distance, or in the workplace.

The learner modelling in VirRAD has two aims. The first is to fulfil the traditional role of learner modelling by providing the basis on which pedagogical assistance is given to learners, in order to enable their gaining an understanding of the

specific domain of VirRAD, namely radiopharmacy. The second aim is broader: it is to assist learners in gaining those learning to learn skills that will be applicable to any subject matter that they wish to understand. To achieve this second aim requires the learner modelling to monitor not the learners' performance in the subject domain, but their use of the highly flexible and diverse learning resources of the VirRAD constructivist learning environment. This will enable the modelling to reason about learners' meta-cognitive skills and competencies, and so provide advice about improved learning strategies and schedules, provide encouragement for their reflection on past activities and promote their conscious reflection on all actions. This complete learner modelling system will be implemented in open source software.

A programme of evaluation of the VirRAD environment is being implemented. To date, formative data has been collected in order to assess the usability and acceptance of the first community prototype. Preliminary results are very positive and feedback to developers has already resulted in a number of system improvements.



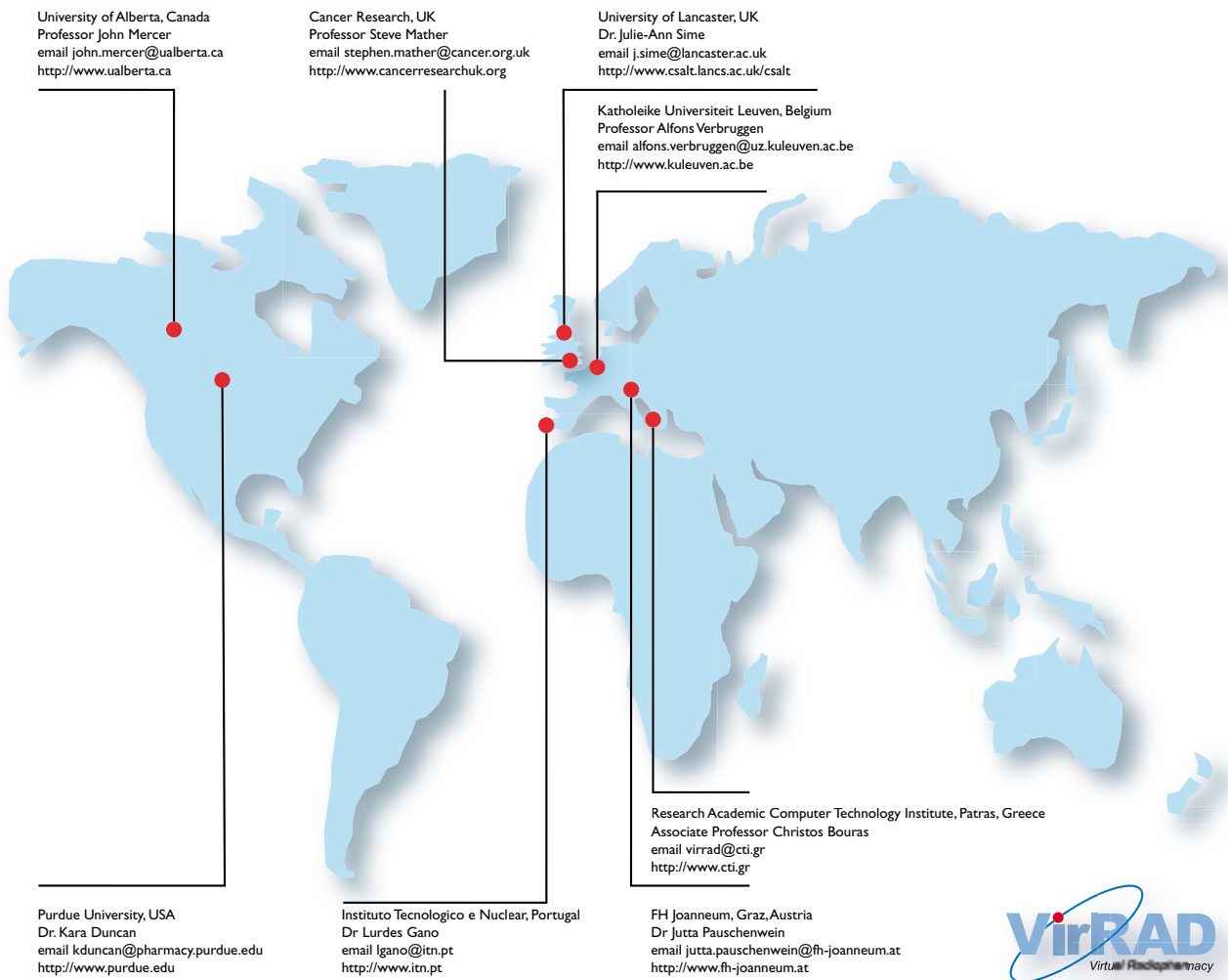
*Example of pedagogical advice*



*Video development and Learner Modelling*



*Capturing radiopharmacy through video*



If you wish to be part of the VirRAD community and of this exciting exchange of ideas and information why not take a look at [www.virrad.eu.org](http://www.virrad.eu.org). Or for further information please contact The Head of Project, Professor Stephen Mather at [Stephen.mather@cancer.org.uk](mailto:Stephen.mather@cancer.org.uk)