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Transforming Knowledge into Action through Gaming and Simulation

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Design and Layout: Adrian Döge

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ISBN: 3-00-013989-3

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Knowledge Building in Online Simulations with Sieberdam/ROCS

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1. Knowledge Building in Online Simulations

1.1. Gathering Expertise: The Better of Two Worlds?

The interest in and the developments in the area of (game)simulations for e-learning have since the end of the nineties (in particular in the corporate world for corporate training and management development) known a strong increase (see for example Alrich, 2004; Schank, 2002; Davies, 2003; Crawford, no date). Simulations turn out to fit the new educational concepts such as life-long learning, competency-based learning, learning communities, authentic learning and ‘less schedule-bound and time and place dependent learning’. According to some (game)simulations will bring e-learning to a new level (Davies, 2003; Aldrich 2004). In the recent past in several countries experiments and pilot projects have been initiated in which e-learning, (digital) game based learning, learning content management systems and online simulation are intertwined (see for example Dziabenko et. al., 2003).

An important argument for the combining of e-learning and simulations concerns the so-called authenticity of the learning environment. Through simulations the learning can become more ‘authentic’ (realistic), as students have to build work-relations with other persons (‘relating’), have to employ various activities (‘create’) and have a ‘real’ audience for their actions and products (‘extending the audience’) (Simons, 2004). By the use of online (web-based or internet-mediated) simulations students can, for example in teams, carry out assignments for ‘clients’ in a realistic but safe environment. To finish these assignments they have to interact with other students, teachers, clients and experts (Dziabenko et al. 2003, Maharg, 2004, see also Asakawa & Gilberm 2003). For that matter, we are speaking here of a type of simulation where the interaction between persons (students with each other or with teachers, clients, stakeholders or external experts) is central. With this type of simulations, also known as ‘simulations for social interaction’, the main focus is on computer supported collaborative learning. This contrary to other types of online simulations that are based on the interaction of individual players with the content (represented by a computer model or game engines). Another advantage of the online execution of interactive simulations is that the constructed knowledge can be stored, distributed and re-used. In this way a knowledge center is created for students and teachers.

Although the required technology for e-learning by means of simulations and gaming seems to have grown up, there is still a high need for experience...
and research on the way in which simulation- and communication technology can be used best and on how simulations can be embedded best into higher education. The amount of pilots and evaluations with online simulations for e-learning in higher education so far is limited. Likewise there is also little guidance and assistance available for teachers, students and simulation developers in higher education. The development of scripts and scenarios for simulations in higher education, for example, is a time-consuming task, for which a large amount of knowledge and experience in the field of ICT, simulations, education and subject matter is required. Content, context and used technology are often highly intertwined, which makes it hardly possible to develop new content (cases, scripts, scenarios) within an already existing context (simulated environment) or to build on already developed and available technology (for example by use of a learning content management system or a web environment). To enable a wider and more effective application of simulations in higher education, a simulation environment is needed that uses a flexible and modular build technical infrastructure with which teachers and simulation developers relatively easily can develop and implement new games for diverse learning goals, educations and learning environments.

An example, or prototype, of such an simulation environment is Ardcalloch (Maharg, 2004). So far Ardcalloch has been limitedly used in legal education in Scotland. Besides, the focus has been so far on the acquisition of (legal) skills. However, the simulation environment is so interesting, rich and flexible that it should be possible, with few adaptations and further development, to use the environment for the development and sharing of knowledge in legal and related education, such as policy and management. In our opinion both the tool and the simulation environment can be developed further into a rich simulated environment that can be used for many educational goals at colleges and universities.

As part of the VSNU-project RechtenOnline a first attempt was made to explore the possibilities to translate this concept of online simulations to the Netherlands. A Dutch virtual city was built, Sieberdam, that can be used by teachers, in combination with the software RechtenOnlineCommunity-Services (ROCS), to construct and play online simulations. We will briefly explain these instruments in the second part of the paper. The limited experience with Sieberdam/ROCS shows that it is interesting and feasible to further develop and validate this tool. With Sieberdam/ROCS we have a tool that enables teachers to set up and use simulations in their education, without much knowledge of simulations and ICT. What is still lacking though are experience and support on how these simulations can be embedded best in higher education. Which tasks are for example the most suitable and how to develop simulations for large groups of students? Which effects for the student, teacher or faculty can be realized by the use of online simulations? How can Sieberdam/ROCS and similar simulation environments develop themselves in the future?
To answer these and similar questions we have set up the KODOS-project (Knowledge Building in Online Simulations). The goal of this project is to test and validate the wider applicability of the concept of Online Simulations. By setting up, executing and evaluating five simulations within various learning contexts knowledge is developed about the application of online simulations in higher education. The intention is to make the collected experiences and the gained knowledge available in the form of a ‘manual for online simulations’. This manual will provide educational guidelines for setting up and carrying out online simulations wherein the interaction between students, with teachers and third parties (simulated clients, experts) is central.

The five simulations differ in context, set-up, target group and goal. However, the majority is focused on interdisciplinary issues in the area of policy, management and law. Moreover, in each of the simulations the goal is to reach consensus around a problem definition, in interaction with stakeholders from different disciplines and with various interests. Finally, all simulations will be developed by teachers and will be embedded by them in their current educational practice. Table 1 provides an overview of the planned simulations. A more detailed description of the simulations is given in the next section.

### Intrafaculty
- Erasmus University Rotterdam
  - Legislative Drafting Online, Faculty of Law
- Leiden University:
  - Computer Skills for Lawyers, Faculty of Law
- Willem de Kooning Academie
  - CMD-project, Communication and Multimedia Design

### Interfaculty (national)
- Technical University Delft and Erasmus University Rotterdam
  - Westwijk Online, Faculty of Technology, Policy and Management and Faculty of Social Sciences

### Interfaculty (international)
- Erasmus University Rotterdam & Glasgow Graduate School of Law
  - Licensing project, Faculty of Business Administration

Table 1: Overview of simulations

### 1.2. Experiments – Where To Go?
In this section we describe the five planned simulations in some detail.

#### Legislative Drafting Online
This simulation will be used in the Mastercourse Legislative Drafting. In this simulation the students first create, in mutual understanding, a legal provision and later on a short piece of legal regulation.
The specific objectives for this simulation are:
- to determine to what extent the simulation and the regular face-to-face classes can be offered separately and whether the simulation can exceed the duration of one semester.
- to explore how further expertise can be made available to students.
- to explore whether the simulation is also suitable for the composing of other text such as contracts, regulations, judgments, objections and appeals.
- to explore the opportunities to work together with teachers and students at other faculties.

This simulation is planned for both the first semester of 2004-2005 and the first semester of 2005-2006.

**Computer Skills for Lawyers**

This simulation is part of the first year course on legal computer use. The main goal of the simulation is to enable students to acquire the ICT-skills that they require in their future as a legal practitioner. The assignments will deal with several legal cases, with roles such as parties, solicitors, jury and partners.

The specific objectives for this simulation are:
- to create a closer connection to the real-life situation, among other things by dividing tasks and by organizing those in workflows.
- to explore whether a simulation can be used in mass education against realistic investments to draw to small groups of students (per simulation) and to guide them more individually.

This simulation is planned for the first semester of 2005-2006.

**CMD-project**

The CMD-course at the Willem de Kooning Academie aims to develop students into professionals that meet the needs to the growing multimedia industry. An important element in achieving this is practice-based learning that allows students to put theoretical learning into practice on projects that are based on life-like situations. Such projects are usually team-based and involve the students developing a multimedia product for a specific target customer on the basis of a briefing from a client. The simulation will be used on two projects: Making an interactive commercial (second year) and making a community website for people aged 55+ in Rotterdam (first year).

Specific objectives for these simulations are:
- to test whether they allow tutors to play various roles within the project more effectively.
- to test whether they help students overcome their perception of conflicts in the roles tutors must adopt.
- to assess whether the simulation environment allows tutors to observe, coach and assess the team work process during the project more effectively.

- to assess whether the simulation environment allows tutors to observe, coach and assess student interactions with the client and target customers more effectively.

The first year simulations are planned for February-April 2005 and February-April 2006. The second year simulation is planned for September-December 2005.

**Westwijk online**

The simulation Westwijk online is a combined project of the Bachelor in Public Administration at the Erasmus University Rotterdam and the Bachelor in Technical Public Administration at the Technical University Delft. The simulation offers students the possibility to acquire knowledge and experience in policy making and controlling at a local level based on the intended restructuring of the city centre of Sieberdam.

Specific aims of this simulation are:

- to develop and offer more effective and more efficient case-based education (in Public Administration).

- to investigate whether and if so, how the simulation environment Sieberdam/ROCS can be used for the Public Administration education (in the Netherlands).

Both simulations are planned for the period August 2005- January 2006.

**Licensing project**

The Licensing project involves the writing of a licensing contract between a client and a group of legal students. The client is a group of Business school students from the MBA program at the Erasmus University. The other party, the internet shop is a group of legal postgraduate student of the Glasgow Graduate School of Law. The aim of the project is that the two parties formulate a licensing contract, in which the interests of both the sales person and the internet-shop are looked after.

The specific objectives of this simulation are:

- to confront students in two different disciplines with each other's attitudes and preferences vis-à-vis a licensing contract.

- to explore the opportunity to add an international setting to this type of simulation.

- (possibly) to create some form of interaction between the two cities of Ardcalloch and Sieberdam and to make some relevant comparisons.
This simulation will run twice, in October-November 2004 and in October-November 2005.

1.3. Possible Future Projects (Dutch Treat)

There is a definite interest for the ROCS/Sieberdam instrument in Dutch higher education. First some of the remaining 2003 RechtenOnline funds have been redirected to make some improvements and amendments to the products already delivered. Second a SURF-application was admitted and granted. That is the project named KODOS, discussed in the previous paragraph. Thirdly, the RechtenOnline Foundation considers exploring Sieberdam/ROCS in the context of moot courts, that exist as a more or less regular course in almost all Dutch law faculties. As things stand now it is highly likely that Sieberdam/ROCS will be introduced in legal education throughout the Netherlands via the moot court courses. In the academic legal education community there now basically are two groups at work where implementing ICT is concerned: RechtenOnline (6 law faculties) and the (4) law faculties that are part of the wider Dutch Digital University.

Preliminary discussions between the (makers of the) twin towns of Ardcalloch and Sieberdam have shown an interest to move into new European countries. In that respect we are looking for appropriate European funding schemes. We have not yet dared to look any further. However, suggestions are welcome.

2. Sieberdam/ROCS – Organisational and Didactical Underpinnings

2.1. Database Driven

Sieberdam/ROCS is a database driven environment for online simulations. ROCS is the software/database, build with the OpenACS toolkit (Version 5.0). Sieberdam is the graphical interface.

2.2. Four Modes

ROCS offers four user friendly modes to handle four aspects of simulations.

CityBuild

The CityBuild mode is the tool for Sieberdam City building and maintenance.

Objects can be created and added to the Yellow Pages and/or the Sieberdam flash map. Both Yellow Pages and the map are the main portals for Sieberdam.

Objects can be Characters, Locations, Props, Stylesheets or Images. Characters are the persons in Sieberdam. These persons provide the environment of the
roles in simulations. *Characters* have websites providing direct information and offering a contact-option. *Locations* are places in Sieberdam, the stage for playing the simulations. *Props* are requisites, e.g. everything in Sieberdam that is not a location or character (such as infrastructure, monuments etc.; of course any prop can be switched to character or location if needed in a specific simulation). When you compare a simulation with a moviesscript, than the Sieberdam *locations* are the stage and the *characters* are the role descriptions.

**SimBuild**

The template-author creates a template. That is the abstract, complex part of simulation writing. The staff member, in the SimInst-mode, ‘only’ has to fill the blanks in the template to make a new simulation. A template has three elements: roles, states and tasks (see figure 2). *Roles* are all persons playing a role in the simulation. *States* are given moments in a simulation. At such a moment a task can be performed. Being succesful or not leads to changes in the state of the simulation, and potentially to new tasks. A simulation always is in one state only. *Tasks* are the assignments that persons have to fulfil during the simulation. Performing a task succesfully leads to a next state of the simulation. A sequence of tasks (and hence states) could be: ‘seek advice’, ‘do research’, ‘give advice’, ‘comment on advice’, ‘revise of advice’, ‘give final advice’. 

Figure 1: CityBuild Result
SimInst

In the Simulation Instantiate mode a template is filled. The template provides in a rather abstract way the roles, tasks and states of a simulation. It also has a suggested duration. The idea is that a staff member selects a template that comes closest to his or her needs and adapts that template. Over time a collection of (basically empty) templates will be available for use by others.

The Settings-tab in SimInst is used to provide some basic information about the simulation: the name, a date to send a start notification, the starting and ending dates, the enrollment option and a description of the simulation, meant for (potential) users, e.g. students.

With the Roles-tab roles are linked to characters. In the template the roles are defined. A role is ‘dressed up’ by linking the role to a Sieberdam character. Compare a puppet theatre: the role is the hand, the character is the puppet on the hand.

There is a number of characters readily available. New characters may be added for a simulation. That is done in the CityBuild mode by the CityAdmin.

Tasks are specified in the section Tasks. Attachments may be added (as props in CityBuild). A description of the task is written. The template contains a general description, e.g. write a document. What specific document obviously is simulation-dependent, and has to be specified.

The fourth tab considers the assignment of participants in/to groups, e.g. of 2 or 3. This depends on the simulation and the template. It has consequences for the casting of the participants. Participation is by invitation or mandatory. Participants are informed when the simulation starts.

Figure 2: Tasks, Roles and States
Finally, the *casting* determines how we link students to roles; e.g. who plays what role, in what case (parallel simulation)? Participants can be automatically assigned to cases and roles, or choose their own cases, or choose their own cases and roles. The automatic assignment can be influenced by the choice of groups to choose from. If there is a role ‘Judge’ which cannot be played by students, but only by staff, then the role ‘Judge’ is casted from a group that contains only staff-members. We can choose how many people can play a role simultaneously. That may be useful if students should cooperate for any project (producing a document etc.). Casting in cases can be changed manually by the admin (add student, replace student, change group etc.).

**SimPlay**

SimPlay is the simulation-running mode (see figure 3).

![Figure 3: SimPlay](image)

Left top is the character you play, with the role indicated. Clicking on the character-link provides more information on the character. Under *Your Options* a student has an overview of all messages, of all available tasks, a portfolio (for documents), a description of the present simulation, and an on/off for notifications (old and new email messages regarding email, tasks etc.). Under *Contacts* there is a list of all characters that participate in this simulation. Under *Recent Messages* there are messages sent to other players (core of the simulation process). Send *New Message* gives a list of all players, clickable and with an attachment-option. Performing *Tasks* is the most important activity in a simulation. In performing tasks a student influences the simulation progress. Tasks are a dynamic element; they may appear for a given period only; new tasks may appear etc. Under *Document Portfolio* a student’s own and received documents are stored.
2.3. **Sieberdam**

Sieberdam is the graphical interface between the user and ROCS. It is a Flashmap, that has links to the ROCS database. The map draws data from the database. From the database an XML-document is generated. An XML-document basically is an ordinary textdocument.

It contains data that are imported and used in the Flashmap. The five types of data that are used in the Flashmap are in so-called nodes: 1) the title of the object, 2) the Object ID, to identify the Object, 3) a description of the Object, 4) the url of the website of the Object, 5) the path to the thumbnail of the Object.

![Figure 4: Sieberdam](image)

The Object ID is a number, by which the Flashmap identifies to which Object the icon has to be linked. This number is used for placing the icon on the map. When the source-document of the map is opened an icon can simply be dragged from the Library on the map. Then the Object ID is linked to the icon.

2.4. **Sieberdam & Ardcalloch - The Twin Towns Compared**

**Similarities**

Sieberdam/ROCS is inspired on the Scottish/Glasgow Ardcalloch example. It uses many of its didactical underpinnings. Sieberdam shows many similarities in its lay-out and set-up. Objects on the map and in the Yellow Pages function as sources of information, and as portal for a simulation. Characters have their own websites.

**Differences**

There are some obvious differences between Sieberdam/ROCS and Ardcalloch. The latter was created to be an integral part of a new educational program. It was meant to accommodate students during the full length of the curriculum (one year or more). It is used in several courses of the program. Sieberdam/ROCS is developed as a completely independent instrument. Its use is not related to any particular educational program. It can be used for one single course at one single institution, or be used in any more comprehensive way.
Ardcalloch casts roles for students solely as beginning practising lawyers. All students are member of a law firm. Hence there are quite a number of law firms in Ardcalloch. Sieberdam/ROCS has no pre-set casting. Anyone (student, staff, expert) can be casted in any role. Obviously this means that an Ardcalloch type of legal-professional casting may result. Although when building Sieberdam/ROCS two concrete legal simulations were developed, the focus of the tool is much more ‘open’ in the sense that it offers instruments by way of building blocks to easily create and run discipline-independent simulations. Compared to Ardcalloch Sieberdam/ROCS intends to be a much more incidental, flexible and easy-to-operate instrument.

Pros and Cons
Open for discussion.

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