



CHAPTER FOUR

VIDEOGAMES

1. VIDEOGAMES AS POSSIBLE LEARNING ENVIRONMENTS

Videogames As Learning Applications

Contemporary virtual learning environments ([see also Chapter 2 – Education, Paragraph 1](#)) usually provide course material, communication and collaboration tools, assessment and access to resources. Editors of the contemporary videogames provide possibilities to change content of the games. That's why a game content can be converted to the part of curriculum content.

One can include some learning material (in a simple text or multimedia – text with images, animation, video format) that must be read for performing the game's tasks. The game can be designed for a group of players to solve tasks collaboratively. Resources are to be shared. Questions to ask and quizzes serves for assessment. Scores saved provide some feedback for evaluation of learning. In such a way, games can be a forum where learning arises as a result of tasks stimulated by the content of the games, knowledge is developed through the content of the game, and skills are developed as a result of playing the game. Collaborative problem solving is one of the most important elements of educational value of a game. Knowledge is gained inside an attractive for learner's game environment.

Videogame as learning environment ([see also Chapter 2 – Education, Paragraph 1](#)) is based on challenge, reward, learning through doing and guided discovery, in contrast to the "tell and test" methods of traditional instruction. The design of the **pedagogical process of the videogame** ([see also Chapter 1 – Introduction, Paragraph 1 and 2](#)) should aim at the immersion of a learner to the environment of the videogame, and at the same time the student's immersion to the learning subject. Games often position learners in the role of the hero, who engages in **transformational play** (transforms a virtual world), see for example the game [Atlantis Quest](#). Today's students who have grown-up with digital technology are especially poised to take advantage of such learning environments.

Brief History Of Videogames ([see also Chapter 3 – Multimedia, Paragraph 5](#))

The first known concept for an electronic game was a device called the [Cathode-Ray Tube Amusement Device](#) patented in the United States by Thomas T. Goldsmith Jr. and Estle Ray Mann in 1948. *Spacewar*, created in 1962 is credited as the first widely available and influential computer game. First video game in arcades - *Computer Space*, created in 1971, was not very successful, but started the history of arcade games. Arcade industry entered its greatest period of creativity and popularity in 1978 with many technically innovative and genre-defining games in the first few years of the decade. It was the beginning of the golden age of arcade games. **Space Invaders**, **Atari Football** had a great success. The golden age was remarkable not only for its game play advances, but also for its technical innovations. One of the most important was the implementation of vector graphics, created by an electron beam drawing lines on a black screen. The use of vector graphics allowed designers to animate many more objects on the screen at the same time at a sharper resolution than raster graphics allowed at the time as well as create better-defined shapes and even wire frame 3D models.

At this time, computer and video game development split to many areas, such as arcade machines, university computers, handhelds, and home computers. While the fruit of development in early video games appeared mainly (for the consumer) in video arcades and home consoles, the rapidly evolving home computers of the 1970s and 80s allowed their owners to program simple games.

With the increasing computing power and decreasing cost of processors as the Intel 80386, Intel 80486, and the Motorola 68030, the 1990s saw the rise of 3D graphics, as well as "multimedia" capabilities through sound cards and CD-ROMs. Early 3D games began with flat-shaded graphics, and then simplified forms of texture mapping (*Wolfenstein 3D*).

The 90s also saw the beginnings of Internet gaming. In 1992 the real-time strategy game [Dune II](#) was released. [Alone in the Dark](#) (1992) planted the seeds of what would become known as the survival horror genre. Adventure games continued to evolve, with Sierra's *King's Quest* series, and

LucasFilms'/LucasArts' [Monkey Island](#) series bringing graphical interaction and the creation of the concept of "point-and-click" gaming.

Type And Characteristics Of Videogames

This section is taken from [Engage GBL Tools Help document](#), pp. 38-44¹:

- **Puzzle.** These games involve the solving of a puzzle of some kind, some times against the clock, these sometimes require physical skills as well which takes them close to the action genre. They are usually very simple graphically.
- **Action.** Action games focus on physical coordination, successful use involves skilful use of the hardware such as joysticks and buttons and the mouse, and usually requires quick reflexes to avoid obstacles or react to different stimuli that appear. This is perhaps the most basic genre, since the activity involved is principally reactive, and their relative simplicity (both in terms of their use and their creation) also means that this is perhaps the most broadly used type of game. This is the type of game most frequently provided (along with some strategy games, such as those based on card and board games, such as Solitaire or Backgammon) with computer and phone hardware as part of the defect software package. These games include the classic arcade and home computer games that constituted the first computer games such as Asteroids or Space Invaders, maze games (Pacman), platform jumping games (Super Mario Bros, Sonic), race games and combat and shooting games (Street Fighter). The games may be played against the computer or another player.
- **Adventure** These games involve exploration of, and interaction with, the environment and elements and characters within it as the main activity. The player is usually required to solve puzzles in order to find different items, work out the next step involved, or understand the environment. The interaction tends mostly to be nonconfrontational and fighting and combat play a minor role, and are usually more centred on the use of 39 | P a g e different tools rather than simple shooting. Time constraints may be involved, however not always. The richness and complexity of the environment that is being explored plays an important part in the success of these kinds of games. Examples of these kinds of game include Myst and Riven
- **Action and adventure games.** Many action games are enhanced with other elements, such as strategy or problem-solving. For example many shooting games involve elements of strategy related to the choice of weapon and other attributes and tactics such as the choice of environment. The action adventure genre combines elements of action games, particularly combat, with a focus on some kind of exploration or quest to find items, which often involves puzzle-solving or challenges related to the order in which different activities within the game are undertaken, among others. Examples include for example Prince of Persia, or the Pokémon series.
- **Strategy.** In strategy games, which derive from board games such as Monopoly or Risk, the player has "godlike" view of the game world under his or her command, and stands outside managing and directing what happens within the world by his or her choices, making it evolve in a particular direction. The aim is to control the environment and the way it develops. This may be done alone or with other players. These games require careful and skilful thinking and planning and may be turn based or work in real-time. The focus may often be on military, economic or social scenarios or a combination of these. An example of this type of game includes the Civilisation series.
- **Simulation.** Simulation games aim to realistically mimic the conditions of a particular environment or activity. There are various types of simulation and in some senses they repeat the patterns involved in the other games genres with the difference that the aim is a focus on

¹ Engage GBL Tools Help document for integrating, Game Based Learning in the classroom Document edited by DEIS, Department of Education Development, Cork Institute of Technology, Online under: <http://www.engagelearning.eu/community/wp-content/uploads/2010/02/Engage-Tools.pdf> [last accessed on 27.04.2012]

the imitation or reproduction of real conditions, while games tend to involve invented or fantasy worlds.

Construction and management simulations have much in common with strategy games. In this type of simulation players must build, expand or manage fictional communities or projects with limited resources. In these games the player is the overall planner and leader, and must meet the needs and claims of game characters with regards to food, shelter, health, economy, religion, etc. An example is SimCity. Other games attempt to simulate a business activity where the player controls the economy of the game, and often the development of a company.

Life simulation games or Artificial Life Games involve the control by the player of one or more artificial lives, by manipulating different parameters of the organisms and the environment over time. These may be invented organisms (Spore), pets (Nintendogs) or human characters (the Sims series).

Vehicle simulations provide the player with a realistic interpretation of operating various types of vehicles. These may be aircraft or spacecraft that simulate the act of flying but can also simulate combat situations, simulations of the operation of a high-performance vehicle and require the player to race against other players or time such as Need for Speed.

Sport simulations simulate the playing of traditional physical sports (actually playing the sports) such as FIFA 2009 for football. In this sense they are really a subcategory of action games. There are other sport related games that focus on the strategy behind the sport, for example, acting as a football manager, and are therefore closer to strategy games.

- **Role Playing**, The activity involved in role playing games derives from the assumption by the player of a particular role which has a series of characteristics, skills and abilities, which the player may define at the start of the game. Activity within the game often involves a series of quests or tasks to be performed often involving rescue and the objective tends to be to increase the power, skills and abilities and experience of the role character by successful performance, in this way developing the character. They derive from traditional role-playing games (such as Dungeons and Dragons) and the theme and characters are often loosely based on medieval or mythical subjects. There may be a strong emphasis on combat or alternatively strategy, in some games this may depend on the nature of the role chosen. An example of this kind of game is World of Warcraft.
- **MMOGs, Massively Multiplayer Online Games**, are multi-player games that enable thousands of players to play online against each other simultaneously usually in a virtual world created for the purpose. The activity involved in these games may be similar to the activity involved in any of the other genres and indeed many games now involve the possibility of playing online with others as part of the design. The key difference is that the other game players are often not known to the player at first, which often changes the dynamics and behaviour of the game play, making it more complex and unpredictable, and hence for many, more absorbing. Examples include Quake and World of Warcraft.
- **Music games** usually challenge the player to follow sequences or develop specific rhythms either by stepping their feet on a special dance pad, or by using a device emulating a real music instrument. They are close in nature to action games since success relates to the physical dexterity of the player, e.g. the Guitar Hero series

Game characteristics

Integrated Multimedia and Personalisation of the Environment : Integrated media is targeted towards the user as an individual rather than a part of a mass audience. By integrating content from several sources into a database, the user is able to select a unique combination of content particles that fit his/her interests.

Personalisation is an efficient way to improve the usability of publications. Personalization of the content filters out excess information which the user does not need. Personalisation of the appearance presents the content in a form at which best suits the user and the context of use. Integration and

personalisation of media content require a lot of conversions as the information flows from the content provider to the user terminal.

Virtual Experience : The history of videogames shows, that technological advances are integrated to videogames very quickly, sometimes more quickly than to other spheres of human life. Education has to use these advantages. Nowadays technology provides possibilities to create the feeling of real environment and feeling of being inside. This feeling of *immersion in virtual* environment is very important for learning. *Virtual experience* affects learners, similarly as being in virtual museums or virtual historical environments affects visitors. It is very important to link these gaming features to learning goals.

2. VIDEOGAME DESIGN FOR EDUCATION

If you wish to integrate a video game in your teaching practice, you have following choices:

- You can choose a ready made videogame, and integrate it into your didactical design.
- You can choose a ready made videogame and adapt it, in order to add elements, or contents that will support facilitating your desired learning processes.
- You can design your own videogame and integrate it into your teaching practice
- Help learners design a videogame, that facilitate the desired learning processes to reach learning objectives.

In this Chapter we offer some guidelines and discuss these approaches. You can also find which skills and competences you need if you wish to carry out one of them. Some of the advantages and disadvantages of the approaches are discussed.

Choose a Videogame for Education

To help you choose the right game the project [“The Learning Game”](#) provides a searchable database of videogames reviews, that have been evaluated and are categorised according to their **type, genre** (see also Chapter 2 – Education, Paragraph 3), games visual perspective (first person, third person, isometric, other), language, the availability of an editor, and the amount and type of players (single player, multiplayer, etc).

In **How and why to use videogames in didactics** (see also Chapter 2 – Education, Paragraph 3) you find an introduction of the game genres used in education, and the learning objectives for which they are usually being used, as well as an more in depth explanation, of how to use simulations for educational purposes.

To help you choose a videogame for the achievement of specific learning objectives follow the classification matrix below:

Table Legend **: Feature very relevant

Learning Objective	Definition	Features Required	Appropriate Games/ Typology	Number of players	Examples
Memory / Repetition / Retention	Factual Knowledge	<ul style="list-style-type: none"> Presence of a content engine (information to recall, facts, dates, events, places, major ideas, subject matter) ** 	Drill and Practice Quiz games	One vs PC	Al Morale's game show presenter Virtual cell

		<ul style="list-style-type: none"> Presence of an assessment engine in order to test player ability ** Presence of engine that develops the game from the point of view of the content, graphics, etc. Increasing level of difficulty Time factor is a constraint ** Low level variation of the game set and situations 	Puzzle games		<p>MedicMED</p> <p>Geogebra</p> <p>Principles of virology</p> <p>Roadquiz</p>
<i>Dexterity / Spread / Precision / Motoric</i>	Sensorial/dextrous knowledge	<ul style="list-style-type: none"> Availability of a set of easily understood instructions The level of difficulty increases during the game from a "quantitative" aspect The game missions are repeated The game is often a simple test of skills and reflexes Chance is a factor ** Presence of a game engine (for the graphics) ** Session based games (when you lose you have to start again) Great attention paid to the graphics details ** Time factor is a constraint ** Eye to hand co-ordination skills development ** Immersive simulation 	<p>Shoot'em up</p> <p>Beat'em up (Combat/fight games)</p> <p>Driving games</p> <p>Simulation games</p>	<p>One or One Vs One</p>	<p>DOOM</p> <p>Tomb Raider</p> <p>Microsoft flight simulation</p>
<i>Applying Concepts / Rules</i>	Translate knowledge into new context : use information use methods, concepts, theories in new situations	<ul style="list-style-type: none"> Presence of a set of rules and instructions both well defined and easily understood Possibility to adopt and apply the rules set in different contexts Balance between reality and abstraction Turn based games Session based games 	<p>Sport games</p> <p>Action games</p> <p>Driving games</p> <p>Drill & Practice</p>	One vs PC	<p>FIFA 2004</p> <p>Driver/Carmageddon</p> <p>Global infectious diseases and epidemiology</p> <p>Monkey Wrench Conspiracy</p> <p>Protein purification Lab Simulation</p>
<i>Decision Making (strategy + problem solving)</i>	Analysis of knowledge based on problem solving, prediction, drawing conclusions, choice making, reasoned argument	<ul style="list-style-type: none"> Narrative based game ** Chance is a factor* Real time game Game situation divided into scenarios with specific goals relatively brief to reach Availability of documents that describe the situation in a detailed way Accurate description of the problem Real time monitoring of the other 	<p>Strategic games</p> <p>Adventure games</p> <p>Role play games</p> <p>Simulation games</p>	One in connection with other players/opponents	<p>The SIM saga</p> <p>Business game builder</p> <p>International politics simulative exercise</p> <p>MARKSTRAT3</p>

		<p>player/opponents position and activities</p> <ul style="list-style-type: none"> ▪ Time factor is taken into consideration ▪ Intrinsic games ▪ Open-endedness ▪ Background knowledge of content is vital to successful completion or victory ▪ Observational simulation 			
<p><i>Social Interaction / values / cultures /</i></p>	<p>Understanding the social environment of others</p>	<ul style="list-style-type: none"> ▪ Luck does not play a part ** ▪ The game involves a degree of negotiation or coalition-building ▪ Reflection is a factor ▪ Persistent state game ▪ Narrative based game ▪ Presence of tools for communicating and exchanging objects with other players ** ▪ Availability of a range of contexts ▪ Game completion time is not particularly relevant ▪ The level of difficulty is determined by the abilities of more than one player rather than the software infrastructure ** ▪ Feedback is relevant and detailed ▪ At the end of the game the player can review his own strategy 	<p>Strategic games</p> <p>Role play games</p> <p>Simulation games</p>	<p>Many players</p>	<p>A multimedia organisational change simulation</p> <p>Collective bargaining</p> <p>Fabusi</p> <p>Management game for Europe (MAGEUR)</p>
<p><i>Ability to learn / Self assessment</i></p>	<p>Evaluation</p>	<ul style="list-style-type: none"> ▪ Availability of evaluation tools ▪ Engine sets different game scenarios every time ▪ Availability of relevant documentation ▪ Time factor is not a constraint ▪ Persistent state game ▪ Presence of tracking tools and the facility to review previous steps ▪ Presentation and Review of the result achieved** ▪ Questions to foster reflection ** ▪ Highlights player's Points of strength and weakness** ▪ The ability to learn is developed by increasing levels of difficulty and availability of different choices ▪ No place for luck ▪ Good balance between action and reflection ** 	<p>Role play games</p> <p>Simulation games</p>	<p>One</p>	<p>Business policy game</p> <p>Daedalus'end</p> <p>Geogame</p> <p>Middle east politics -internet based role play simulation</p>

Table 01 : The UniGame Classification Matrix²:

2 Dondi, C., Edvinsson, B. and Moretti, M. (2004). Why choose a game for improving learning and teaching processes? In Guidelines for Game-based Learning; Pivec, M., Koubek, A. and Dondi, C. (Eds.), Pabst Science Publishers, Germany, 58-62

Once you have identified the game or the games you wish to use, you also need to consider important characteristics and constraints of your learners and teaching context like for example³:

- the size and characteristics of the student group. Issues of importance are for example : What is the attitude of the learners towards games ? How many of them are videogame players in their freetime ? What kind of games do they prefer ?
- the information and communication technology (ICT) skills of the student group : Do your students have the ICT skills needed to cope with the videogame ?
- the technical resources which are available for the student group to use : Do you have the right technical infrastructure to support the game play process ? Some games need the latest technologies to run effectively
- the support, both technical and educational, upon which the teacher can call : to which degree can you help learners cope with the technical and the educational issues of the game ? Are there learners in your group, who can take up such roles and support you and their peers ?

The next step in some games, mostly the ones that are explicitly developed for educational purposes, will be the adaptation of the educational contents of the game environment, or the choice of a specific scenario or story line you wish your learners to try out. This is highly dependent on the type of game you will choose. Many commercial games you can just use as a catalysator for learning. The process of learning through play is very well described in the graph below, although explicitly instructional content is not a prerequisite for learning to take place:



Table 2: Input-Process-Outcome Game Model (Garris, Ahlers, Driskell (2002))⁴

Let the students play by them selves and in groups. Consider that students might not like to play with their teachers⁵. Use the debriefing and discussions after game play to direct learner's attention to important experiences they made during play and help them transfer new acquired skills and competences from the game world, to the real world.

Adapt a Videogame for Education

Successful commercial videogames, ones that are good in imersing players in their environments, offer a great user experience, attractive graphical representation and high complex activity, are produced in big teams with a very high cost⁶. Therefore, educators cannot afford the design and development of such games. However what teachers with some experience in game play and programing can do, is use editors and the code provided by the game developers of some games, in

3 Macleod, H., Heywood, J., Heywood, D., and Littleton, F. (2004). Choosing and using a learning game. In Guidelines for Game-based Learning; Pivec, M., Koubek, A. and Dondi, C. (Eds.), Pabst Science Publishers, Germany, 77-91

4 Garris, R., Ahlers, R., Driskell, J.E. (2002) Games, motivation, and learning: A research and practice model, Simulation & Gaming, 33(4), 441-467.

5 Sfiri, A. and Pivec, M. (2005). Learning Games Application in Universities and Lifelong Learning. Proceedings of Computer Simulation in Information and Communication Engineering CSICE'05, Sofia , Bulgaria , 20th – 22th October , 2005, pp. 52-56

6 Squire, K., & Jenkins H. (2003). Harnessing the Power of Games in Education. InSight, Volume 3.

order to create their own stories and adventures, and adapt the games content or environment in such a way that triggers and facilitates the desired learning processes of players. To find out more have a look at the [Aurora Toolset](#) and [The Elder Scrolls Construction Set \(TES\)](#). An example of an adapted educational game is the game [Revolution](#).

To adapt or modify a commercial game to fit your educational goals should not be that hard, if you use tools that help you adapt games with no programming knowledge⁷. One of these for example is the tool called [ScriptEase](#), which can be used by Educators to tell their own stories in an existing game environment. What you mostly need is time to play and try out games, eagerness to experiment and willingness to innovate.

Design your own Videogame for Education

If you wish to design your own game, you will need basic knowledge and skills from many different areas, you will however have full control over the learning objectives, the context, the scenario and the experience of your learners. In the next section ([Integrate learners in a Videogame Design for Education](#)) you find some suggestions of how to go through this process with your learners, making the process rich and highly educational for all parties involved, even if the project will not show the expected results at the end. The following game design steps are a shorter version of the guidelines suggested by Pivec, M. and Sfiri, A. (2004) in the paper How to implement a game in an educational context⁸ in combination with the insights won during the discussions at the Game Design workshop offered at the Kick off meeting of the Project “Play the Learning Game” in Florence, in December 2011.

Suggestions for the Design Process:

1. *Decide on the learning objectives* : What should players learn? What is the learning content ? The UniGame classification provided on the section [Choose a Videogame for Education](#) above, will help you become clear about different learning objectives, and help you define the type and the characteristics of your game. Define learning goals as clearly as you can.

2. *Situate the learning activity in a model game world*: Place learners/players activity in a meaningful situation, time and space, where the outcome is important and the activity is engaging. Think of an appropriate story for your educational game. Think of aspects and game characteristics like:

- What exactly is the task of the player or the players?
- With which decisions or judgements should they be confronted?
- What are possible game behaviours, actions, from which they can choose from?
- What are the consequences?
- What do they have to work upon and how? Which specifications will help them reach learning objectives?
- What is their knowledge level so far?
- On what must they elaborate to be able to come to the solution?
- Can they use or “buy” external expertise to get this additional knowledge (an advantage related to other teams)?

3. Proceed with the *elaboration of the storyline* and the *screenplay*, dealing with the issues of your learning objectives. Think of a narrative structure and additional characters to engage players. You can

7 M. Carbonaro, M. Cutimisu, H. Duff, S. Gillis, C. Onuczko, J. Schaeffer, A. Schumacher, J. Siegel, D. Szafron, and K. Waugh. Adapting a commercial role-playing game for educational computer game production. In GameOn North America, 2006., online under : <http://www.cs.cmu.edu/~waugh/publications/gameon06.pdf> . Last accessed on the 26.04.2012

8 Pivec, M. and Sfiri, A. (2004). How to implement a game in an educational context. Guidelines for Game-based Learning; Maja Pivec, Anni Koubek, Claudio Dondi (Eds.), Pabst Science Publishers, Germany, 92-114

consider narrative very often used narrative structure and functions, like the ones described by [Vladimir Yakovlevich Propp](#).

4. *Incorporate Underlying Pedagogical Support:* The support the game provides in the form of simplification of the problem or in having some of the problem performed must be managed to maintain the appropriate level of difficulty throughout the game.

- Is it helpful or necessary to provide unexpected events? Do they also happen in the real world?
- Would you demonstrate appropriate behaviour or provide guidelines? Would this be helpful?
- What would be the systems feedback, as a reaction to the player's decisions?
- Which game elements could you involve? Identity formation, score keeping, rewards, punishments, competition, game levels, ...
- Is it appropriate to provide instructional content to help players continue?

5. *Design decisions :* Consider the look and feel of the game environment and decide on the tools you can use to develop it. Which are your strengths and interests in the use of technology? You can construct a virtual game environment with use of drawings, graphics, photographs, animations, video, music, etc. [Chapter 3 : Multimedia](#) of this manual gives you an overview of the basic functions of such software and you can find very many manuals and videos and guidance in the web. In the [Software Tutorials section](#), developed in the [Learning Game](#) project, you will find step by step guides for game authoring software to create 2D or 3D environments. Have a look for example at authoring tools like the [Adventure Maker](#), [Neo Book 5](#) and [Live Code](#).

6. *Conceive and design the interface :* Detailed guidance for this step of the implementation you find in Chapter 6 of this manual How to conceive and design an interface ([see also Chapter 3 – Multimedia, Paragraph 6](#)). If you will use photographs, identify the place where you will realise the photo and video shooting. You will need to make a list of objects in different states and actors and a list of all necessary tools for the effective realization of the game, like for example camera, videocamera, various tripods, PC, Software useful for elaborating the photo/video material collected.

7. *Implementation and evaluation:* These are the next steps where you implement your ideas in a prototype and carry out some tests. Only your target audience can give you valuable feedback for your game, which is important for the quality improvement.

Integrate learners in a Videogame Design for Education

“In the same way that teaching a subject is one of the best ways to learn it, designing a simulation or a game about a subject is another great way of gaining a deeper understanding of the subject”, wrote the authors of Chapter 3 in this Manual, [How to use videogames in didactics](#) ([see also Chapter 3 – Multimedia](#)). This is a [constructionist approach](#) to learning, firstly advocated by [Seymour Papert and Idit Harel \(1991\)](#) and advocates the approach “learning by making”.

The design of video games for learning is a highly multidisciplinary area of practice. You will need competences and skills in the design of learning processes (didactics), like for example the definition of learning goals, in narratives, story telling and scenario writing, in design, in programming and in evaluation. If you wish to integrate the videogame design into your teaching practice, this will be a rewarding experience in this experiential form of teaching and learning. Time will be invested during class and it is highly possible, that learners will volunteer to spend some of their free time in the development. They will do this, because it will be fun!

To integrate students in the development of a game discuss this idea in class and present the steps to be carried out. Let students form teams, assign roles and choose their areas of expertise and be there to answer questions and coordinate activities.

In the following section you find the description of the development of two games, a 2D point and click game and a 3D game, that will give you a more detailed understanding of a game design process.

3. CREATING VIDEOGAMES

How To Create Videogames With Practical Examples

First Example: "The Dark Room"



The Project

The idea consists in the attempt to teach some scholastic issue, not through a simple exposition of the matter but through the involvement of the pupil in an experience, even if virtual. The experience should be motivated by the participation as protagonist in an adventure. In this case the adventure is of "Noir" genre, very appreciated by the young people.

Procedures

1. Decision of the argument to treat: **The analogical photography and the use of the darkroom.**
2. Research of online tutorial (traditional e-learning lesson):
<http://www.silverlight.co.uk/tutorials/toc.html>
3. Proceed with the elaboration of the storyline and the screenplay of the adventure, dealing with the issues of the **development and press of a black and white negative film**, through an intriguing and involving situation, a classical "noir"; we'll attempt to establish a logical medium-difficulty path based on the storyline. This should allow the player to take part to an event succession that is, at the same time, exciting and effective for the technical learning. For this reason we'll arrange in a strategic way a number of useful objects to collect during the path. The player has also the possibility to read a "real"book inside the game about the topics to be learned
4. Identification of the typology of the videogame to realize: a photographic/realistic **point&click** adventure with an immersive 360 degree main view
5. Identify the place where realize the photographic session: a real darkroom
6. Selection of the elements that will constitute the location for the photo and video shooting. The photographic and videographic material of our videogame will be realized on this set, based on the analysis of the selected tutorial:
 - a. Useful real objects for the development of a negative film (to be photographed);

- b. Useful real object for the development of B/W photography (to be photographed);
 - c. Actors, real people that act some important technical procedures to be recorded on video.
7. Collection of the necessary tools for the effective realization of the foto/video session:
- a. Camera
 - b. Videocamera
 - c. Various tripods
 - d. PC
 - e. Software useful for elaborating the photo/video material collected.

The Minimum System Requirements For This Game Are:

Computer: IBM PC or compatible, Pentium 133 MHz CPU or better

Memory: 64MB RAM and 20MB hard disk space

Monitor: 256 colors or better (the "True Color" mode is highly recommended)

Interface: Mouse and keyboard

Operating System: Windows98 / 2000 / XP or compatible

The 360-degree panorama feature requires DirectX 7 or compatible.

Type Of Game

Title: The Dark Room - Missing at the boundaries of the digital divide

Typology: Didactic Game

About: Photography

What students can learn: How to develop a Negative Film

Game's Author Informations

Name: Cristina Gregolin

Institution: Brera Academy of Fine Art

Country: Italy - Milan

Website: Entropy-art.com

Contact: [Mail](mailto:mailto:)

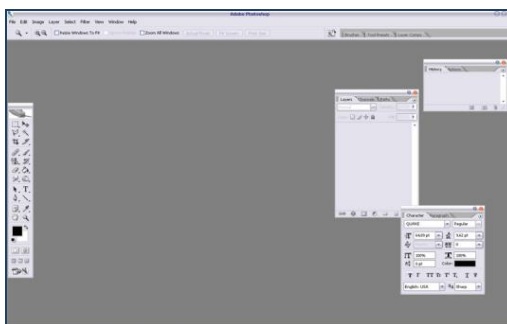
Software Used

[Adventure Maker](#)



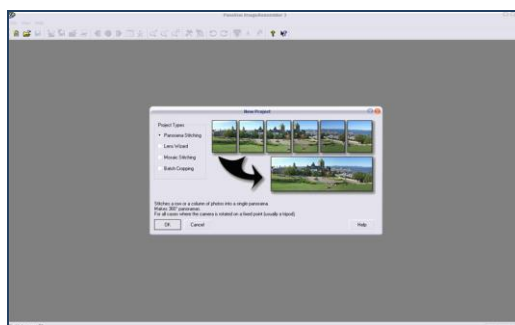
Adventure Maker is a free innovative toolkit for Windows that allows creating point-and-click games and multimedia software in minutes, without any scripting or programming. You can create software for Windows and for PSP.

[Adobe Photoshop Cs2](#)



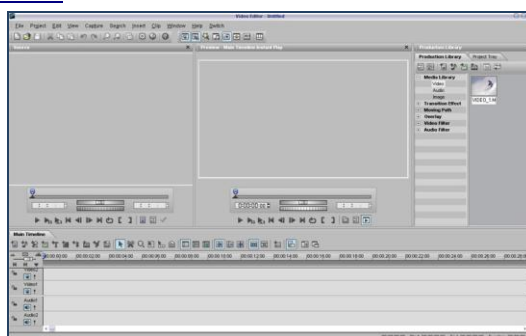
Adobe Photoshop, or simply Photoshop, is a graphics editor developed and published by Adobe Systems. It is the current market leader for commercial bitmap and image manipulation, and is the flagship product of Adobe Systems. It has been described as "an industry standard for graphics professionals." Although originally designed to edit images for paper-based printing, Photoshop can also be used for a wide range of other professional and amateur purposes.

PanaVue Image Viewer



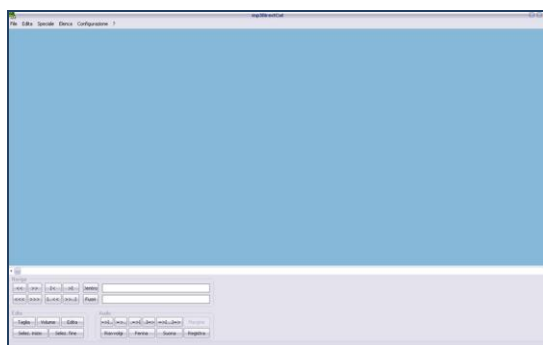
PanaVue ImageAssembler assembles (stitches) together a wide variety of images in a snap: photos of all kinds, 360 degree panoramas, in rows, columns, or matrices, maps, blue prints, and posters digitized with a camera or a scanner, aerial or satellite photos, art paintings, medical imagery... Our state of the art technology provides professional quality results even for huge size images, up to 500 MB for the final image. Easy to use in automatic or manual-stitching mode to succeed even the most difficult cases. Effectively works with non-leveled cameras and almost any lenses including full-frame fisheyes. Advanced "intelligent" image blending algorithm. Complete contextual help. QuickTime VR format supported. TWAIN compatible.

Video Editor - Media Studio Pro 8



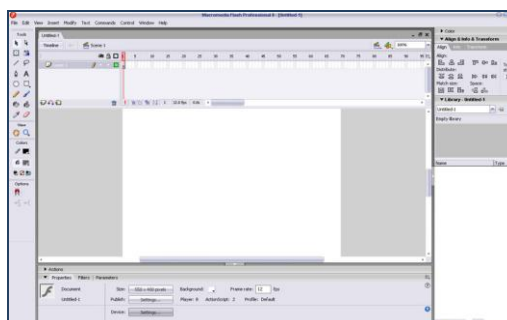
Ulead MediaStudio Pro (MSP) is a real-time, timeline based prosumer level non-linear video editing software by Ulead Systems. It is a suite of 5 digital video and audio applications, including: Video Capture, Video Paint, CG Infinity, Audio Editor and Video Editor. MSP is only available on the Windows platform.

Mp3 Direct Cut



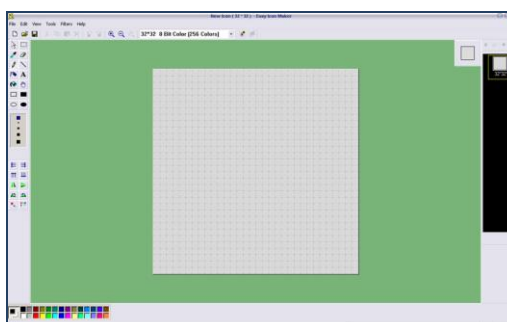
Mp3DirectCut is a fast and extensive audio editor and recorder for compressed mp3. You can directly cut, copy, paste or change the volume with no need to decompress your files (e.g. to wav format) for audio editing. This saves encoding time and preserves the original quality, because nothing will be re-encoded. The built in recorder creates mp3 on the fly from your audio input. Using Cue sheets, pause detection or Auto cue you can easily divide long files.

Flash Mx



Already a powerful tool for creating rich Internet content, Flash has evolved into a robust environment for developing online advertising, electronic learning courses, user interfaces for enterprise applications, and multimedia content. In addition to animation and vector graphics tools, Flash now includes video support for MPEG, digital video, MOV, and AVI formats. You can edit, manipulate, and animate video objects or use scripting to make your videos interactive. You'll also find new graphic design capabilities such as Bezier curves, transformation tools, and pixel-level snap control. In addition, Flash's ActionScript environment has undergone significant improvement. ActionScript Editor is now customizable, allowing you to configure text display properties (font, size, and color), syntax coloring, and toolbox panel content. Code formatting, code hinting, and an ActionScript debugger can aid in developing dynamic, data-driven Internet applications.

Icon Maker



Use this simple utility to edit Windows icons. IconMaker contains a variety of paint tools to let you edit icons in either standard or custom sizes, in color depths up to 32-bit True Color. For Windows XP and Windows Vista icons, you can use semi-transparent areas. You can import and export ICO, PNG, XPM, and other images. Paint tools include: color replacer, pencil, brush, flood fill and other. You can paint your icons pixel by pixel.

Second Example: “The Dark Room” The Making Of

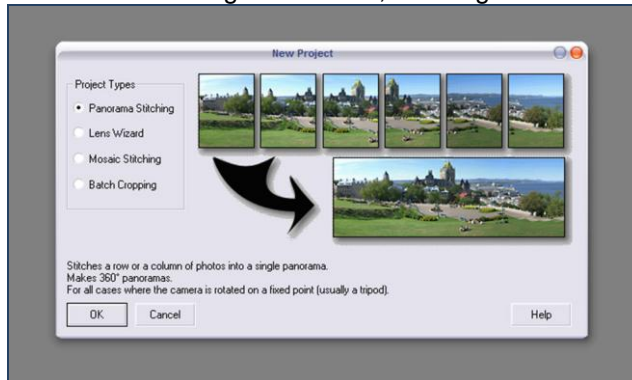
Step By Step

1. The first production step of the project is the achievement of the 360 degree panorama:
 - Creation of the set. We have to prepare the room and dispose all the objects that we want to photograph during the photo shooting.
 - Put the camera on a calibrate tripod at the centre of the environment that we have to photograph. You can create a calibrate tripod simply applying a piece of paper measuring-tape (that you have previously prepared) all along the perimeter of the cylindrical central bar, just near the rotating head where the camera is fixed.
 - Choose the right photographic lens on the basis of the view we want to get and the distance from the objects.
 - Take the photos turning with the calibrate tripod. For having a good panorama, the number of pictures to take depends from the lens used: in most cases, for example using a 35-50 mm lens, 24 shots in portrait mode are necessary, or 18 in landscape

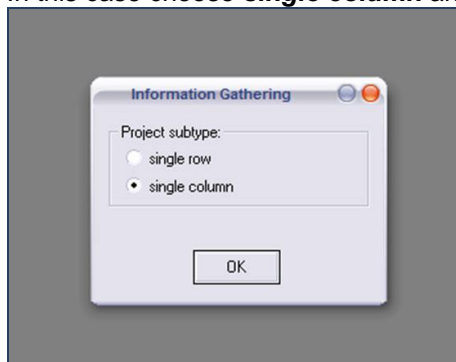
- mode. In this case, considering that the room was very narrow, 3 images series, taken at 3 different height (everyone constituted by 18 photographs), was carried out.
- Elaborate the 54 images obtained, that will be all stitched together with an appropriate software.
2. The second step consists to take all the photographs that will have to be enlarged and analyzed during the game. Obviously, you have to photograph all the stages both with the objects to pick up during the game and without them. This is useful to give the player the feeling of really taking them, because they'll disappear once taken.
 3. Then, it is necessary to shoot the didactic videos to insert in the game during the high spots. Infact, once the player has found and gathered all the necessary objects, he can see a video showing all the phases of technical procedure taught/learned. The video realized for this videogame are three, each one conceived for making easier the visual learning of:
 - Negative film development
 - Enlarger use
 - Photo development and printing
 4. Now that the shooting work is carried out, we have to proceed with the editing phases. We need different software, for the image processing, for the video processing, for the authoring phase and so on, as you can see in the "software used" section. So, let's see together the fundamental moments of the procedure:
 - Start downloading on the pc the photographs taken and begin to process them.



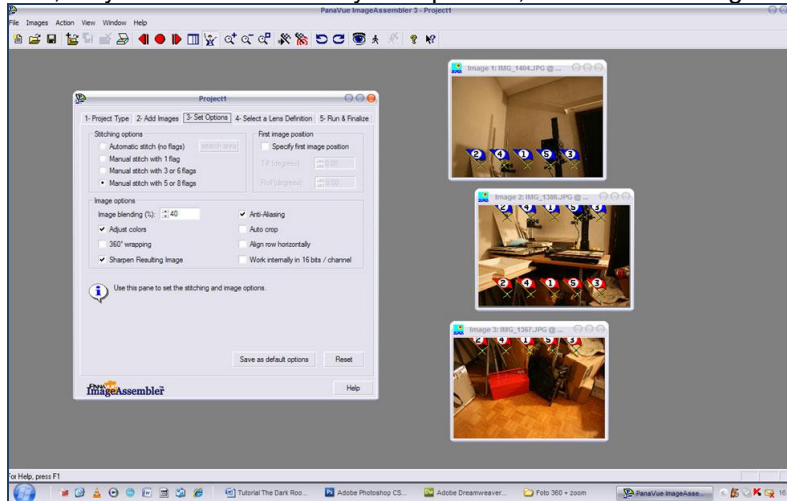
- We have to stitch them in one unique image (the panorama). So, open the images with PanaVue ImageAssembler, and begin to stitch the vertical ones.



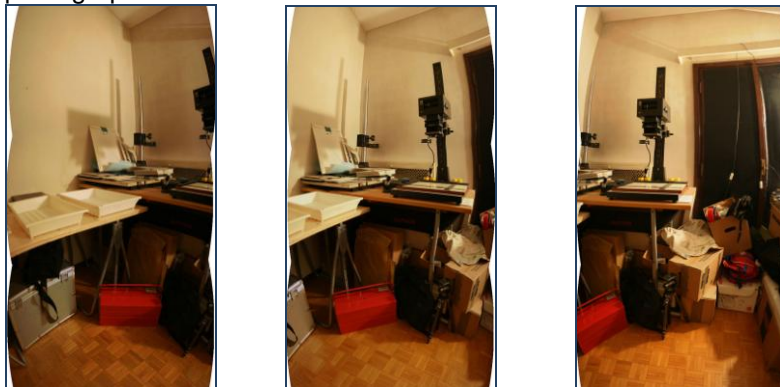
- In this case choose **single column** and confirm



- This software uses a system of matching points marked with coloured flags. The user has to choose the number of flags to get, then he has to arrange them inside every couples of photos, according with the corresponding colour. It seems difficult but it isn't, only consider that more you're precise, more the stitching will be correct.



- In this way we obtain a series of big vertical images, by stitching together 3 photographs at a time.



- By stitching them all together (this time in a horizontal way), we obtain *almost* the final result, a very long image whose imperfections have to be corrected with an image processing software, such as Photoshop.

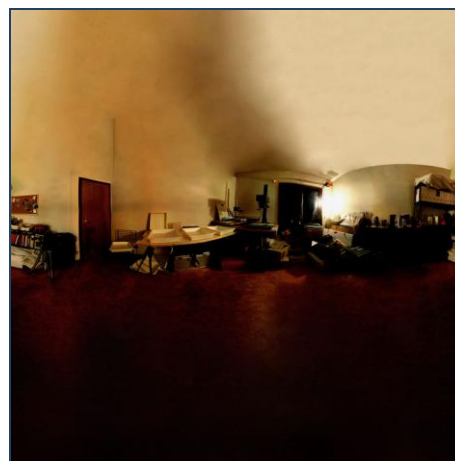
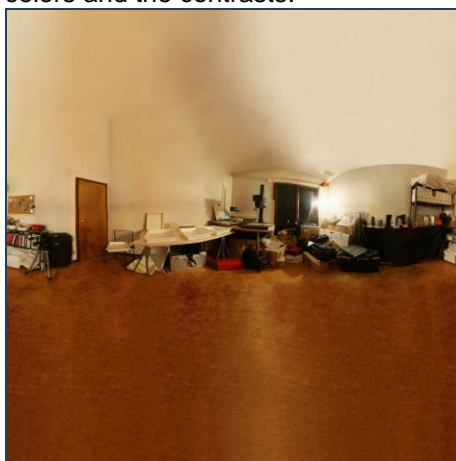


- With the same software we'll enlarge the panorama canvas into a square of 2048x2048 pixels, since the authoring software that we'll use to create the interactive adventure (Adventure Maker, see in the "software used" section) need this size for the image to be used. At this aim we have to create the superior and inferior portion of the

image.

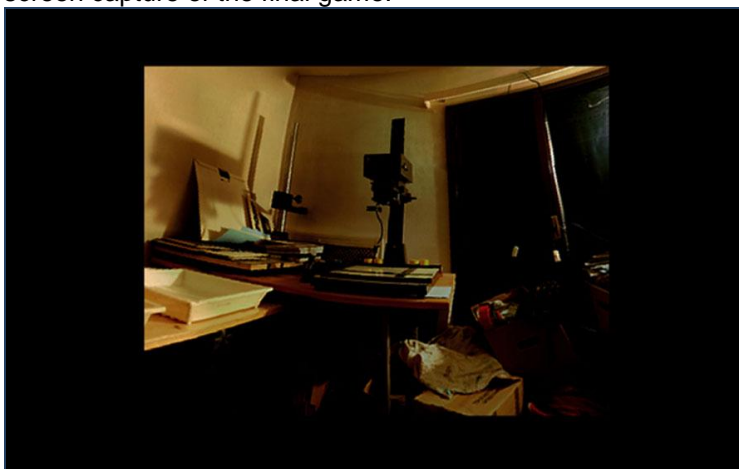


- Again, always with Photoshop, we will change the image feeling by modifying the colors and the contrasts.

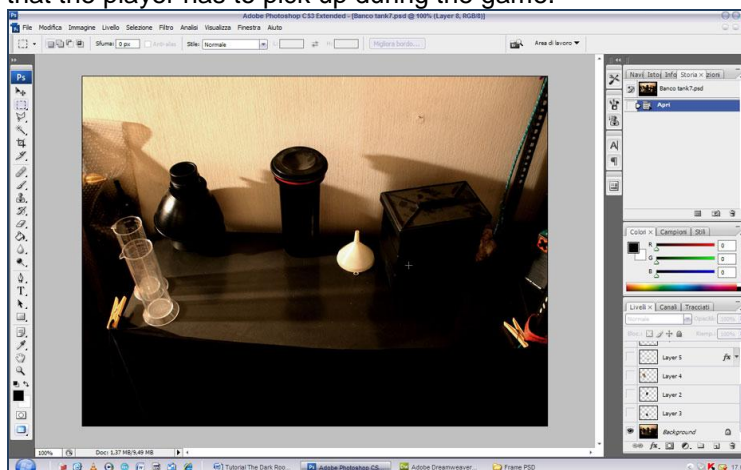


- As we have said, we will use **Adventure Maker** to create the final game. The next steps are concerning the achievement of material needed by this software. A special section of this site is completely dedicated to it, and you should read it. If you want you can download and see it [now](#).
- Nevertheless, only the central part of the square image will fill the final screen rendered by Adventure Maker. This procedure is anyway necessary to make the view looks more realistic. For this reason, to get a visually correct result, the central part of the square has to be neither too much crushed nor too much lengthen. Maybe you have to make some experiments, before achieving a positive result. See below a

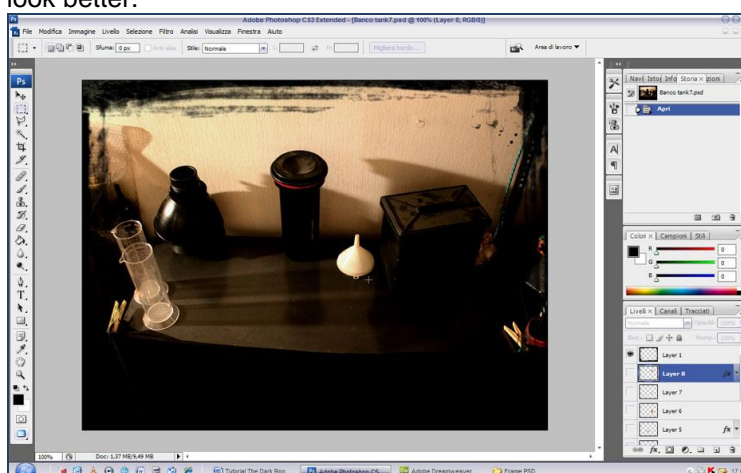
screen capture of the final game.



- Now we have to elaborate the pictures that show the enlarged portions of the whole environment. We will prepare many images each scene, with and without the objects that the player has to pick up during the game.



- Additionally, we can add some graphical elements in the picture to make the frames look better.

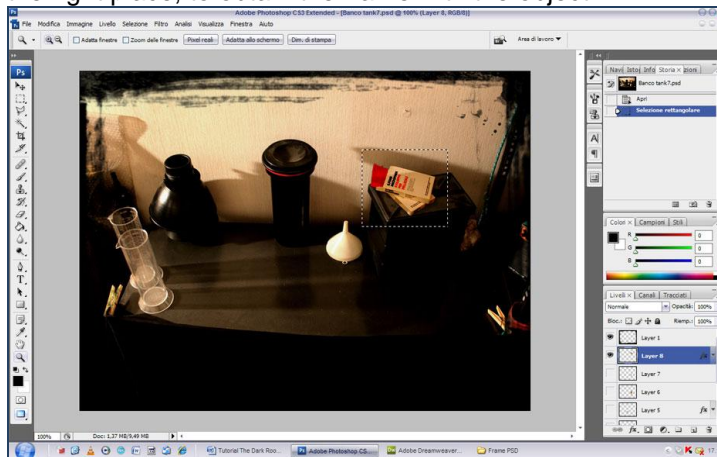


- Below you can see the image of the chemical powder as cropped from the picture complete with the objects. Saving this portion of the image in .png format (available in any image processing software) allows you to preserve the transparent background,

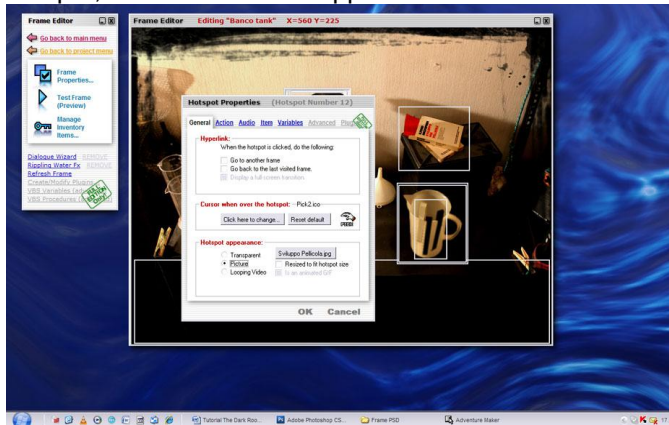
in a way that you can work better on the frames' montage..



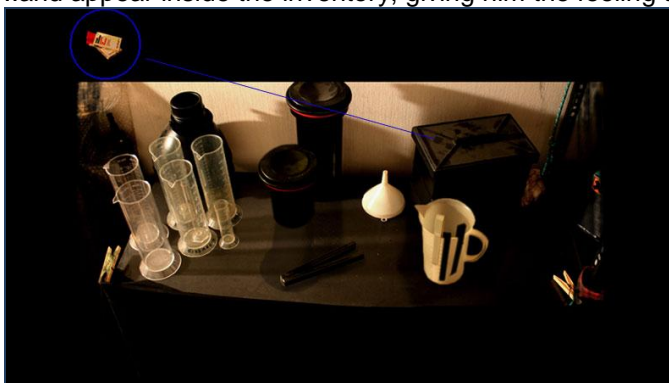
- Here you can see how the .png portion with transparent background is positioned in the right place, to obtain the frame with the object.



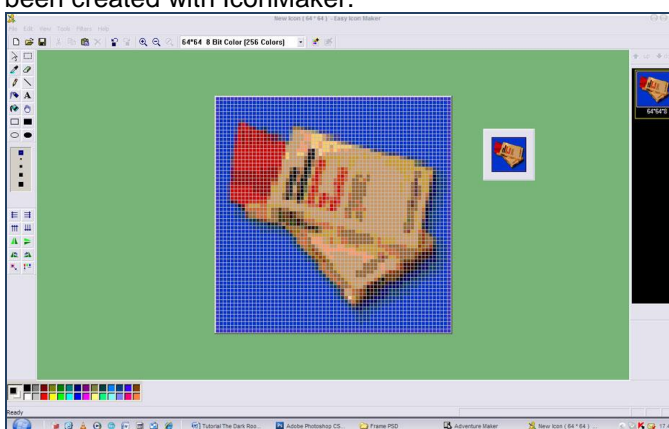
- In Adventure Maker we will have to place the image without the objects as general background of the scene; then, we'll place on it the small object's images as hotspots' background, in the right position. In this way, when the player will click on the object-hotspot, he will make it disappear from the frame..



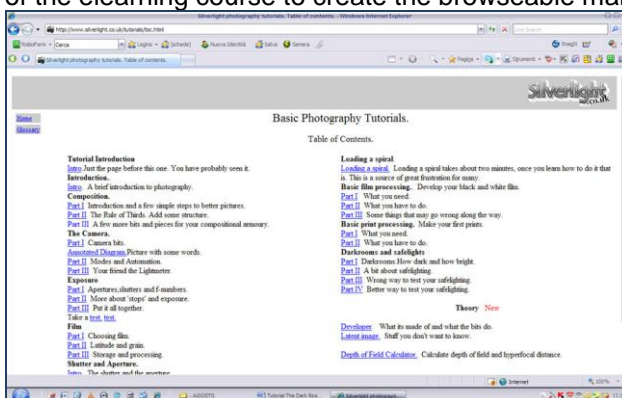
- ..and appear inside the inventory, giving him the feeling to had really got it.



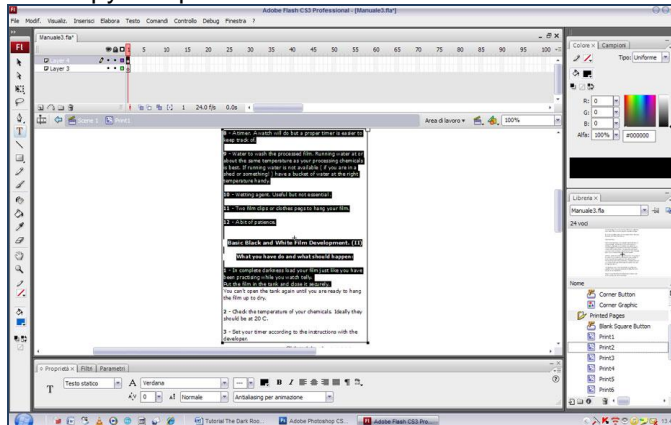
- In the following image you can see how the icon that appears in the inventory has been created with IconMaker.



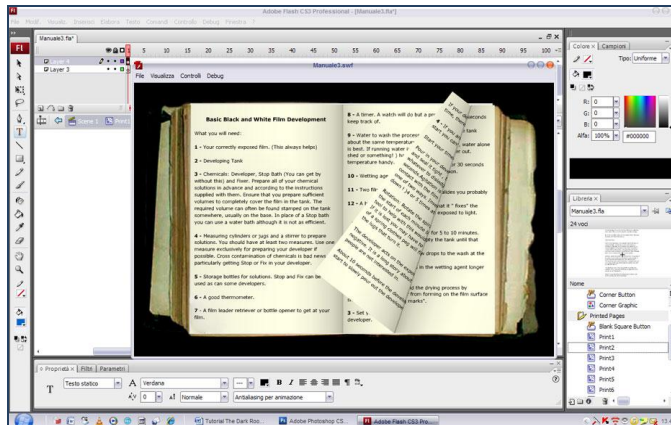
- A good way to insert animations in a multimedia application like our videogame is to use Flash. In the next steps we'll see, in broad terms, how some animations of The Dark Room have been produced. Book animation: select the most interesting section of the elearning course to create the browseable manual..



- ..we copy and past it in Flash..



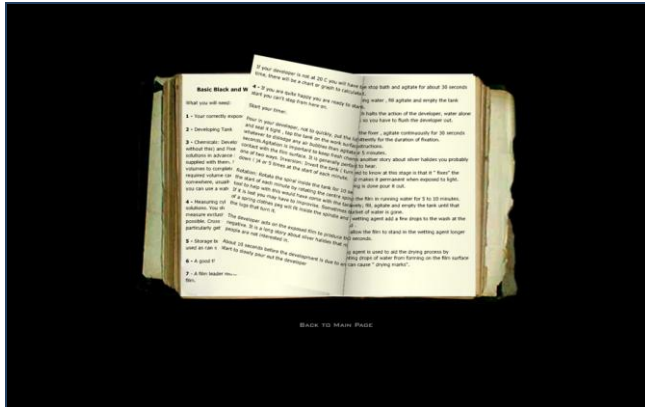
- ..then we use it inside a customisable Flash open source file available online, creatink a new Flash animation..



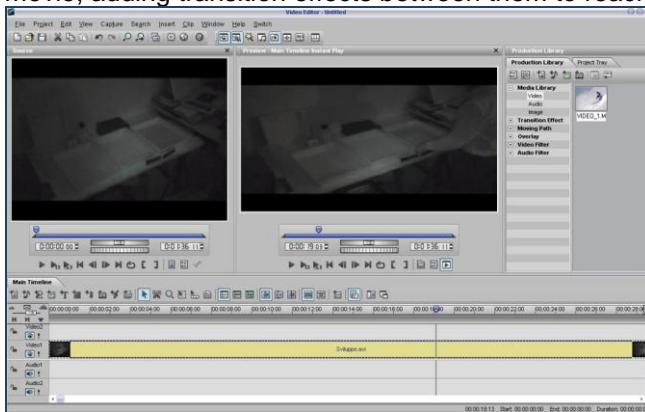
- ..then we insert it in the Adventure Maker project (as you can read in the Adventure Maker tutorial). During the game, when the user click on the manual..



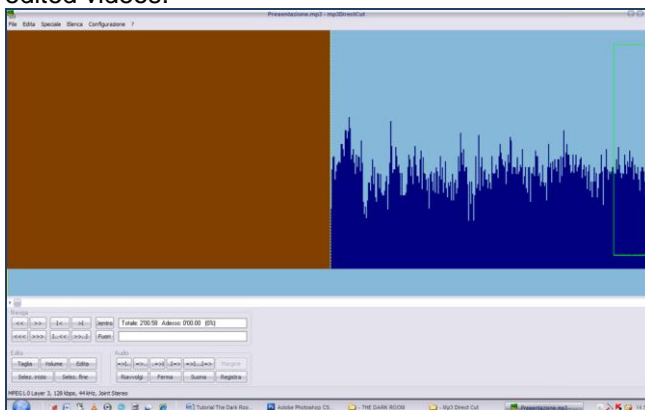
- ..Adventure Maker will show the animation of the browseable book.



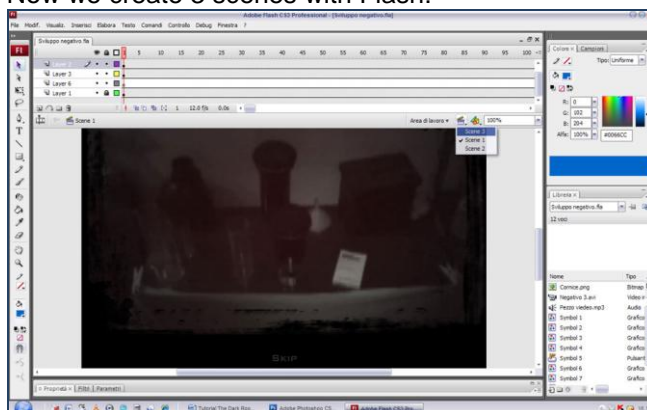
- The next step is to prepare the 3 videos embedded in the game. For doing this, we have to edit the movies previously recorded during the photo session. We will use Ulead Media Studio for the visual editing. We cut and paste sections of the original movie, adding transition effects between them to reach a more dramatic impact.



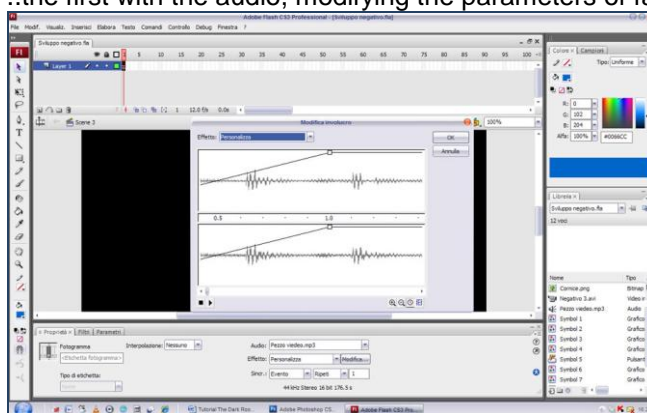
- Here below you can download a tutorial completely dedicated to the video editing using [Ulead Media Studio](#)
- When we edit the movies we can both use the original sound or, better, add a new one. In this last case we have to edit the sound file with a sound editor. In **The Dark Room** game some music has been arranged with Mp3DirectCut and added to the edited videos.



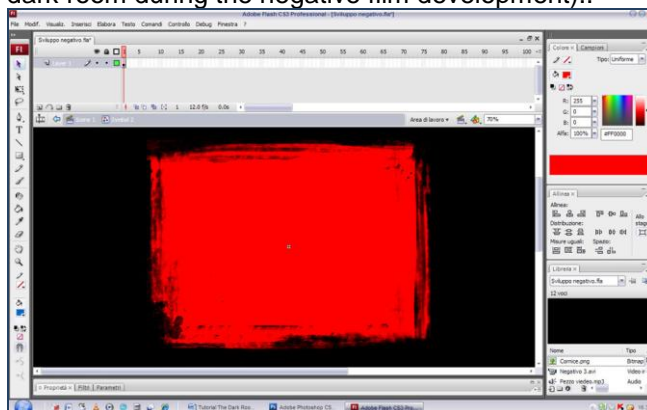
- Now we create 3 scenes with Flash:



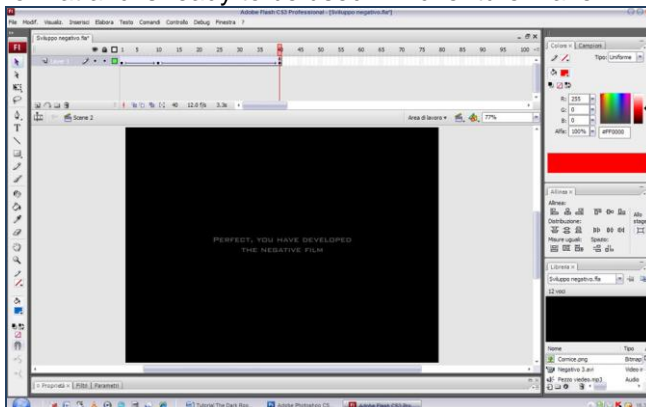
- ..the first with the audio, modifying the parameters of fade-in and fade-out volume..



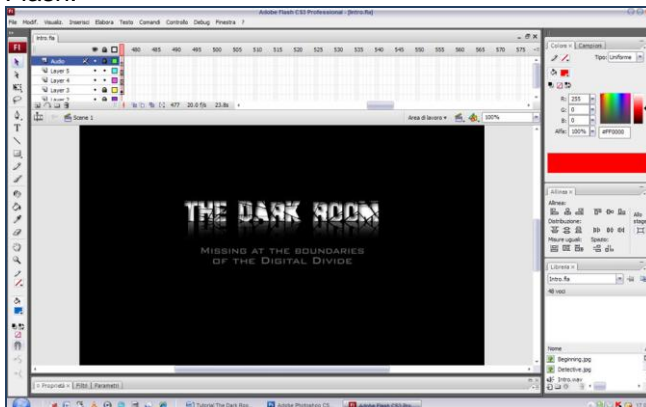
- ..the second with the just edited video, by adding the layers for making it captivating and more dramatic (for example inserting a red filter that is pertinent to the light of the dark room during the negative film development)..



- ..and the third scene with the ending frame of the video, this is now saved in .swf format and is ready to be used in Adventure Maker.



- Also the introduction of the videogame is also composed of some scenes edited with Flash.



How To Modify Videogames With Editors:

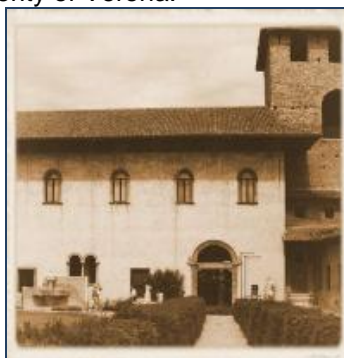
“Return To Castelvecchio”

Virtual Reconstruction Of An Historical Italian Castle In Verona



The Project

The idea is to use the immersive 3D technology of the first person videogames to create a virtual visited tour of the Castle. The possibility for the user/gamer to "be-inside" the environment and to have complete freedom of movement and eyesight, gives the tour a new didactic and communication power. Moreover, the game engine used gives the possibility to be programmed and coded to make certain things happen during the tour. In this case, sometimes a voice starts that gives historical information about the Castle. The work was realized for the LG project in the context of a Thesis in Communication Science at the University of Verona.





Historical Information About The Castle

The castle, an imposing civic building from the medieval Veronese period, was built between 1354 and 1356 by order of Cangrande II della Scala. The design was conceived by the della Scala family as a defence against both outside invasions and popular rebellion.

The surrounding area allowed for a rapid and easy escape from the city: after crossing the fortified bridge, accessible only to the noble family, the road to the north along the Adige valley was a secure route.

The city's geographically strategic location led to the development of a fortification system, consolidating the remains of the Roman and Commune periods.

In 1404, following the brief Carrara and Visconti dominations, the city became part of the Venetian Republic. The castle was used exclusively for military purposes, as a weapons and munitions warehouse and subsequently, in the eighteenth century, became the seat of the Venetian military academy.

In the days of the anti-French revolt known as the "Pasque Veronesi" (1797) the castle was the site of numerous armed engagements. The Napoleonic epoch marked the beginning of a radical transformation of the existing structure. The plan provided for the construction of an army barracks around three sides of the drill court, but only those sections along the river and towards the Palazzo Canossa were built. This building, in neo-classical style, continued to serve a military function in the Austrian epoch.

Only after 1923 did the castle cease to serve an exclusively military function. It underwent a dramatic structural change, following plans by Antonio Avena, director of the Civic Museums, and the architect Ferdinando Forlati: the reconstruction of the swallowtail battlements, the insertion of late Gothic and Renaissance decorative elements in the facades, and extension of the pictorial decoration in "period" style. Beginning in 1925 the castle became a museum, where valuable art collections were installed.

Beginning in 1958, under the direction of Licisco Maganato, a new organization of the entire building was planned, to restore the value of the notable historical and artistic patrimonies. This critical and historical revision favored authenticity, and thus eliminated the false contexts created in the previous renovation. The task of restoration and museum installation was entrusted to the architect Carlo Scarpa, whose highly original solution is universally recognized as one of the finest examples of museum renovation of post-war Italy.

More Information At The Web Site

<http://www.comune.verona.it/castelvecchio/cvsito/>

The Minimum System Requirements For This Game Are:

Pentium II 400 MHz
128 MB RAM

Windows 95/98/ ME/2000/ NT4/ XP
1100 MB hard drive space
3D hardware accelerator with 16mb vram with full OpenGL support
56.6 kbps modem for multiplayer
An original copy of Return to Castel Wolfenstein videogame installed

Type Of Game

Title: Return To Castelvecchio

Typology: Didactic Game

About: History of Art

What students can learn: Historical and artistic information about Castelvecchio of Verona (Italy)

Game's Author Informations

Name: Andrea Aldegheri

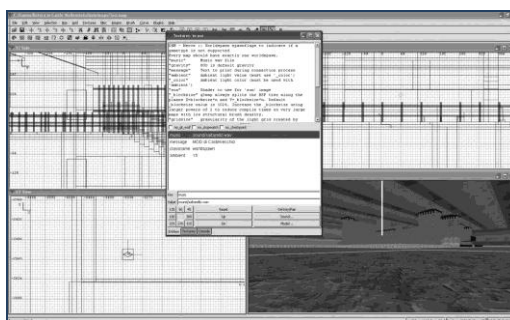
Institution: submitted by Brera Academy of Fine Arts

Country: Italy - Milan

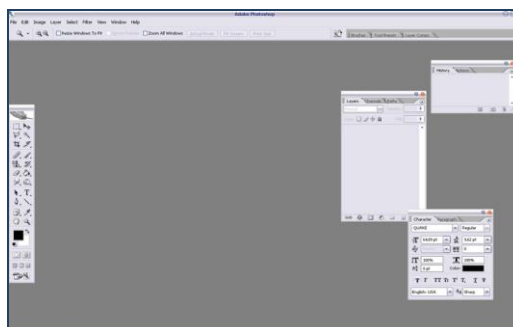
Contact: [Mail](#)

Software Used

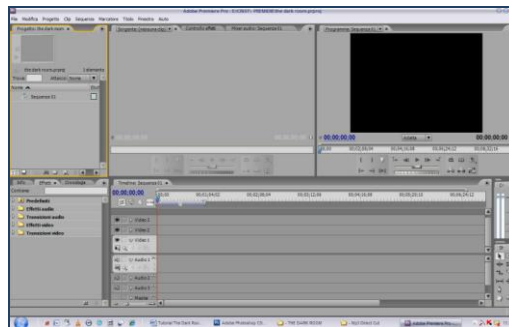
[GTKRadiant](#)



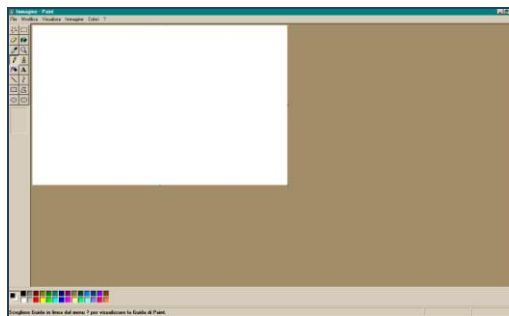
[Adobe Photoshop Cs2](#)



Adobe Premiere



Paint



Sound Recorder



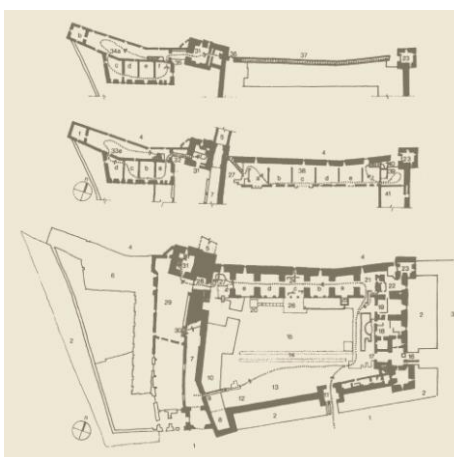
“Return To Castelvecchio” Making Of Step By Step



The creation of the three-dimensional version of Castelvecchio has been a long work separated in various phases: the first one involved the visit to the castle to understand how it was made, the structure of the building and the proportions of the various rooms. Subsequently in the libraries have been taken in loan books in which the plan of the building was found in all of its stairs. Subsequently, using GTKRadiant it has proceeded to the construction of the building.

The principal objective was to interpret the information of the plan with the elements perceived during the real visits and to succeed in transposing these data in GTKRadiant to get the representation of the real castle.

Almost difficult to build were the *vòlts*, that structures that allow, in an ancient building, to create ample voids in the walls; the difficulty is given by the fact that these architectural structures are created with GTKRadiant in an horizontal way, parallel to the sight of the plant, the one that is called **XY View** in the program. To make it rotate vertically, it is necessary to click on **Selection> Rotate** and then on the voice in base to which it is desired to rotate the selected object; by default the program proceed with a rotations of 90°, but if we desire some rotations of different anglings we have to click on **Arbitrary rotation** and in the window that will appear we have to indicate the axle of rotation and the number of degrees needed.



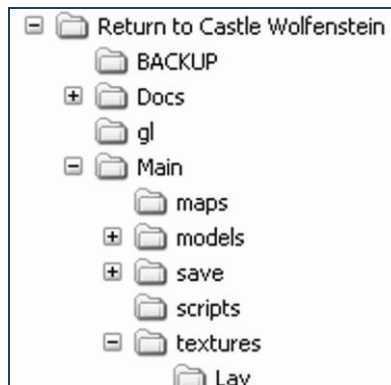
Gtkradiant Basics For Create Buildings

GTKRadiant is a free software downladable from the site <http://www.geradiant.com>. It allows, using the graphic engine of the game (in the case of all the videogames of the ID-software it is Trinity), to create some MODs, "modifications" of the games itself.

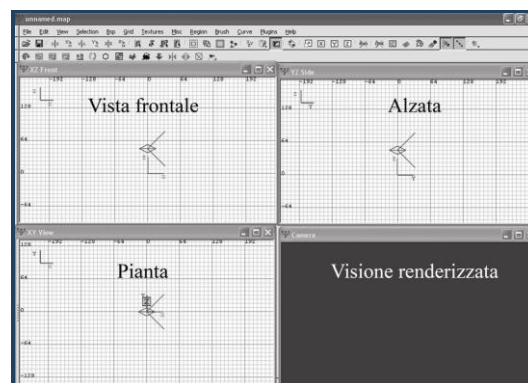
The program is not found directly on the site above, but it is avaiable through a series of mirrors.

To create a 3D environment , a “place” in which the player moves inside, it is necessary that this is the fluiddest possible, and this is realizable by reducing the number of polygons present on the rendered scene. The rendering engine, for every frame reads the inputs of the player, calculate the new position in the map,, individuates the position of possible BOT or of other players, elaborates the collisions and the animations, draws the frame, sincronizes the whole in real time and, finally, shows the output on the screen.

Once uploaded GTKRadiant we have to proceed to its installation, during which the user it is prompted to indicate the path of the main directory of the game; once this is done, the installation program ends the procedures and it is ready to be used.



It is possible to immediately begin to build, but first of all it is necessary to set up the inside windows that allow us to visualize the MOD that we are going to realize, because for a good construction many views are needed: the view from above, the frontal and the side views and, very useful, the one that shows us the whole rendered scene in real time, that is a three-dimensional preview with low quality textures applied that has the purpose to make us understand what we are doing and where we are working on.

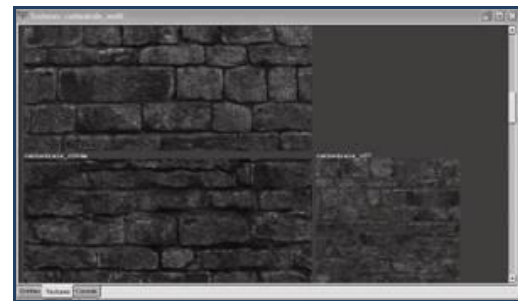
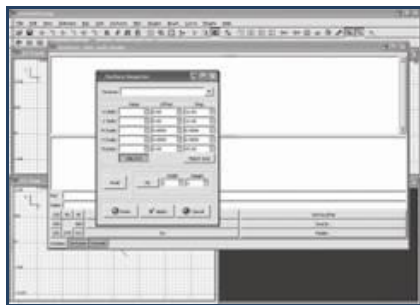
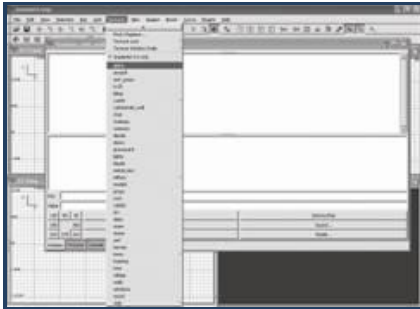


It is now necessary to begin to build the first wall: with the mouse pointer moved upon the view from the above, we draw a rectangular selection holding pressed the left button of the mouse; then we move on one of the other two windows -the frontal view or of the side one- we click a little above the border of the rectangle and -by keeping the left button of the mouse pressed- we move it in vertical toward the above: in this way a height is given to the rectangle just built.

In this way we have just built the first wall, and we can preview it in the fourth window, the one of the rendering preview.

As it regards the textures, in the map there are two ways of using them: the first one is to use those available in the game itself; while the second way consists of importing them from outside the game as image files, and this is possible by putting them in the Texture folder created inside Main, located in

the directory of the game. The images have to have dimension of the sides calculated in power of two ($2^x \times 2^y$ where $X = Y$ or $X > Y$ or $X < Y$; for example $28 \times 28 = 256 \times 256$ or $28 \times 26 = 256 \times 64$ or $26 \times 28 = 64 \times 256$) and a resolution of 72 DPIs (Dot For Inch), that is the image is composed from 72 bright points for every linear thumb, in how much superior resolutions or greater dimensions would make the game crash, causing the reset of the computer, since the required memory to make the game work would be very superior to the memory that is found installed on the mother card.



The construction of a room implicates that we have to build the figure six times in a way to have all the six walls of a room.

For connecting two rooms through a corridor, it is necessary to create the passages in the walls and this is done by lifting a wall from the level of the floor, filling the space with another wall and giving attention by keeping free the space for the passage where the doors are previewed; finally by connecting the two rooms with a corridor, that it is nothing other that another room deprived of the walls that have to allow the passage.

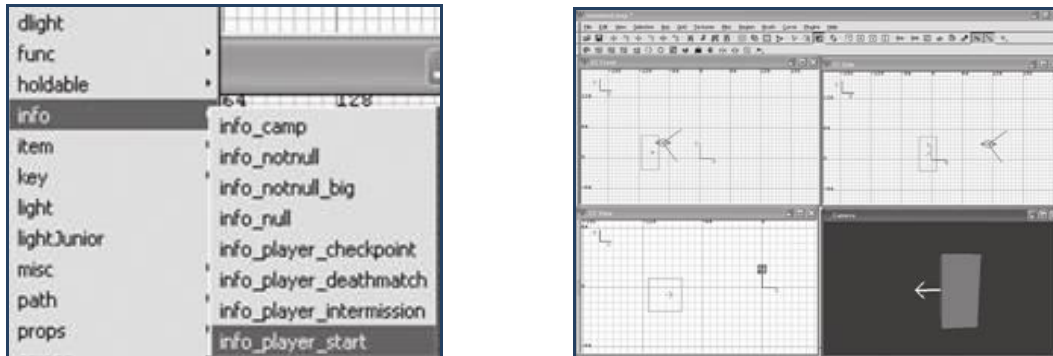
In this way it is possible to create a great variety of environments, from the houses to the castles, and even to build some futuristic environments.

To apply the textures on the model that has just been created (after putting them in the proper directory) we have to select the brush and, subsequently, move above the menu bar and click on *View > Toggle > Console View*; by doing this, a window appears in which the textures are seen, but the window appears empty, because the images have not yet been loaded. For loading them, we have to click on the menu bar on the voice *Textures* and in the list that appears we have to choose the images, that are grouped in various typologies according to what they represent. It is enough then to select firstly the brush and after the texture to make it be applied above the brush.

Oncethe texture is inserted it is necessary to manage it, and this means to widen or tighten it up so that it covers the whole width, height and depth of the object, in such way that no points of junction are seen; or to make that the square of the texture has the same dimension of the base and the height of the used file and that it is repeated so many times how many are necessary for covering the whole object.

To do this it is needed to click on the *Textures* menu and subsequently on *Surface inspector*: in this way a window opens in which by clicking on *Fit* it is possible to widen the texture on the surface avoiding that it repeats; by clicking on *Axial* the square of texture is multiplied up to cover the whole object.

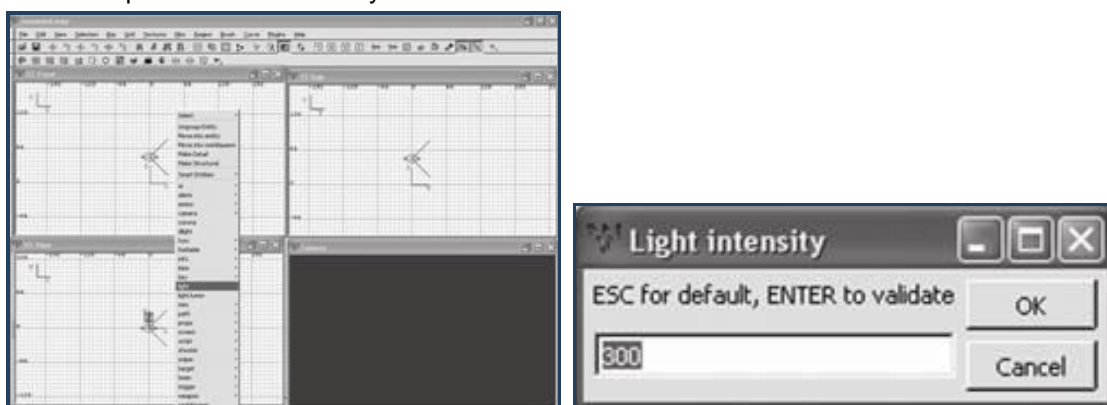
There are then other options, as *H Shift* and *V Shift* that allow, respectively, to horizontally and vertically lengthen the image; then modifying the values in *Rotate* it is possible to rotate it, while for moving it we need to modify the values in *H Scale* and in *V Scale* with the result that, for example, we can make begin a tile of the floor precisely next to the wall, so that to create a best illusion of reality.



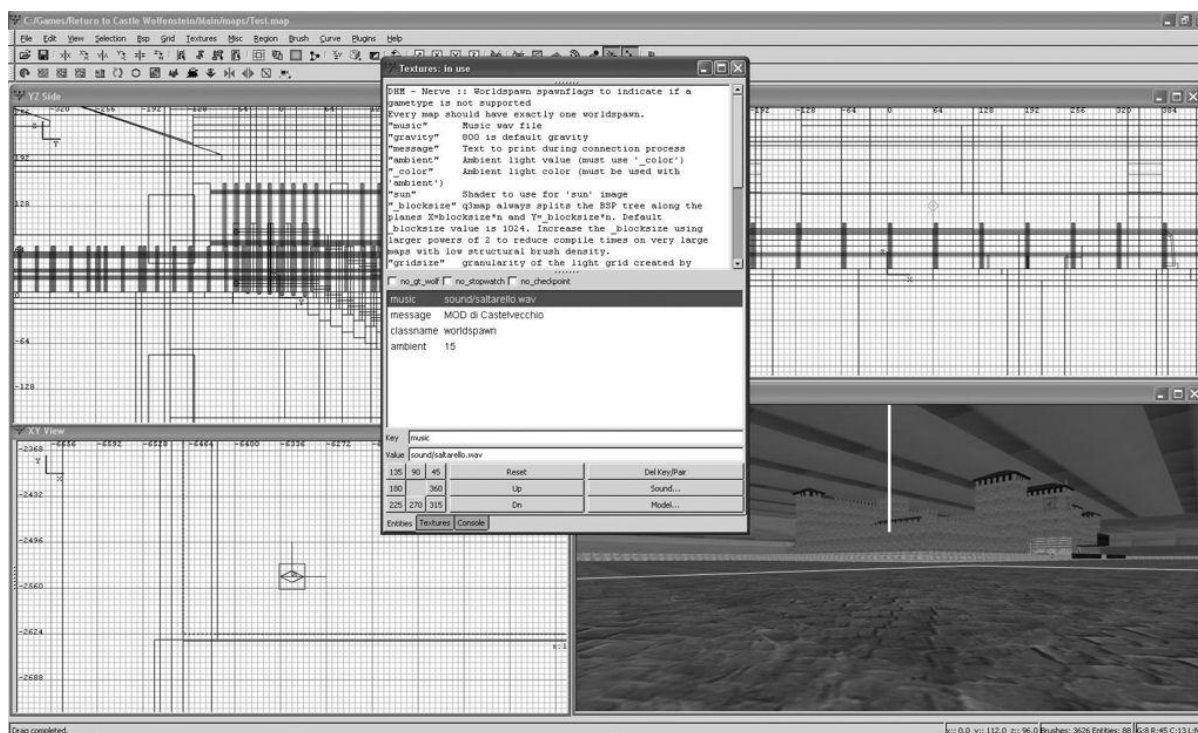
It is now necessary to create the point from which the player will have access to the level. To make this we right click on the created map: by doing this, a menu appears and in it we have to choose *Info* and then *info_player_start*. In this way a red figure appears (we can put only one of this inside any map). From that point, once compiled, the game has a beginning. This object, as you can see in the image above, it is endowed with an arrow and this points out the direction in which the look of the character is facing at the beginning of the adventure.

Now we have to complete the elements that compose the scene, the models and the camera, that is managed by the player and that he can modify his liking, by inserting the lights, whose purpose is, besides to illuminate the scene, to create pathos in the player by lowering the level of brightness in certain moments of the game.

The light is inserted by right clicking with the mouse in the part of the level in which is wanted to position it: a menu will appear and here we have to choose the voice *Light*: a dialogue box will appear in which it is asked to indicate the intensity of the bright ray. In this way a light point has been created that can be duplicated as much as you like.



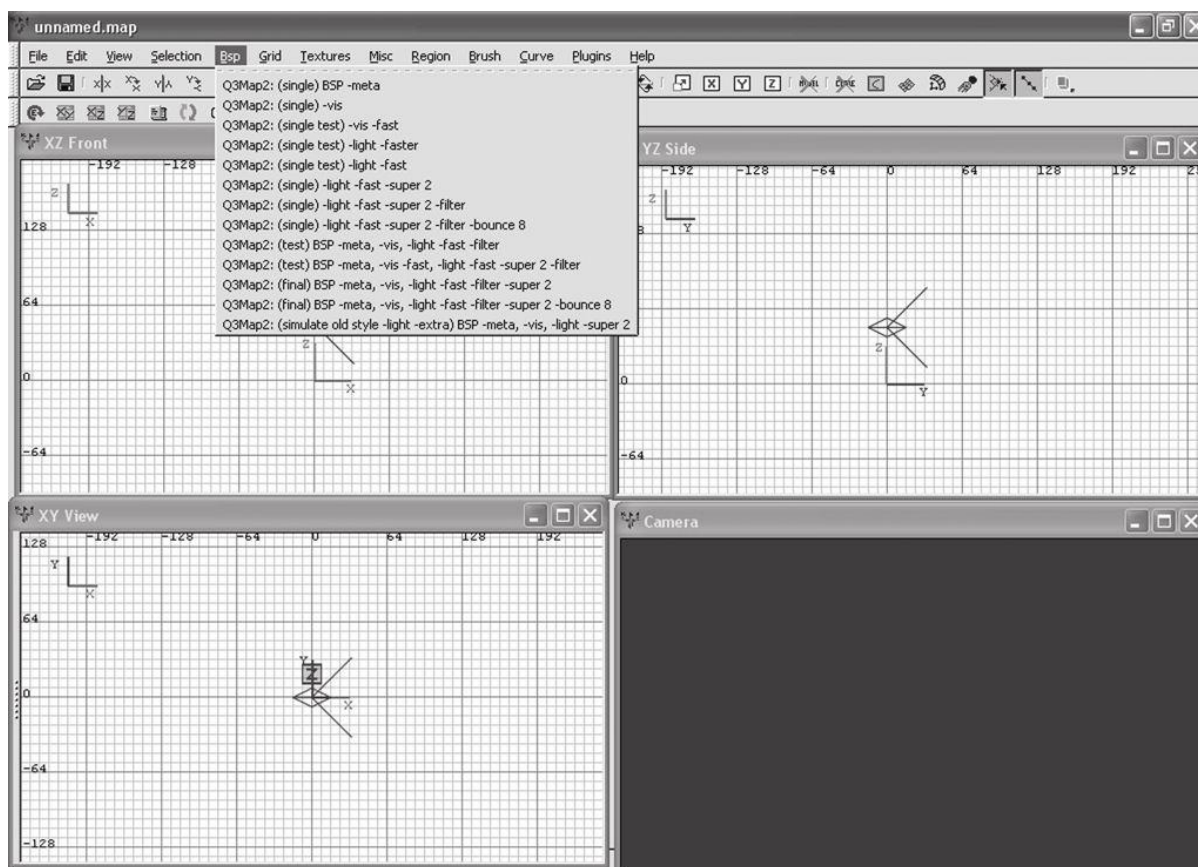
Inside the map just created it is possible to insert an environmental sound, that is activated in the moment in which the level is loaded: to do this we have to select any brush of the map, activate the *Entity View* and insert *MUSIC* as value in *KEY*; in the voice *VALUE* we will put the path of the audio file that we want to use.



As has been mentioned above, the map, once completed, must be compiled. This operation has a double motive: the first one is to allow some controls aimed to discover malfunctions or errors of coding; the second and most important, is to allow the diffusion of our own work through various channels, such as the peer-to-peer, the e-mail or simply the upload on sites or forums from which other users can download it.

To create a map so that to have a preview, we have to click on *Bsp* and then on *Q3Map2: (single) BSP - meta*: it appears in this way a MS-DOS window in which there are shown the elaborations that are running and the percentage of completion.

After having ascertained that the map correctly works and that it is in conformity with what we have established, we have to click on *Bsp* again and then on *Q3Map2: (final) BSP - destination, - vis, - light, - fast, - filter, - super 2, - bounce 8* for having the final compilation of the map. This second operation needs more time in comparison to the preceding one to be completed, because all the elements of the map are compiled (the shaders, the reflexes and all the elements that improve the perception of the MOD are elaborated); for this reason the time of elaboration can last from about ten minutes to a few hours, according to the power of the computer on which we are working.



The result of the compilation process is a file with extension “BSP”, acronym of “Binary Space Partition”, that is the type of file used by John Carmack when he conceived DoomThis game and others that have the same graphic engine use this type of file.

The process of compilation is subdivided into four single processes linked between them: the first one organizes and identifies the data of the map, as the audio and the textures; in the second phase the surfaces are built in a three-dimensional way; in the third phase the lights are elaborated, their color on the various surfaces and the shaders; in the fourth and last phase the file of area is created (with extension “AAS”), that gives instructions to the BOTs (characters that stir in the map and with which it is possible to interact in various way) about things to do and how to stir in the map.

Now that the work has been completed, it is necessary to test it, and for doing this it is necessary to start the game and to access the command console; to do this we have to press the key \ and then digit the command “map” followed by a space and by the name of the map itself. After some instants the map is loaded and it becomes possible to move inside the environment just created.

