

**Grant Agreement Number ECP-2006-EDU-410030**

**eViP**

**Case studies of the use of virtual patients**

<b>Deliverable number</b>	<i>D4.2</i>
<b>Dissemination level</b>	<i>Restricted</i>
<b>Delivery date</b>	<i>29th February 2008</i>
<b>Status</b>	<i>Final</i>
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**eContentplus**

This project is funded under the eContentplus programme<sup>1</sup>,  
a multiannual Community programme to make digital content in Europe more accessible, usable and exploitable.

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<sup>1</sup> OJ L 79, 24.3.2005, p. 1.

**Background:**

Below are the individual case studies relating to the use of VPs completed by each of the partners. These case studies use a standard template.

**Case study on the use of VPs by SGUL**

Institution	St George's University of London
Name & role of person completing this report	Terry Poulton and Chara Balasubramaniam
Date of report	29 <sup>th</sup> Feb 2008
<i>Please describe the VP system(s) used in your institution</i>	
<p>The VP system used at St George's is called Labyrinth. It is an experimental educational pathway authoring and delivery system, initially developed at the University of Edinburgh. It is now being further developed into an open source system (Open Labyrinth) by the Northern Ontario School of Medicine and other partners from around the world including St George's.</p> <p>Users of Labyrinth are presented with set or randomly selected choices as they move through a Labyrinth, each of which has a consequence for the user.</p>	
<i>Please give details of the students who have used your VPs (discipline, under/postgraduate, etc)</i>	
<p>Students from the following courses and levels have used St Georges' VPs:</p> <ol style="list-style-type: none"> <li>1. Pre-clinical undergraduate medicine</li> <li>2. Clinical undergraduate medicine</li> <li>3. Foundation years of medicine (F1 and F2 in the UK)</li> <li>4. Pre-registration nursing</li> <li>5. Continuing professional development nursing</li> <li>6. Paramedic foundation degree</li> <li>7. Psychiatry and mental health</li> <li>8. Learning disability.</li> </ol>	
<i>Please briefly describe the types of VPs in use at your institutions (media used, interactivity, etc)</i>	
<p>The VPs used at St George's are 'branching VPs', with a focus therefore on developing clinical reasoning through making choices and observing consequences. Labyrinth offers the opportunity to take different paths depending upon which choices the student makes as the VP scenario unfolds. This is a feature that to some extent mimics the 'most likely' real life choices and decisions that a doctor has to make with regards to being clinically competent.</p> <p>Increasingly, multimedia material is added to the VPs which include clinical skills videos and clinical science topics. Scoring systems have been activated for VPs used</p>	

for formative assessment. There is a continuing review of new resources and features which can be usefully added to the cases.

*Please describe how your VPs are used in different educational scenarios*

SGUL VPs are used in three main areas:

1. In session, in Problem-Based Learning tutorials, replacing conventional paper-based patient linear scenarios, with branching interactive online cases, which allow the student tutorial group to decide on options and note the consequences
2. As supplementary resources for students to use as self-directed learning opportunities, with cases tailored to coincide with the core curriculum teaching of the period in question e.g. Paediatric cases, which are not only delivered during the Paediatric attachment but will be closely tied to the theme of the individual week
3. In classroom-based formative assessment sessions. This is further explained in the following section below.

*How do your VPs integrate with conventional forms of teaching (e.g. face-to-face, lectures, clinical teaching, etc)*

1. Used as the core Problem Based learning ‘case of the week’, in face-to face tutorial sessions in the first two years of medicine – the predominantly bioscience years. These are central to the core delivered curriculum
2. As supplementary resources on line for self-directed learning, during clinical attachments as described above
3. For formative examination in the computer classroom, with tutorial feedback integrated with specific face-to- face clinical teaching sessions during the clinical years of the course.

*How do you integrate your VPs with other e-learning opportunities?*

Problem Based Learning is a learning method which uses the patient scenario as the core basis of the curriculum in the first two years; VPs will replace that core learning experience. So all other teaching is triggered by the case itself, whether paper-PBL, or online-VP.

As self-directed resources, VPs are integrated with additional clinical science and skills resources, so in effect the case is expected to trigger as much as possible all other learning opportunities.

As assessment VPs, they are intended to trigger student revision.

*How have you integrated your VPs technically with your institutional virtual learning environment?*

All VPs are accessible through Moodle which is the institutional virtual learning environment (VLE). Most are deposited in a designated VP area which is restricted to staff access. Individual teachers make their own judgement as to which, when and where individual VPs are made available to student accessible areas/courses of the VLE. VPs will be moved shortly to the newly-developed ‘Open Labyrinth’ on the SGUL server, and will increase the range of options for VP availability.

*If relevant, please describe how your VPs are used in formative or summative assessment.*

Labyrinth has an in-built scoring system, and VPs are being used for formative assessment in the Paediatric attachment, in which all students complete, separately, the formative VP online, and then discuss the cases as a group with a facilitating tutor.

*Please describe the results of any evaluation of the use of VPs you have conducted with your students*

In a recent study in our graduate entry to Medicine course, SGUL looked at the impact of adapting an existing PBL case for use, online, in a branching format. Though the case would normally have been a paper case, the questions asked of the students were directed towards the choices and consequences inherent in the new online case. The case was delivered to 11 base-rooms and a total of 78 students.

The use of repurposed interactive VPs as a replacement for conventional linear PBL was strongly supported by students, who found the options in the case created a more engaging session, and to some extent believed they learned more; they disliked the absence of a paper summary, and this appeared to detract from the value of the repurposed (online) PBL. The clear message was that the most important element of repurposing in-session VPs was the ‘options and consequences’ rather than the additional media, which was also appreciated.

Students who had experienced formative testing using Assessment VPs, were asked for their views of this form of assessment. Very few (1.5%) had any difficulty with the technology. Most found the cases realistic, fair and liked the method of assessment. The most common complaint was that they were not allowed to go back to change an answer, or review information. One noted “the more practical experience I have, the better I will perform”.

*Briefly describe your plans for developing VPs in the future*

1. To replace the problem based learning ‘paper’ cases in the curriculum with VPs
2. To replace the mini-cases in assessment with formative and summative VPs
3. To extend the VPs into various blended learning curricula for workplace learners such as the SGUL Paramedic Foundation Degree
4. To take VP s into virtual worlds for (3) above (viz. PREVIEW: A JISC-

funded project to develop online PBL in Second Life).
<i>What advice would you give a school wanting to use VPs for the first time?</i>
If creating VPs, use a system which is seen by staff as a reasonable and not excessive time investment. Try to identify where the value of the VPs lies for students, rather than creators. Target particular areas for VP production. Single VPs dotted around the curriculum are interesting, they will have novelty value, but they may have very limited impact in the subject area, and therefore limited impact in the curriculum. The use of VPs will also be more difficult to evaluate. Above all, try to share other people's VPs.

### Case study on the use of VPs by KI

Institution	Karolinska Institutet (KI)
Name & role of person completing this report	Uno Fors and Nabil Zary
Date of report	29/02/2008
<i>Please describe the VP system(s) used in your institution</i>	
<p>Web-SP</p> <ul style="list-style-type: none"> <li>- Information about the VP system: <a href="http://websp.lime.ki.se">http://websp.lime.ki.se</a></li> <li>- Entry point for the students: <a href="http://patientcases.org">http://patientcases.org</a></li> </ul>	
<i>Please give details of the students who have used your VPs (discipline, under/postgraduate, etc)</i>	
<ul style="list-style-type: none"> <li>• Medicine (pre-clinical and clinical undergraduate)</li> <li>• Nursing (clinical undergraduate and postgraduate)</li> <li>• Dentistry and related professions (pre-clinical and clinical undergraduate, training prior to licensing for dentists with foreign degrees)</li> <li>• Physiotherapists (undergraduate)</li> <li>• Laboratory engineers (undergraduate)</li> <li>• Coaching (k12 schools, unemployment agency)</li> <li>• Teacher training (“virtual students”)</li> </ul>	
<i>Please briefly describe the types of VPs in use at your institutions (media used, interactivity, etc)</i>	
<ul style="list-style-type: none"> <li>• There are different types of VPs, each one customized for a discipline and/or educational level</li> <li>• All include multimedia such as images, audio, movies and flash animations</li> <li>• The VP flow and interactivity is unrestricted</li> <li>• Feedback provided to the students is partly individualized and generic where the students compare their answers with the experts.</li> </ul>	

<p><i>Please describe how your VPs are used in different educational scenarios</i></p> <ul style="list-style-type: none"> <li>• Currently our VPs are mainly used in the undergraduate clinical courses, both for self-learning/assessment and jointly with scheduled seminars</li> <li>• The students targeted are on campus, in hospitals and in remote locations</li> <li>• Finally VPs have replaced paper-based cases in several disciplines.</li> </ul>
<p><i>How do your VPs integrate with conventional forms of teaching (e.g. face-to-face, lectures, clinical teaching, etc)</i></p> <ul style="list-style-type: none"> <li>• VPs are used by faculty during the lectures to illustrate a clinical disease and as a student activating method</li> <li>• Bank of VPs are being developed and provided as a mandatory activity during the clinical rotations to ensure that students have encountered the most common diseases</li> <li>• With the implementation of the Bologna process, VPs are in a higher extent coupled to specific learning objectives.</li> </ul>
<p><i>How do you integrate your VPs with other e-learning opportunities</i></p> <ul style="list-style-type: none"> <li>• In distance courses, VPs are usually made accessible via Ping Pong (KI: s official learning management system) embedded as a required course activity</li> <li>• For campus students, VPs are accessible via the course portal, tied to a scheduled activity or via a separate entry point (patientcases.org).</li> </ul>
<p><i>How have you integrated your VPs technically with your institutional virtual learning environment?</i></p> <ul style="list-style-type: none"> <li>• A single sign-on procedure is being tested to ease the administration</li> <li>• We are evaluating whether some of the tools in the VLE could be made available within the VPs (Example: synchronous/asynchronous communication tools)</li> <li>• Finally, an integration of the administrative tools and scoring tools is being investigated.</li> </ul>
<p><i>If relevant, please describe how your VPs are used in formative or summative assessment.</i></p> <p>Web-SP is used in formative assessment in medicine (paediatrics), dentistry (comprehensive dentistry) and nursing (clinical diagnostics).</p>
<p><i>Please describe the results of any evaluation of the use of VPs you have conducted with your students</i></p> <p>We have conducted evaluations in several disciplines (Medicine, Nursing and Dentistry) with focus on the acceptance, usability, and learning and as an assessment method:</p> <p>N Zary, G Johnson, J Boberg, U Fors: Development, implementation and pilot</p>

evaluation of a Web-based Virtual Patient Case Simulation environment - Web-SP. Biomed central medical Education (2006) <http://www.biomedcentral.com/1472-6920/6/10>

Zary N, Johnson G & Fors U: Web-based Virtual Patients in Dentistry: Factors influencing the use of cases in the Web-SP system. (accepted for publication in European Journal of Dental Education 2007)

Sandberg M, Youngblood P, Hayes J, Brutlag P, Nevins A, Zary N, Fors U, Dev P & Gesundheit N: Medical Students' Self-assessment Abilities - A Comparison of Computer-Based and Standardized Patient Exams. E-Learn 2007, Quebec, Canada.

Brutlag P, Youngblood P, Hayes J, Sandberg M, Nevins A, Zary N, Fors U, Dev P & Gesundheit N: Student Acceptance of Web-based Simulated Patients for Assessment. E-Learn 2007, Quebec, Canada.

Gunning W, Crist K, Zary N & ForsU: Medical student attitudes and perceptions of a web-based Virtual Patient Case Simulation Environment (Web-SP) for Problem-Based Learning discussion groups. AMEE 2007, Trondheim, Norway

P Brutlag, P Youngblood, E Ekorn, N Zary, U Fors, P Dev & N Gesundheit: Determining the Best Methods: Validation of Content and Scoring for a Web-based Assessment Tool in Medical Education. E-Learn 2006, Honolulu, Hawaii, USA.

N. Zary, N. Gesundheit, P. Dev, P. Youngblood, P. Brutlag and U. Fors: Case-Based exams using a Web-based patient case simulation system (Web-SP). AMEE 2006, Genoa, Italy.

*Briefly describe your plans for developing VPs in the future*

- The main focus will be on creating a bank of VPs that match the curricular learning objectives set as part of the Bologna process, combined with the increased implementation of VPs throughout all the curricula at KI
- Additionally, we envisage the creation of a national repository of VPs during the lifetime of the eViP project.

*What advice would you give a school wanting to use VPs for the first time?*

Evaluate the need to use VPs based on the learning objectives set. Adopt a student centred approach and when creating VPs seek best evidence in the published scientific literature.

### Case study on the use of VPs by LMU

Institution	LMU Munich
Name & role of person completing this	I.Hege

report	
Date of report	29/02/2008
<i>Please describe the VP system(s) used in your institution</i>	
CASUS ( <a href="http://www.casus.net">www.casus.net</a> )	
<i>Please give details of the students who have used your VPs (discipline, under/postgraduate, etc)</i>	
<ul style="list-style-type: none"> <li>• Medicine (internal med., surgery, radiology, interdisciplinary, psychology, occupational medicine, environmental medicine, neurology, paediatrics, emergency medicine, general medicine, clinical skills)</li> <li>• Animal health</li> <li>• Dentistry</li> <li>• Law</li> <li>• Anglistics</li> <li>• Career choice (at schools).</li> </ul> <p>It is used in the following contexts: undergraduate, Continuing Medical Education (CME), nurses, and schools.</p>	
<i>Please briefly describe the types of VPs in use at your institutions (media used, interactivity, etc)</i>	
<ul style="list-style-type: none"> <li>• The VPs used are very different depending on the field and scenario</li> <li>• Most of the VPs include multimedia material like images (can include hotspots) and/or movies. The interactive elements used are: 7 different answer types with quantitative and qualitative feedback, hyperlinks and expert comments. If applicable a "protest" button can be used to contact the case author and suggest improvement, ask questions or discuss an aspect</li> <li>• The navigation of the VPs is linear.</li> </ul>	
<i>Please describe how your VPs are used in different educational scenarios</i>	
<ul style="list-style-type: none"> <li>• Used as an additional e-learning unit integrated as preparation for weekly seminars</li> <li>• Used as a voluntary e-learning unit containing exam relevant material</li> <li>• Combination of the above two points</li> <li>• Used as obligatory e-learning unit (relevant for credit), e.g. 2 of 10 VPs have to be solved successfully (minimum correct answers, minimum session duration, minimum visited cards defined by the courses instructors)</li> <li>• Used as voluntary e-learning unit in addition to lectures</li> <li>• Used as learning by teaching tool (team work) in a seminar setting (credit is given for a completed VP)</li> <li>• Used as examination tool.</li> </ul>	
<i>How do your VPs integrate with conventional forms of teaching (e.g. face-to-face, lectures, clinical teaching, etc)</i>	



Most of the integrated VPs match the curricular learning objectives and are a useful addition to lectures. Some are integrated as preparation for a weekly seminar with a discussion of the VP within the seminar.

*How do you integrate your VPs with other e-learning opportunities?*

- VPs are partly integrated in the learning management system of the faculty and can be combined with learning material like movies
- The clinical skills VPs are combined with another e-learning tool ("Nickels" by the University of Kiel) which presents some background information.

*How have you integrated your VPs technically with your institutional virtual learning environment?*

- Some VPs can be booked and accessed via the Virtual University of Bavaria (vhb)
- Some VPs are integrated in the learning management system of the faculties (e.g. Clix, and Moodle)
- At the LMU currently the integration of CASUS into the faculty system "MeCuM-online" is implemented.

*Please describe the results of any evaluation of the use of VPs you have conducted with your students*

Numerous studies have been conducted since the beginning of CASUS in 1993.

- Every term all integrated VPs are evaluated with an online questionnaire (For each course of VPs a questionnaire can be attached by the tutor).

Other major studies also include:

- Computer-based VPs vs. paper-based VPs
- Investigation of different integration strategies
- Concept Mapping to support the differential diagnostic reasoning process
- Supporting the diagnostic capacity of medical students through case- and example based learning
- Does an internet-based learning environment for clinical skills in addition to the face-to-face teaching enhance the performance of the students?
- CME-course participants through group learning and online cases: a modified team-based approach
- Electronic Key-Feature-Problems for assessing procedural knowledge.

*Briefly describe your plans for developing VPs in the future*

- Currently VPs in paediatrics, internal medicine and epidemiology are being developed
- The main focus will be on creating VPs which match the curricular learning objectives and fit into the existing courses.
- Another important aspect will be the update of the existing VPs.

*What advice would you give a school wanting to use VPs for the first time?*

The most important aspect is a good integration strategy when using VPs.

### Case study on the use of VPs by WAR

Institution	University of Warwick
Name & role of person completing this report	David Davies
Date of report	29 <sup>th</sup> February 2008
<i>Please describe the VP system(s) used in your institution</i>	
<p>The VP system used in Warwick is the IVIMEDS (<a href="http://www.ivimeds.org">www.ivimeds.org</a>) system. This is a web-based Adobe Flex VP authoring and delivery system. IVIMEDS VPs are XML-based and include multimedia resources and a study guide. There is also an offline authoring tool created using Adobe AIR. VPs created offline may be uploaded to either the Warwick e-learning platform for delivery to students (using SiteBuilder – a custom-built content management system) or to the IVIMEDS repository for sharing with IVIMEDS partners. Currently there are 28 medical schools using the IVIMEDS VP system.</p>	
<i>Please give details of the students who have used your VPs (discipline, under/postgraduate, etc)</i>	
<p>All of our students are enrolled on an undergraduate MBChB degree. Warwick students have a prior biological sciences degree prior to entering medical school. The course is split into two phases; Phase I is medical school based with some exposure to primary care, and Phase II is hospital based with further primary care work-based learning. Virtual patients and other forms of case-based learning are used across the course.</p>	
<i>Please briefly describe the types of VPs in use at your institutions (media used, interactivity, etc)</i>	
<p>The IVIMEDS VPs are non-linear, that is students are free to explore any aspects of the patient case depending upon their learning outcomes. Each VP is multi-visit; just as with real primary or secondary care patients, each VP may visit their doctor or clinic several times. As new visits unfold then the learning opportunities increase. Particular patient visits emphasise one or more learning outcomes. For example, in a VP with stroke, an early visit might allow the students to better understand the cerebrovascular anatomy of the brain, while a later visit will help the students understand diagnostic radiology imaging, diagnosis, treatment and patient management.</p> <p>VPs contain embedded narrative text, Flash-based interactive media, images, videos, and multiple-choice questions.</p>	

*Please describe how your VPs are used in different educational scenarios*

VPs come with optional study guides. A student studying in a problem-based learning mode will likely not use a study guide because he/she will have their own learning outcomes to fulfil. Other students may choose to use the study guide as this helps the student get the most out of each VP case depending upon the module in which the VP is used.

We have piloted the use of virtual patients in inter-professional learning, where medical students learn alongside students from other professions e.g. nursing. As this is a small component of the course, we are evaluating the relative merits of further developing an inter-professional VP approach.

*How do your VPs integrate with conventional forms of teaching (e.g. face-to-face, lectures, clinical teaching, etc)*

VPs, and indeed all e-learning at Warwick, complements more traditional forms of teaching. We have not yet totally replaced sections of the curriculum with e-learning or VP-only approaches; however we are considering this, especially for formative assessment. The Warwick curriculum is heavily biased towards group work, and tends to have fewer lectures. The curriculum is not strictly problem-based and a subject expert facilitates group work. In Phase II, students have a learning outcomes framework to fulfil but they undertake less structured clinical rotations. It is up to each student to find his/her way through the clinical learning opportunities. Consequently different students experience a different case mix. We are potentially looking at using VPs to provide a consistent baseline of case mix that all students experience, complemented by access to real patients during rotations.

*How do you integrate your VPs with other e-learning opportunities?*

In addition to what has been mentioned above, we are also trying to integrate more e-learning into VPs through their study guides and are increasingly looking at how VPs can form the front-end to clinical simulation scenarios, either acted out by simulated patients or with some form of technology-based simulation. We are also planning formative assessment using VPs and digital clinical simulations. We also continue to invest in simulation centre training.

*How have you integrated your VPs technically with your institutional virtual learning environment?*

Warwick does not have a traditional VLE as such, instead opting for a more open content management system using a home-built system called SiteBuilder. Warwick also emphasises so-called web 2.0 technologies and we have created Warwick blogs, with over 4,000 active blogs across campus. VPs are currently linked to each relevant module's web site, although we are exploring taking a more competency or outcomes-based framework context rather than focus on arbitrary modules.

*If relevant, please describe how your VPs are used in formative or summative*

*assessment.*

We don't use our VPs formally in assessment although this is something we are interested in. There is formative MCQ-based assessment built into some VP study guides although this is not consistently applied across the course.

*Please describe the results of any evaluation of the use of VPs you have conducted with your students*

We have yet to fully evaluate the VP approach at Warwick because we have only been members of IVIMEDS since August '07. However we will be evaluating both student and teacher experience later in the year.

*Briefly describe your plans for developing VPs in the future*

We are building a competency framework based around our course's learning outcomes matched against the General Medical Councils' Tomorrow's Doctors outcomes. This competency framework will be closely aligned to Foundation training competencies, not least because medical schools will be taking on responsibility for Foundation Year 1 training. We are currently the only UK medical school evaluating the Map of Medicine, a web and evidence based clinical decision support system. We are planning to use clinical guideline algorithms to create the scripts for new VPs aligned to postgraduate training needs.

In turn IVIMEDS is ensuring that its VPs tools are compliant with the MedBiquitous technical format, and will continue to develop teacher-friendly editing tools.

*What advice would you give a school wanting to use VPs for the first time?*

Involve your teachers, especially clinical teachers as early as possible. A sense of shared ownership of VPs in particular, but e-learning in general, is vital to successfully embedding new technologies in the curriculum.

Don't underestimate the technical support needed to help teachers achieve successful e-learning.

Be clear about your learning outcomes so that it is clear to both teachers and students how e-learning and VPs complement other forms of teaching.

## Case study on the use of VPs by UM

Institution	Faculty of Health, Medicine and Life sciences, Maastricht
Name & role of person completing this	Bas de Leng

report	
Date of report	29 <sup>th</sup> February 2008
<i>Please describe the VP system(s) used in your institution</i>	
<p>Cases at FHML are developed with an English version of the CAMPUS authoring system (<a href="http://www.medicase.de">www.medicase.de</a>). The cases are delivered with the CAMPUS thin-player module embedded in the experimental learning management system Dokeos (<a href="http://www.dokeos.com">www.dokeos.com</a>). This way of producing VPs enables us to incorporate prompts and feedback within a VP and with the complexity and sequencing of its components. The way of delivering VPs enables us to plan blended-learning activities with VPs and to monitor the actual use of the VPs at a distance.</p>	
<i>Please give details of the students who have used your VPs (discipline, under/postgraduate, etc)</i>	
<p>Pre-clinical medical students use VPs in internal medicine (cardiology, oncology) and clinical undergraduate medical students use VPs in paediatrics.</p>	
<i>Please briefly describe the types of VPs in use at your institutions (media used, interactivity, etc)</i>	
<p>VPs use images (sometimes interactive), interactive lab forms, sounds (heart and lung), and sometimes videos.</p>	
<i>Please describe how your VPs are used in different educational scenarios</i>	
<p>At the moment VP are predominantly used for knowledge acquisition/application and clinical reasoning in a mono-disciplinary setting. It is voluntary learning material for individual preparation and follow-up of lectures, tutorial groups and exams (i.e. familiarisation and review VPs).</p>	
<i>How do your VPs integrate with conventional forms of teaching (e.g. face-to-face, lectures, clinical teaching, etc)?</i>	
<p>Our VPs are planned for briefings prior to team-training with simulators in acute care. Our VPs are also embedded with interactive presentations/seminars (in-session VPs). Finally, our VPs are used as a preparation tool in 'triads' for tutorial groups (familiarisation VPs).</p>	
<i>How do you integrate your VPs with other e-learning opportunities?</i>	
<p>Our planned VPs are combined with audience response systems (electronic polling), simulators (mannequins), and computer supported collaborative learning (by means of asynchronous communication).</p>	
<i>How have you integrated your VPs technically with your institutional virtual learning environment?</i>	
<p>Our VPs are embedded in a separate learning management system (Dokeos), which</p>	

facilitates planning and monitoring of blended learning activities. Maastricht University uses Blackboard as its main institutional learning management system (LMS), but this LMS wasn't suitable for the delivery of the VPs.

*What advice would you give a school wanting to use VPs for the first time?*

Think of active learning situations with VPs, try to link the results of this learning with other learning activities in the curriculum, and use them for topics where VPs actually 'add value'.

### Case study on the use of VPs by HD

Institution	Ruprecht-Karls-University Heidelberg, Universitaetsklinikum
Name & role of person completing this report	Soeren Huwendiek, eViP-Project lead Heidelberg
Date of report	29/02/2008
<i>Please describe the VP system(s) used in your institution</i>	
<p>The VP system used at Heidelberg University is the CAMPUS Virtual Patients system. The CAMPUS Virtual Patient system consists of an authoring component, two player components to present a case in two different formats and an assessment system.</p> <p>The authoring system allows easy development of VPs including the possibility to integrate background knowledge (expert comments, links to external resources), different types of questions (multiple choice, long menu, short menu, free text) and media (picture, audio, video) at any point in time and attached to any single item of the case.</p> <p>A special characteristic of the CAMPUS VP system is that each case can be presented to the student in two different ways, the CAMPUS-Classic Player and the CAMPUS-Card-Player. While the Classic Player focuses on a very detailed, more simulative, graphically enhanced and authentic VP-environment the Card Player is a more pre-determined, more structured and more text-based interface. Besides these the Classic</p>	

Player also features a higher variety of question types.

The assessment system features many types of questions including long menu questions. In addition it is legally compliant by the use of technical measures (encryption, server mirroring, constant monitoring).

*Please give details of the students who have used your VPs (discipline, under/postgraduate, etc)*

The following have used CAMPUS Virtual Patients: undergraduate medical students in their 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> year.

*Please briefly describe the types of VPs in use at your institutions (media used, interactivity, etc)*

The VPs used at Heidelberg University are highly interactive: In the Classic Player students freely choose questions in history-taking, physical, laboratory and technical exams and diagnoses from long lists with up to 9000 different items. The VPs are media enhanced by graphs, pictures, sound- and video files.

The Card Player features an easier-to-use interface with mainly short menu questions. It was originally designed for continuing medical education.

*Please describe how your VPs are used in different educational scenarios*

The VPs are mainly used in blended-learning scenarios, consisting of small groups working on the VP- cases with a tutor present for questions, followed by a tutor-led discussion of the VP.

The VPs are also used as preparation and wrap-up for lectures, seminars and small group sessions and are offered for self-study via access through the Heidelberg learning management system AthenaMed.

*How do your VPs integrate with conventional forms of teaching (e.g. face-to-face, lectures, clinical teaching, etc).*

The VPs are integrated as preparation and wrap-up for lectures, seminars and within tutor led small group teaching.

*How do you integrate your VPs with other e-learning opportunities*

The Campus system is fully integrated into the online LMS-system AthenaMed. The VPs include links to Internet-resources, such as guidelines and media and links to a standard German paediatric textbook, which has been digitised for this purpose.

*How have you integrated your VPs technically with your institutional virtual learning environment?*

Access to the VP-system is managed over the Heidelberg learning management system AthenaMed (SCORM). In addition, there is a timetable for students with descriptions of lectures and seminars. Within these descriptions there are links to relevant and recommended VPs concerning the topic.

*If relevant, please describe how your VPs are used in formative or summative assessment.*

The assessment system embeds many question formats including long menu questions. In addition it is legally compliant by the use of technical measures (encryption, server mirroring, constant monitoring). It is widely used at our faculty.

*Please describe the results of any evaluation of the use of VPs you have conducted with your students*

We conducted studies concerning design principles of virtual patients, curricular integration principles of VPs, and VPs as an assessment tool. Most of the studies will be submitted for publication in the very near future.



<i>Briefly describe your plans for developing VPs in the future</i>
Currently VPs in Paediatrics, Psychiatry, Neurology and preclinical specialties are developed. It is also planned to continue integration of existing VPs into the seminar-preparation/-wrap-up context and for preparing for real patients. Furthermore, VPs will be combined with skills training and adapted to training of final year students and for continuing medical education. Update of existing VPs and design of new VPs in Paediatrics is also part of our plans.
<i>What advice would you give a school wanting to use VPs for the first time?</i>
Integrate the VP well into the curriculum and assessment, and cooperate with partners in developing and using VPs.

### Case study on the use of VPs by CLUJ

Institution	Universitatea de Medicina si Farmacie "Iuliu Hateiganu" Cluj-Npoca, Romania
Name & role of person completing this report	Valentin Muntean / Local project manager
Date of report	29 <sup>th</sup> Feb 2008
<i>Please describe the VP system(s) used in your institution</i>	
Web-SP <a href="http://vpmed.umfcluj.ro/webasp">http://vpmed.umfcluj.ro/webasp</a> The system is now being implemented in both Medicine and Nursing	
<i>Please give details of the students who have used your VPs (discipline, under/postgraduate, etc)</i>	
1. Medicine	
1.1. pre-clinical undergraduate	
1.2. clinical undergraduate	
1.3. postgraduate / residency	
1.4. continuing professional development	
2. Nursing	
2.1. clinical undergraduate	

2.2. clinical postgraduate.
<p><i>Please briefly describe the types of VPs in use at your institutions (media used, interactivity, etc)</i></p> <p>All our VPs are in WebSP player (Karolinska Institutet <a href="http://websp.lime.ki.se">http://websp.lime.ki.se</a>). They all include multimedia material, images, movies and audio recordings. The interactivity is based on quantitative and qualitative feedback, hyperlinks and expert comments.</p>
<p><i>Please describe how your VPs are used in different educational scenarios</i></p> <ul style="list-style-type: none"> <li>• As a supplementary learning and formative feedback resource for students to use as self-directed learning</li> <li>• In Problem-Based Learning tutorials, replacing conventional paper-based patient scenarios.</li> </ul>
<p><i>How do your VPs integrate with conventional forms of teaching (e.g. face-to-face, lectures, clinical teaching, etc)</i></p> <ul style="list-style-type: none"> <li>• VPs match the curricular learning objectives and are integrated as useful additions to the lectures, seminars and clinical bedside activities</li> <li>• VPs will replace the paper cases in Problem Based Learning tutorials.</li> </ul>
<p><i>How do you integrate your VPs with other e-learning opportunities</i></p> <p>VPs are partly integrated with:</p> <ul style="list-style-type: none"> <li>• The medical algorithms for clinical situations and diseases, available at <a href="http://www.med-online.ro">www.med-online.ro</a></li> <li>• Imatest online lectures, available at: <a href="http://www.imatest.graffco.ro/user/pages/home.php">www.imatest.graffco.ro/user/pages/home.php</a></li> </ul>
<p><i>How have you integrated your VPs technically with your institutional virtual learning environment?</i></p> <p>All VPs are accessible through WebSP, on the “Iuliu Hateiganu” University server. At the moment the access is restricted to staff and students enrolled in VPs pilot program.</p>
<p><i>If relevant, please describe how your VPs are used in formative or summative assessment.</i></p> <ul style="list-style-type: none"> <li>• The VPs we use at the moment are in the WebSP system, which is mainly</li> </ul>

designed for auto-evaluation (formative)

- It is our intention to develop VPs in other players / mini-cases for both formative and summative evaluation.

*Please describe the results of any evaluation of the use of VPs you have conducted with your students*

A survey of students' opinion on Web-SP cases was done in the third week of December 2007. The questionnaire was rated on a Likert scale (1= strongly disagree to 5 = strongly agree). There were 25 respondents (78% of 32 5-th year medical students studying the clinical module of endocrinology and surgery). The students had to choose one of the four cases available, to solve it in less than 90 minutes and to answer the anonymous electronic questionnaire. Most of the students consider that working with Web-SP cases was fun (4.2+/-0.91) (M+/-SD) and easy (4.04+/-0.84) and the online format appealing (3.6+/-1.08). The cases were interesting (4.16+/-0.75), the knowledge base of the cases appropriate (4.52+/-0.65) and the key feature of the cases important for clinical practice (3.76+/-1.09). The questions and answers were not as straightforward and the illustration not as good as they should (3.28+/-0.94) and (3.12+/-0.93). The feedback on diagnostic and treatment decisions was not appropriate (2.92+/-) (we had very few time to evaluate and give feedback to the students) and the overall difficulty of the cases was inappropriate (2.8+/-0.96) (the students were at the beginning of the endocrinology and surgery module). There were few technical problems with the software ran (satisfied 3.96+/-1.14). Most of the students prefer computer cases to paper and pencil cases (4.2+/-0.91) and wish to have computer simulations in the future curriculum (4.04+/-0.84).

*Briefly describe your plans for developing VPs in the future*

- Develop the VPs collection in order to cover the main topics / objectives for the undergraduate medicine and Nursing existing courses
- Develop the WebSP player to better fit to the needs of different medical specialities
- Develop VPs in other players / mini-cases for formative and summative assessment.

*What advice would you give a school wanting to use VPs for the first time?*

- Identify and develop the necessary support, staff and resources
- Involve a critical number of professors in VP production
- Identify the areas/the curriculum topics for VP production, in agreement with the learning objectives and educational outcomes of the Medical School
- Update existing cases and add new resources and features
- Implement the VPs in both learning and evaluation, formative and summative

- Share VPs with other medical schools.

### Case study on the use of VPs by UJ

Institution	Jagiellonian University, Medical College
Name & role of person completing this report	Andrzej Kononowicz (Technical Developer) Aleksandra Stachoń (Learning Technologist)
Date of report	29/02/08
<i>Please describe the VP system(s) used in your institution</i>	
<p><b>CASUS</b> – a web based VP system including a player and authoring tool for linear cases. CASUS has been developed by the LMU and Instruct.AG.</p> <p>Note: Additionally, a commercial tool <b>MicroSim Inhospital</b> (by Laerdal Medical Corporation) has been used by the Anaesthesiology and Intensive Care Department at UJ. MicroSim is a multimedia-rich desktop application for emergency medicine. MicroSim Inhospital is used by undergraduate students Anaesthesia And Intensive Care Medicine course (6<sup>th</sup>-year students). This system is, however, a black box solution for the UJ, without the possibility of adding new cases or repurposing existing ones. For that reason we regard the MicroSim system as outside the scope of the eViP project.</p>	
<i>Please give details of the students who have used your VPs (discipline, under/postgraduate, etc)</i>	
<p>VPs in the CASUS system have been presented to medical, undergraduate students within the "Telemedicine" course and an elective course "E-learning" (with 3<sup>rd</sup> and 4<sup>th</sup>-year students).</p>	
<i>Please briefly describe the types of VPs in use at your institutions (media used, interactivity, etc)</i>	
<p>VPs from the CASUS system contain multimedia materials like images and video clips.</p> <p>The interactive elements used are: 7 different question types with quantitative and qualitative feedback, hyperlinks and expert comments. As mentioned earlier, VP cases in CASUS are linear.</p>	
<i>Please describe how your VPs are used in different educational scenarios</i>	
<p>UJ is still in the initial phase of VP introduction. Two virtual patients have been presented in a self-directed learning scenario as part of the eViP pilot study. Further</p>	

scenarios are planned, but have not been performed yet.
<p><i>How do your VPs integrate with conventional forms of teaching (e.g. face-to-face, lectures, clinical teaching, etc)</i></p> <p>VPs have been presented in Telemedicine classes dealing with foundations of IT technologies in medicine. Introduction of VPs into clinical subjects is planned.</p>
<p><i>How do you integrate your VPs with other e-learning opportunities?</i></p> <p>A theoretical introduction to the topic of VP, summarising their features and comparing different VP systems is presented to the students via an e-learning platform.</p> <p>Medical students help in translations of VPs from different languages (German, English) within the elective course "E-learning".</p>
<p><i>How have you integrated your VPs technically with your institutional virtual learning environment?</i></p> <p>Students access the CASUS system using the same usernames as for the UJ's e-learning platform (Blackboard Academic Suite). All relevant links and instructions for the use of VPs are copied into the courses on Blackboard in HTML format. An electronic VP evaluation questionnaire for the pilot study has been created using Blackboard's survey tool.</p> <p>A fully automatic single sign-on option between the Blackboard and CASUS system using the SCORM or IMS interface is planned.</p>
<p><i>If relevant, please describe how your VPs are used in formative or summative assessment.</i></p> <p>No formative or summative assessment has been undertaken yet</p>
<p><i>Please describe the results of any evaluation of the use of VPs you have conducted with your students</i></p> <p>An evaluation of two repurposed VPs has been carried out as part of the eViP pilot study among 3<sup>rd</sup>-year students. The evaluation has been continued after the pilot study was over returning in total 139 evaluation forms.</p> <p>The study showed a keen interest in VPs among the polled students (mean 4.14 in a 1-5 Likert scale). The presented knowledge was comprehensible (mean 4.20 in a 1-5 Likert scale) and the applied VP system (CASUS) was definitely easy to use (mean 4.57 in a 1-5 Likert scale). The general mark of the presented patients was high (7.59 in a 10-point scale). Direct comparison of the two presented VPs, from which one was repurposed from a different culture and one from a different structure, revealed a slight superiority of the second one over the first (7,39:7,77) even though it is far too early to draw general conclusions from these result in the matter of VP's repurposing workflows.</p>

*Briefly describe your plans for developing VPs in the future*

A learn-by-teaching project for postgraduate medical students is about to start in a few days aiming to create new patients for credit. Repurposing of medical virtual patients into nursing is planned for the near future. It is also intended to enrich the current virtual patients with animations using Flash.

What advice would you give a school wanting to use VPs for the first time?










- A comprehensive and frequently updated VPs' referatory is needed for preserving an overview of the existing patients
- Web-based VP systems are more practical and accessible than desktop applications
- Medical students can be of great help in introducing VPs at a school. It is worth asking them for help while preparing new cases. For instance, translations of cases from other systems may be done with good results by medical students of final years (supervision by subject matter specialists is of course necessary).

**Annex:**

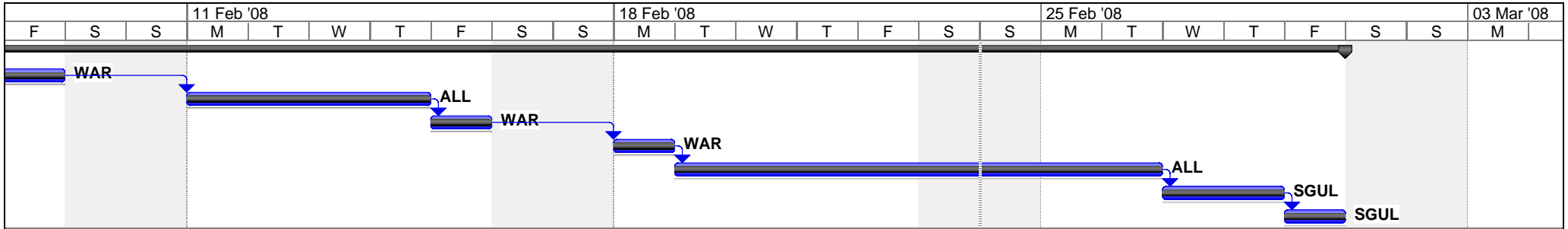
Annex A – Project plan for deliverable 4.2

# **Annex A – Project plan for deliverable 4.2**

ID	Task Name	Duration	Start	Finish	Predecessors	04 Feb '08								
						W	T	F	S	S	M	T	W	T
1	<b>Deliverable 4.2 Case studies of the use of VPs</b>	<b>21 days</b>	<b>Fri 01/02/08</b>	<b>Fri 29/02/08</b>										
2	Create proforma of case study report	6 days	Fri 01/02/08	Fri 08/02/08										
3	Review proforma of case study report	4 days	Mon 11/02/08	Thu 14/02/08	2									
4	Change proforma based on review	1 day	Fri 15/02/08	Fri 15/02/08	3									
5	Finalise proforma	1 day	Mon 18/02/08	Mon 18/02/08	4									
6	Each partner to finalise case study proforma	6 days	Tue 19/02/08	Tue 26/02/08	5									
7	Collate case study findings	2 days	Wed 27/02/08	Thu 28/02/08	6									
8	Submit deliverable	1 day	Fri 29/02/08	Fri 29/02/08	7									

Project: d4.2.mpp Date: Sun 24/02/08	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	





Project: d4.2.mpp Date: Sun 24/02/08	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	