

ENTREplorer Project



Development of Multiplayer Serious Online Games



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1. Content

1. Content	3
2. Aim of the paper.....	4
3. Introduction	5
4. Multiplayer Online Serious Games	6
5. Development process of games	11
5.1. Objective Target	11
5.2. Preproduction	12
5.3. Production	12
5.4. Postproduction.....	13
6. Development process of serious games.....	14
7. Communication in Multiplayer Online Games.....	18
8. Conclusions, Challenges and Prospects	22
9. References.....	23
9.1. Literature	23
9.2. Pictures.....	23

2. Aim of the paper

This report is the second result in the project ENTRExplorer. It will outline the most important things to consider when thinking about creating and designing a “Multiplayer Online Serious Game”.

Therefore this report contains a short introduction into the topic, further more the try of a definition of multiplayer, some important things about the technical as well as the pedagogical conceptual design of a multiplayer online serious game. Therefore some models will be presented, which can be used in order to optimize the process of creation.

This report will shortly provide the features to be useful; this is, to allow the learner / player multiplayer sessions, all network communication among others in order to produce a truly engaging and effective online serious game.

The aim of this report is to establish a conceptual model that can be used by a game designer for efficient game development or an educational practitioner when designing serious games for effective and optimal learning.

There will be very often a reference to the first result in the project ENTRExplorer, the report on “Theory and Taxonomies of Serious Games” because of the similarity of some topics (e.g. the pedagogical conceptual design), which fit – regarding to the content – into both reports.

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3. Introduction

“For successful design of serious games it is necessary to complement traditional game design with pedagogical as well as didactical questions.

The global market for commercial digital games on various platforms is growing and growing over the past years. Target and audience groups are enlarged through the steadily innovation in digital technology (especially graphics, online, multiuser...), the use of different devices (consoles, smart phones, tablets ...), the introduction of new games for different themes and topics (e.g. music, dancing, alpinism, diving etc.) but also for developing digital games especially for young or elderly people.

Serious games are interesting for almost everybody or almost every institution or company who has to reach an identified audience or target group over various channels over the web.

Beside products or games, which were especially designed for fun or entertainment it is possible to see a development of serious games during the last years, which are designed for formation of opinions, for development of personal skills, for education of development of skills in a professional context, as also outlined in the report on Theory and Taxonomies of Serious Games.

These so called serious games are using successful conceptual designs as well as successful mechanism of commercial successful digital games to reach the goal of implicit or explicit learning targets.

There is to state, that it is difficult to compare serious games with commercial games. There is often a huge amount of money needed for the development of AAA-Games (full price) to implement state of the art graphics as well as state of the art multiplayer functionality. This is often not the case with the development of serious games.

To reach the set goals with a serious game an effective process of design and production is needed, especially because of the need of the involvement of expert in the needed pedagogical and didactical field.

In the following there will be a look on the basic steps regarding the development of an online multiplayer serious game.

4. Multiplayer Online Serious Games

The common understanding of online games means games played on the internet. There are a lot of different technical and pedagogical concepts for games played on the internet. But all games are processed on the server where it's provided. That is the difference to all the other games for PCs, paddles, mobile devises and so on. And that is the technical basis for a new dimension of games, multiplayer games. To bring different people together in the same computer game, the game has to run on the computer, where the different players are connected. In the beginning of multiplayer games, there were for each player an own paddle ore they had to alternate them at the keyboard.



Picture 1: Neverwinter Nights

With the internet a new dimension of playing computer games rises. Different player are sitting on their own computer and play the games contemporaneous at the same server in the internet. So it was a small step to the idea to synchronize them and to give them the possibility to act at the same time in the same game. The idea of multiplayer games was born. The best known and most played multiplayer game today is World of Warcraft. The environment of the game is a virtual world where the different player can take over various roles and fight together with other player against monsters or other player groups. But the range of different technical and content concepts for multiplayer games is wide.

To bring player together sometimes the idea of a common high score list makes a game to a multiuser game. They fight against another by trying to beat the high score of the other players. They play together e.g. in casual games by buying thing from each other ore something like that. All that thousands ideas and concepts are realized in a lot of different games. Since there are graphic based multiuser games available

(started in the beginning of the 1990th with Multi User Dungeons and Neverwinter Nights¹, starting screen²) the other concepts partly will not longer be seen as useable multiuser game concepts. But with the next step to use the multiuser game concept in serious games, all the concepts (of course including full graphic multiplayer games) can become convenient again.

There are several reasons, why the pedagogical value-added of multiplayer game concepts can be an enrichment for a serious game. But at the other hand, there are also circumstances and issues that should be deliberated. At the one hand there is a very interesting dip in the growth of multiplayer games immediately after they start to work in a fully graphical environment.

In the beginning of that kind of game in the early 1990th the producers of that graphically based multiplayer games build their games basing on the ideas of existing games. That this way to create modern multiplayer games does not work was to seen at 1996, when the long-awaited game Dark Sun³ entered the market and the player do accept the game hardly.

¹ http://de.wikipedia.org/wiki/Massively_Multiplayer_Online_Role-Playing_Game (last seen on 15.11.2011)

² http://wallpapers-diq.net/de_18_Neverwinter_Nights_%28NWN%29_2002.html (last seen on 08.11.2011)

³ http://de.wikipedia.org/wiki/Massively_Multiplayer_Online_Role-Playing_Game (last seen on 30.11.2011)

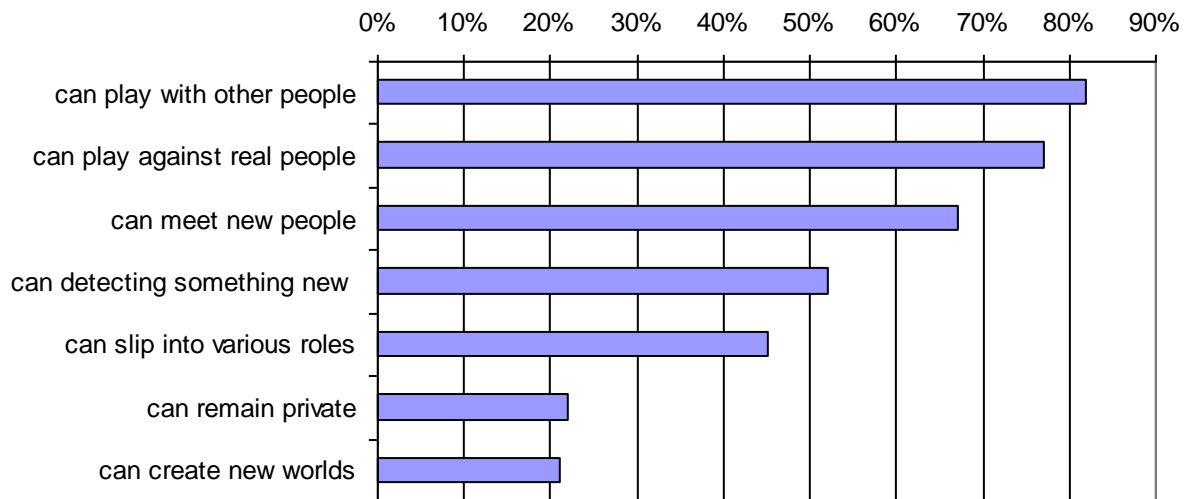


Picture 2: Dark Sun⁴

So the producer had to look for new concepts, because game concepts for single games do not longer fit to games with a big number of players. If the concept of multiplayer games should be used in serious games, the game concepts has to be fitted to a multiplayer game and it has to be guaranteed, that the pedagogical concept also work in that fully new environment of a graphically multiplayer game. But, to gain the pedagogical possibilities and advantages of a multiplayer game may be it is not necessary to start immediately with a multiplayer game like World of Warcraft.

⁴ <http://clasicosabandonware.blogspot.com/2010/04/dark-sun-shattered-lands.html> (last seen on 25.11.2011)

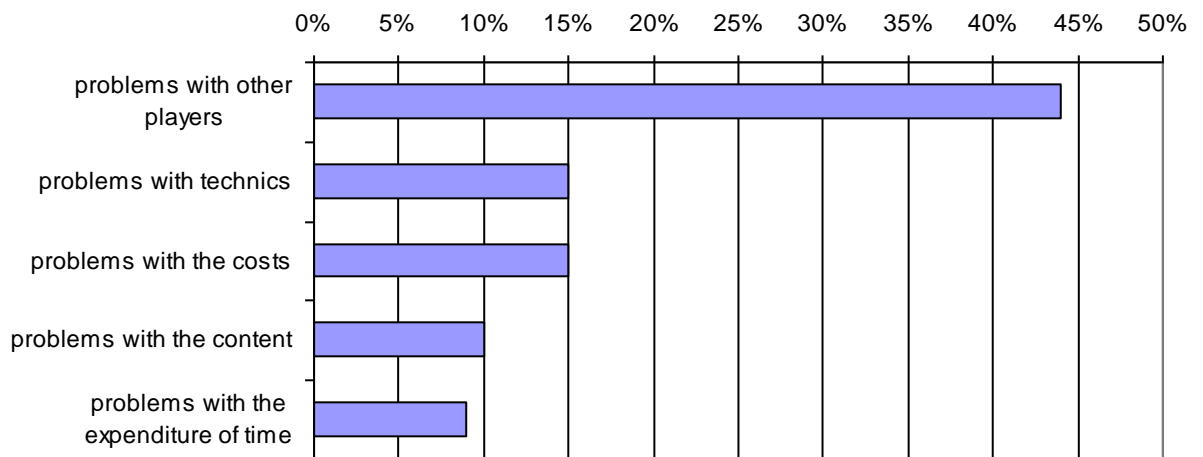
The points that make multiplayer games so popular are in a lot of points the same that make different pedagogical efforts more successful and interesting for learning people. Here the most important issues, why people like to play multiplayer online games:



Picture 3: Why people like multiplayer games

So the most important point with multiplayer online games from the view of the user is the social interaction existing in the games. That brings a lot of pedagogical aspects into the learning effects of serious games. A lot of different aspects of possible pedagogical input and effects are to realize by creating multiplayer games. The producer has been aware, that it means to create new fitting technical and gaming concepts and to use matching pedagogical tools and ideas. But with all the new features and possibilities there are also some new problems attended by.

Here the answers of people asked for bad experiences with online games:



Picture 4: Bad experiences with online games⁵

The most problems for the online gamer are coming out of the biggest advantage of multiplayer online games. The social interaction with other players gives the most reason to play a multiplayer game, but it contains also the most problems gamer see. Flaming and cheating are the most mentioned bad experiences by the gamer.

Using the concepts of multiplayer online games brings a lot of additional possibilities and advantages also for the pedagogical aspect of the serious game. But it needs new and matching concepts to get the possible benefit of all the new features and possibilities.

At the other hand online multiplayer games are the most popular games in the mind of online gamers. Using multiplayer games or even elements of online multiplayer games in serious games will bring new interested people and expand the part of our target group we can reach.

If they stay and learn with playing the serious online multiplayer game will depend on the fitting of the game concept to the new style of multiplayer games. And it will depend on the pedagogical concept, tools and content used and tried to be communicated by the game. And last but not least it will depend on the techniques behind. Online multiplayer games need a much more complex technical background, than simple online games.

⁵ Schorb B. / Kießling M. / Würfel M. / Keilbauer J.: Medienkonvergenz Monitor Online-Spieler-Report 2008; Universität Leipzig, 2008.

5. Development process of games

The development of (serious) games is different from developer to developer. However, the first step within this report is to show the typical phases of production of a game (according to project management phases, widely agreed on), the development of a serious game (especially the variations) will be discussed later on.

There is the possibility to distinct the production process of a game into four phases, which are shown below, some topics to consider during each phase included, the different phases will be discussed in detail:

- **OBJECTIVE TARGET**
 - Market research, cost estimation & budget needed, financing the project
 - Content
 - Game concept, proposal, goals (e.g. after the S.M.A.R.T.-system)
 - If applicable: prototype, demo-version
- **PREPRODUCTION**
 - Full concept (game design)
 - Organisation / definition of resources, management of team and assets
 - Project management, risk management
- **PRODUCTION**
 - Phases of production
 - Quality management
 - Development of marketing (dissemination) and distribution materials
 - Testing
- **POSTPRODUCTION**
 - Release, marketing and distribution
 - Perfective Maintenance, Dealing with the community
 - Gathering Feedback, What was negative – positive in order to use the findings for the next development project

5.1. Objective Target

Within this phase the idea of the product is developed. Furthermore the targets regarding content as well as the defined commercial success of the game are described. Therefore it is also necessary to distinct between games which should be commercial successfully and serious games. Regarding serious games it could also be to be the target not commercial but to reach a certain amount of individuals within the defined target or audience group. In this first phase cost, budget, timeline and needed resources are described.

Result of this first phase is a proposal or first game concept which is necessary for further discussions regarding the development of the game.

The goal of this first phase is to develop a clear vision of the product which will be developed and therefore the formation of the financing of the project.

5.2. Preproduction

When the proposal – result from phase 1 – is accepted it is necessary to prepare everything during the phase of preproduction in order to guarantee the correct production. The results of the phase preproduction can be a variety of experiences as well as documents, such as design concept, design templates, technical documents regarding the development of the game as well as the configuration of the team and resources needed.

The core of this phase are especially two documents, the game-design-document as well as the technical design-document. Both together describe the planned project in detail and are the one and only basis for further development as well as the production. Both documents can underlie changes, if necessary, for example because of changing circumstances, changes within the project team, improvements and so on. A classical project management cycle is often not applicable in this case, therefore – when the project is really complex – project teams are working for example with dynamic models like SCRUM⁶.

The phase preproduction has an intensive meaning for the estimation of risk, of cost as well for the timeline and should be considered as extremely important. This phase is often underestimated within a project.

5.3. Production

With the phase preproduction all preparations are finished for getting to the production phase. This means that the production of the game starts with the core activities.

This means the creation of content – in terms of graphics, of audio and text. This is followed by level design and the programming itself. The project runs through different

⁶ Schwaber, K. / Beedle, M. (2002): Agile Software Development with Scrum, Perason International Education, see also [http://en.wikipedia.org/wiki/Scrum_\(development\)](http://en.wikipedia.org/wiki/Scrum_(development)) (last seen on 15.11.2011)

phases within the phase production, each phase is – according to project management principles – finished by a milestone.

There are several processes, which accompany the production of the game itself, as for example the continuation of the game design, managing quality as well as the production of marketing and distribution materials. It is furthermore necessary, to test all features of the game, to be sure that there are no critical errors within the game – in a technical context and regarding the content.

It is far more difficult to measure the fun of the game, which is one of the most important criteria regarding quality management of a game.

In between it is possible to do the “localization” which means the translation of content, texts, audio into other language versions.

The end of the phase is the so called Goldmaster⁷, the complete finished game which is ready for the distribution onto the market.

5.4. Postproduction

The postproduction phase consists of distribution, of maintenance of the product as well as – if applicable – a further “localization” to other markets. Content of this phase is also the elimination of errors that occur and to provide – for example – new features for the game to enlarge the lifecycle of the product. Usually these updates are provided as patches.

It is recommended to create a so called post-mortem-document, in which the whole project will be critically reflected⁸ to be able to benefit from the experience made.

⁷ Metz, Maren; Theis, Fabienne (Hg.): Digitale Lernwelt – Serious Games. Einsatz in der beruflichen Weiterbildung. W. Bertelsmann Verlag, Bielefeld, 2011.

⁸ Petrillo, F. / Pimeta, M. / Trinade, F. / Dietrich, C.: What went wrong? A Survey of Problems in Game Development. ACM Computers in Entertainment. Vol. 7, No. 1, AArticle 13, February (2009).

6. Development process of serious games

As stated in the chapter before, there are some similarities as well as differences in the development process of (serious) games.

The development of games is usually based on the game design concept, which describes the product in detail. The game itself consists of developing and programming as well as graphics, animations, story, sound and music.

The big difference in the development between games and serious games is the “serious” background, the learning which has to be worked out and developed by domain experts as well as persons with a pedagogical or didactical knowledge or background. They are especially important in the phase “objective target” as well as “preproduction”, where they have a great influence on the whole process.

Domain experts are specialists in the field, which should be covered by the serious game. They are the source for the content, knowledge and soft skills. Pedagogical and didactical experts are responsible for the suitable – pedagogical and didactical – design of the content.

A crucial point in the design of a serious game is the interface between the designers of the game and the domain experts as well as the pedagogical and didactical experts⁹. This means, that the production of a serious game is – regarding the content – more complex because of more interfaces between experts with different interest.

Other challenges are financial background as well as targets of serious games – in comparison to games. A serious game has to target and to inspire a broader and more heterogeneous audience group. Furthermore the budget for a serious game is seldom as high as for a commercial game, parts of the budget have to be used to implement the knowledge-content of a serious game.

More resources are needed to generate playtime in case of a serious game. In a game playtime can be generated through a more complex situation level by level (e.g. a car sports game where you can adjust more parameters of the car level by level). In a

⁹ Seeny, M. / Routledge, H.: Drawing circles in the Sand – Integrating Content into Serious Games. In: Games-Based Learning – Advancements for Multi-Seensory Human Computer Interfaces, Information Science Reference (IGI Global). 2009.

serious game, this is more complex to generate playtime in a pedagogical and didactical way.

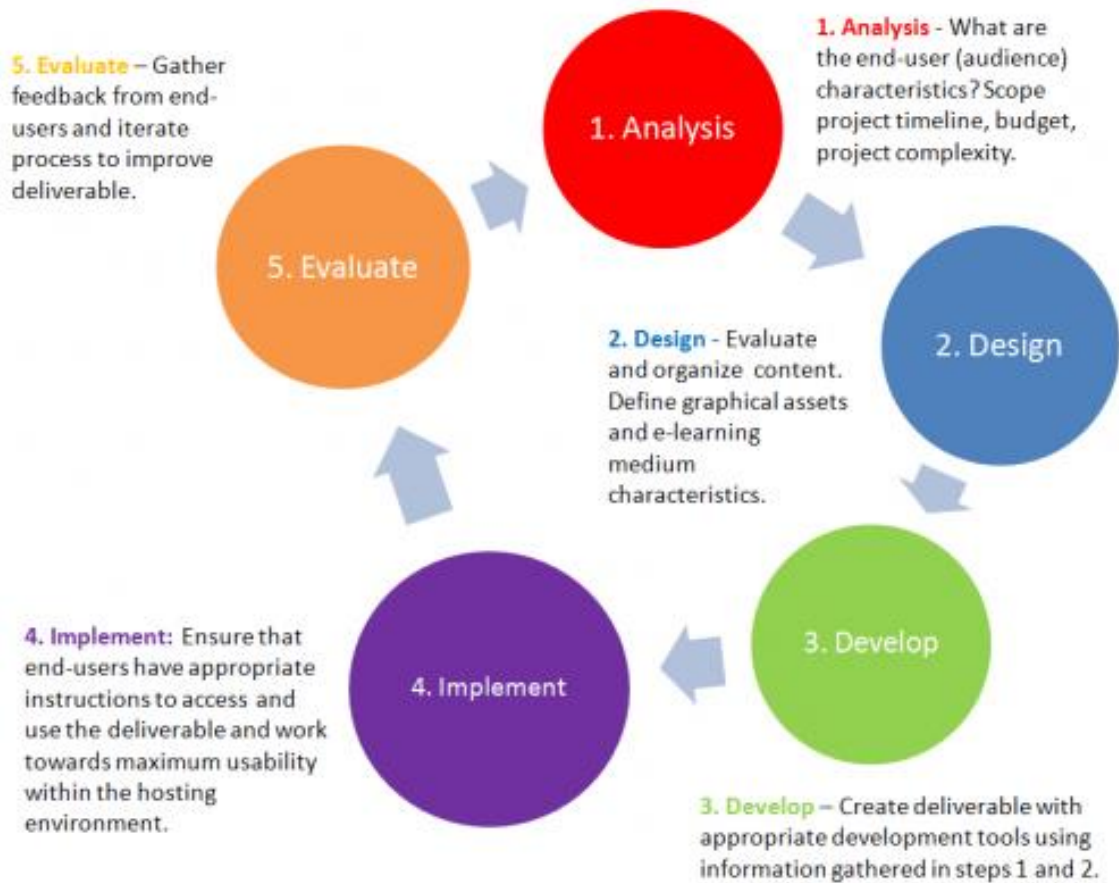
Internationalization (so spreading out the product into more markets) – as mentioned before – is more complex regarding a serious game. Usually the learning content is exactly adapted to a cultural system. Transferring the content into another language – but especially into another context – is very complex.

Measuring success regarding a game is usually the financial success. Regarding serious games it is not that easy because the main goal would be the learning success of a serious game. Furthermore it will be one target to reach as many serious players as possible within the targeted audience group.

One possible model to use for the production of content within a serious game is the Model “basic steps of instructional design ADDIE¹⁰”.

¹⁰ <http://extension.oregonstate.edu/eesc/book/export/html/45> (last seen 11.11.2011)

Basic Steps of Instructional Design (ADDIE)



Picture 5: Basic Steps of Instructional Design (ADDIE)

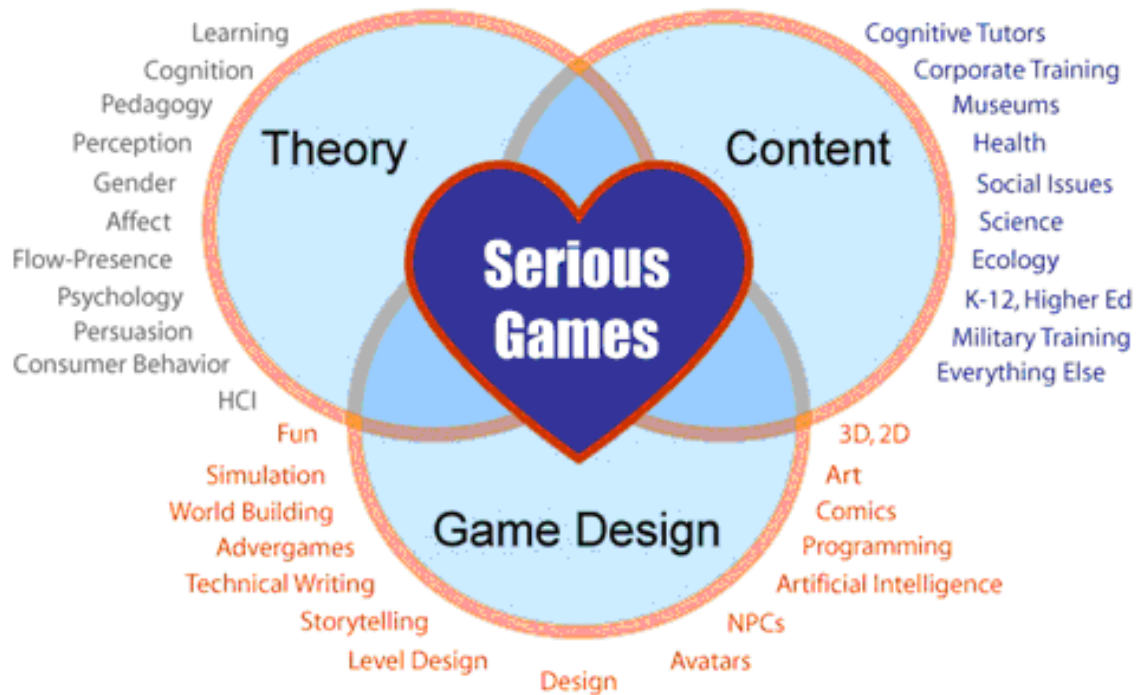
The ADDIE-Model shows the most important steps when creating content for a serious game.

Regarding development of content for serious games the reference is given to the report "Theory and taxonomies of serious games", where it is possible to find the pedagogical as well as didactical background to make serious games successful.

When designing and producing a serious game, it is necessary to have an intense focus on game design, content and theory. This is shown in the next picture, the Heart of Serious Game Design¹¹

¹¹ <http://seriousgames.msu.edu/> (last seen 10.10.2011)

The Heart of Serious Game Design



Picture 6: The heart of Serious Game Design

This picture shows very well the complexity of designing and producing a serious game because of many things to consider...

7. Communication in Multiplayer Online Games

When having a look at World of Warcraft (mentioned before) the success of this game is not imaginable without integrated communication processes. Communication is as well an important part of each multiplayer game or serious game. When looking at serious games it is difficult to find good multiplayer online serious games where communication process are implemented in a meaningful pedagogical and didactical way.

Communication is an essential part of E-Learning or serious games. Following elements or media for communication are possible. There must be the distinction between one-way, two-way and real-time-two-way communication:

One-Way:

- Narrator, Broadcasting, television, presentations...

Two-Way:

- E-Mail
- SMS
- Forum
- Blog
- Wikis

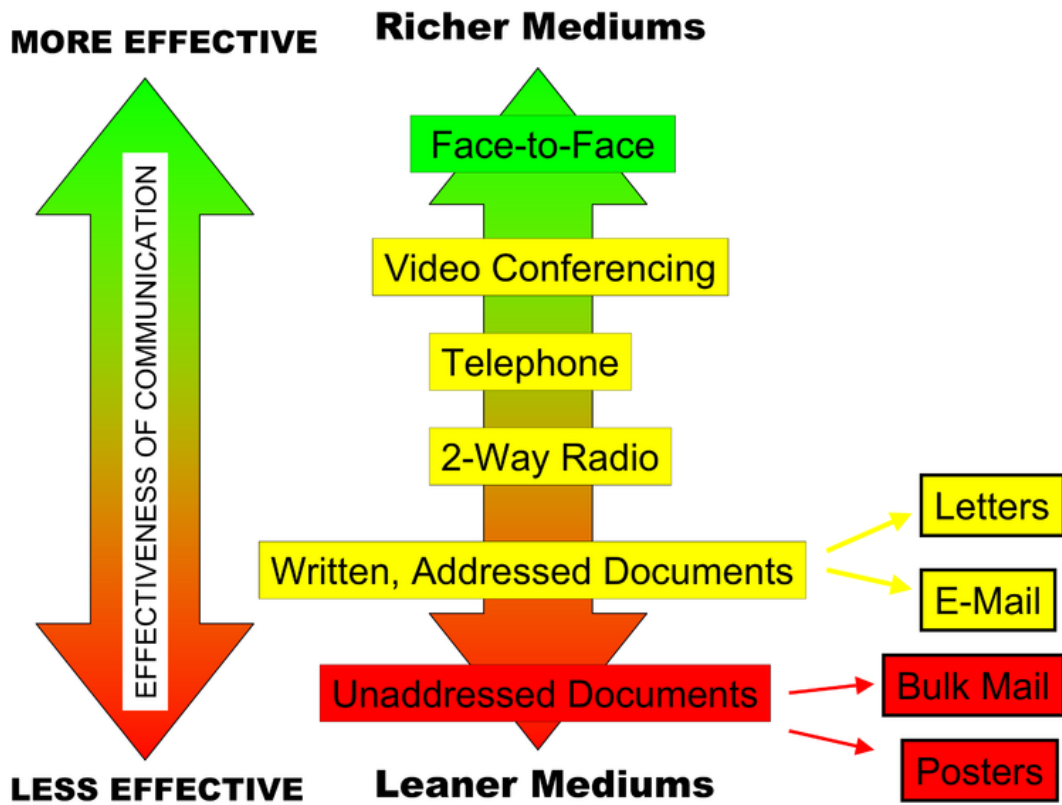
Real-Time-Two-Way:

- Chat
- Web-conference
- Telephone
- Telcos
- Videoconference...

Research showed, that communication is an essential part for motivation in situations of learning.

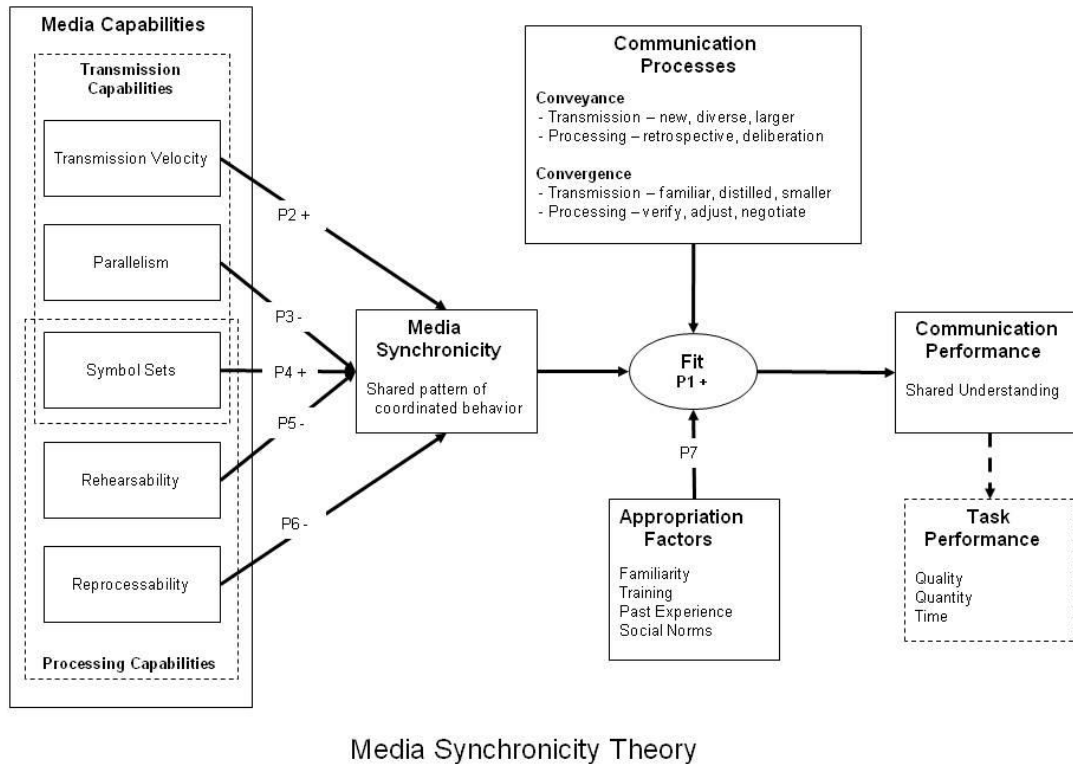
The Media Richness Theory¹² is not really suitable to design communication processes, but show the fit between task and medium as a prerequisite for the effectiveness of communication.

¹² http://en.wikipedia.org/wiki/Media_richness_theory (last seen on 15.10.2011)



Picture 7: Media Richness Theory

The Media synchronicity Theory¹³ is a more detailed theory regarding the design of communication processes. Media is distinguished regarding the directness of feedback as well as the parallelism of contributions.



Picture 8: Media Synchronicity Theory

This means the choice of media is in dependent on the game play, is it necessary, that the player has to spread information very fast to other player of the group or if it necessary to build up a common understanding of a situation. The collective development of strategies or solving various problems can happen on a virtual whiteboard or within a virtual classroom – together at the same time.

In order to communicate with other players to be able to come to a decision together it is necessary to use media with a higher synchronicity, for example videoconferencing, telephone conferencing, chat etc.. In the other case it is adequate to use media with a lower synchronicity, e.g. a forum, e-mail, blogs, wikis...

¹³ http://www.fsc.yorku.ca/york/istheory/wiki/index.php/Media_synchronicity_theory (last seen 18.11.2011)

The use of media is also dependent on the used device and the equipment you need to take part (the more synchronicity, the more equipment as well as – usually – a fast access to the web is necessary).

Communication enhances interaction between players of (serious) games). According to the attractiveness of interaction for motivation there is the reference to Chapter 4 of this report, Multiplayer online games, where it is also possible to see the risks of interaction between player of (serious) games.

Complex games are designed, that higher levels can only be solved together with other players, furthermore multiplayer games enhance teamwork and cooperation. Multiplayer online (serious) games can enhance social skills of the learner or player. Beside teamwork, cooperation, communication skills this can also be leadership, taking responsibility, assertiveness.

Having a look at current serious games, it can be seen that there are more or less no games, where media with high synchronicity are embedded. There are some exceptions. However, there is a big field of development as well as taking into account the availability of new technology.

8. Conclusions, Challenges and Prospects

Serious games are offering new chances for the use in a professional context as well as in education or for other purposes. Serious games try to use the fun of a game and the motivation through fun in order to cause much more examination of a learner or the playing person with a topic or a theme which is content of the product “serious game”. The most important target is to put the learned content into effect.

The production as well as the adoption of a serious game is a individual product, with a lot of challenges – starting from the idea, regarding content and category of the serious game as well as the process of production, marketing and distribution.

It is essential to develop standards as well as processes to ease the production of a serious game and to guarantee success, as far as possible.

Crucial is – however – to transmit the fun (and therefore motivation) of a game into a serious game where the goal should be the serious background of learning (or whatever) and to put it into effect. Therefore it is one of the greatest challenges to face the challenge of financial background. A serious game – whether commercial or not – will hardly has the same financial budget in comparison to an AAA-game (often millions of Dollars or Euros...), therefore the challenge is there to put much more consideration into storytelling and other elements than just graphics or sound in order to create involvement and immersion.

If these challenges are faced – and solved – then serious games will develop as valuable part within the field of education in different contexts, education, professional... Technological innovation will ease this process.

9. References

9.1. Literature

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9.2. Pictures

PICTURE 1: NEVERWINTER NIGHTS	6
PICTURE 2: DARK SUN	8
PICTURE 3: WHY PEOPLE LIKE MULTIPLAYER GAMES	9
PICTURE 4: BAD EXPERIENCES WITH ONLINE GAMES	10
PICTURE 5: BASIC STEPS OF INSTRUCTIONAL DESIGN (ADDIE)	16
PICTURE 6: THE HEART OF SERIOUS GAME DESIGN	17
PICTURE 7: MEDIA RICHNESS THEORY	19
PICTURE 8: MEDIA SYNCHRONICITY THEORY	20