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# Using TRIZ in the forecasting of the computer role playing games evolution

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**Abstract**

This research aims to find out the patterns existing in the computer role-playing games (CRPGs) design and to find out if the system evolution laws of TRIZ (Theory of Inventive Problem Solving) are applicable to them. Only part of the technical evolution laws was explored and only on the selected subsystems of CRPGs, because the complete analysis would constitute a much longer paper. The research was essentially qualitative. In conclusion it allows to state that TRIZ evolution laws are matching to many instances of CRPG subsystems evolution paths what allows to propose directions for the future development of CRPGs.

## 1. Introduction

### 1.1. Role Playing Game (RPG)

Computer Role Playing Games (CRPG), considered in this article, are themselves a genre of the bigger family of games, thus their origins are lying long before the creation of computers. Pen and Paper (PnP) RPGs existed before CRPGs. They appeared on the beginning of the 70s in the USA. Historically the first RPG, "Chain mail", was

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created by Gary Gygax[4]. The first CRPG was created approximately in 1975 by Don Daglow on the PDP-10 mainframe computers[5].

Role-playing games (RPGs) allow gamers to play the part of a character and interact in the game world. They typically send the players' characters (PCs) on a major quest, often made up of smaller adventures (quests). Players are able to develop their characters, earning new skills and abilities by fighting battles or completing quests. While RPGs are traditionally associated with swords-and-sorcery fantasy, they can be set at any place or time.([6]). According to John H. Kim ([7]), real RPG games can be distinguished by the fact that the player is able to "detach" himself from his real self and think as his game character, so it is very concentrated on the notion of psychological immersion.

### 1.2. TRIZ and its laws of system evolution

TRIZ (Theory of Inventive Problem Solving) contains, among many other tools, the laws of system evolution formulated by G. S. Altshuller ([8]) and then developed by numerous scientists. They were used in this paper to define the steps leading to the Ideal Final Result (IFR) for CRPGs and their origins. IFR fixes the terminal point in the path of the evolution. TRIZ's technical system definition was used to describe different subsystems and to help structuring the research.

## 2. Defining CRPGs as technical system

TRIZ describes technical systems (TS) as entities containing a working tool, an engine, transmission, control and casing. CRPG systems contain software and hardware components and each of them consists of the 5 parts mentioned above. This study is focused on the software's working tool and engine:

The Working tool, here, is a CRPG's user interface, both as the graphical and physical interface generated by the software, which allows the player to control his PC and to have feedback on his actions using hardware being the peripherals (keyboard, mouse, screens, speakers, etc.), which allows interacting with the game using human senses and manipulation body parts (e.g. hands). The Engine consists of a game engine software generating data, which is converted to human readable form by the *working tool*. However the whole system is maintained by hardware which requires electrical energy to function.

Even if the artistic part of CRPG systems is not technical, the studies such as Zlotin's et al. ([9]) show that TRIZ can be applied to many non-technical areas including studies made on poetry, music and cartoons and system of Science Fiction ideas classification created by G. Altshuller, which is analogical to his inventions levels classification. He used approach based on reading, discussing and creating fantastic ideas in helping inventors increase their creative imagination. The process can be reverted and used for idea generation in fantastic worlds (as it was done by Boris Strugatskiy). Emotional aspects used for example in quests of CRPG can be treated as shown by Kowalick ([10]).

Modern CRPGs are generally composed of the quests (their descriptions and algorithms), dialogues between characters (contents, scripts, interface), characters which interact actively with game world to perform quests and between themselves (by fighting, discussing, trading, etc.), game world and its objects, game rules (e.g. defining the chance to hit enemy) and physical system defining how player can interact with game.

## 3. Mapping CRPGs to the TRIZ evolution patterns

### 3.1. Game population

Since 1975, several hundreds of CRPGs were created for different hardware platforms. To conduct the present study, its perimeter was reduced to CRPGs made for Personal Computers and in non-Japanese style (these games are

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[4] "History of Dungeons and Dragons" http://www.planetadnd.com/historyofdnd.php, last access: 1/04/2006
[5] http://en.wikipedia.org/wiki/Dungeon_%28computer_game%29 , last access 1/4/2006

very different in terms of gameplay and story). The Massive Multiplayer Online RPGs (MMORPGs), which are played essentially in the Internet, were also excluded. The scope of this study includes CRPGs produced between 1981 and 2003.

### 3.2. Methodology

According to S. Savransky ([11]), because of the lack of time dependence in the evolution of the TS, it is impossible to predict the evolution of such systems using quantitative methods. CRPGs as a system are dependent on a very wide choice of factors, which varied in time. For example, the simplest measure of level of innovation may be the level of sales of these games, however these numbers are meaningless taking into account the context of the market ([12]) which was similar to ideal competition in the 1980s and which is restrained in the 2000s by the oligopoly structure. Quantitative research on patents in the case of CRPGs is pointless, since many of its innovations concern objects which cannot be patented (storyline, quest types, game rules - mathematical formulae, etc.)

The only way to evaluate the evolution of CRPGs is currently through qualitative research. It is based on the detailed tests of a set of games for functional analysis and appreciation of the games' features. It includes the review of opinions of players and industry experts found in 5 important knowledge bases on the computer games ([13]) to diminish the bias of the testers. The cumulative knowledge base was developed to trace the differences in games' features taking into account their relations (such as games' publication date or development teams' composition). It used semantic and statistical analysis for its alimentation with data, their organization and exploitation because most of CRPG information sources do not apply scientific approach in the games' classification and description. Milestone games were selected to illustrate technology transitions described in the next sections. The current results of the comparison are organized by theme of the chosen evolution laws of TRIZ.

## 4. Selected results

### 4.1. How did the idea of CRPG appeared

CRPGs originate from the axiom of Technical Evolution (TE) stating that "both the quantity and quality of human needs, as well as requirements for humans, increase with time".

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[6] Definition of CRPG, http://www.allgame.com/cg/agg.dll?p=agg&SQL=GXD||||||26, last access: 1/04/2006

[7] Kim J. H., "What is RPG" http://www.darkshire.net/~jhkim/rpg/whatis/ , last access : 1/4/2006

[8] Altshuller G. S., 1984, « Creativity as an exact science : The Theory of the solution of Inventive Problems », Gordon and Breach Science Publishing, New York

[9] Zlotin B., Zusman A., Kaplan L. et Al., "TRIZ Beyond Technology: The theory and practice of applying TRIZ to non-technical areas", 1999 Ideation International Inc.

Detroit, MI, www.triz-journal.com\archives\2001\01\f\index.htm , last access 1/04/2006

[10] Kowalick J.F., "The TRIZ approach - Case Study: Creative Solutions to a Human Relations Problem", , TRIZ Journal, www.triz-journal.com\archives\1997\11\b\index.html , last access 1/04/2006

[11] Savransky S. S., "Forecast of Technical Systems", "Engineering of creativity – introduction to TRIZ methodology of inventive problem solving", pp.347

[12] Cook D., 2005, "My Name is Daniel and I am a Genre Addict - The impact of psychological addiction on the game industry", http://www.gamedev.net/reference/articles/article2227.asp

[13]http://www.jeuxvideo.fr/,http://www.gamerankings.com,http://www.allgame.com,http://www.mobygame.com , http://www.gamekult.com
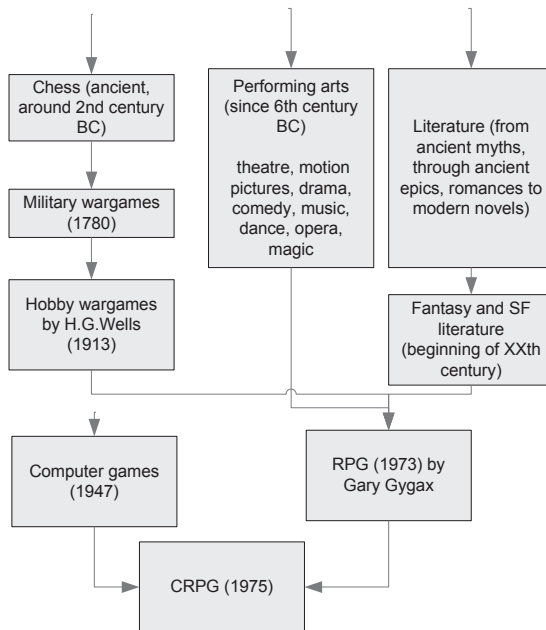
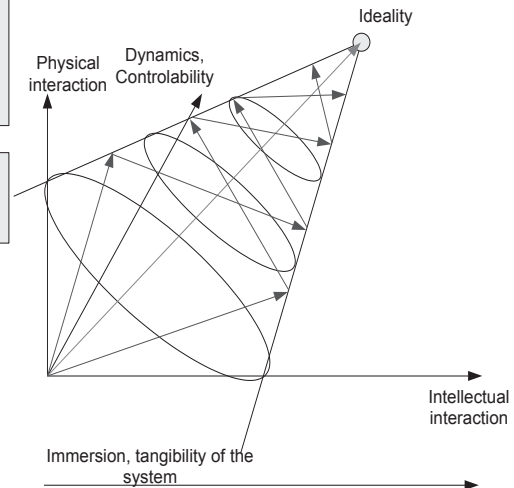Fig.1 - Principal TS contributing to the creation of CRPGs        Fig.2 – Multidimensional character of CRPGs IFR

Taking into account human needs, there was a strong trend in the 1970s to dream and imagine other worlds because of the sociological, political and economical context. RPGs appeared in the USA (fig.1) for which that time was a hard period: defeat in the Vietnam War, stagflation and high inflation rates caused by oil shocks of 1973 and 1979, increase of poverty. The appearance of personal computers allowed the emergence of CRPGs.

### 4.2. Ideality

The law of increase of the degree of ideality was defied by Petrov ([14]) as follows:

$$(1) \qquad I = \frac{\sum\limits_{i=1}^{\infty} F_i}{\sum\limits_{j=1}^{0} P_j} = \infty$$

Where: I - the degree of ideality; F - a function delivered of a positive effect; P - negative effect, expenses; i - a number of variable F; j - a number of variable P.

The ideal CRPG (fig.2) is a game which does not show any interface (physical immersion) to place a player in an infinite number of worlds and in an infinite number of contexts, which are original and allow total intellectual immersion (total association of oneself with the played character). The player has ideal interactivity with the game world, including story-related elements (e.g. intelligent dialogue responses) and ideal interaction with all physical senses. The game allows doing things that are impossible in the real world on our current level of technology (changes in physical laws, use of magic). From the point of view of engineering, the idea of "Matrix" would express very well an ideal solution.

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[14]Petrov V., 2002, "The Laws of System Evolution", TRIZ Journal, www.triz-journal.com/archives/2002/03/b/index.htm, last access 1/04/2006

### 4.3. Regularity of using space

It is one of the most visible evolution factors. CRPGs have developed from text-based (1D) e.g. "Dungeon" (1975), through different 2D stages to fully 3D games which feature 3D characters and items, for example in "Morrowind" (2002).

### 4.4. Transition to super system

This rule was quite often a reason of major breakthroughs in the CRPG world. Joining together into bi-systems or multi-systems, several computer game genres resulted in major advances. Very good example is given by Real Time Strategy (RTS) games such as "Dune 2" (1992) and "Command and Conquer" (1995) in terms of the tactical control of the units (PCs in CRPGs) resulted in the creation of real time isometric CRPGs of the "Baldur's Gate" (1998) family that replaced most of more complicated mechanisms of party control existing before, such as the system in "Ultima IV" (1990) or "Eye of the Beholder" (1991).

### 4.5. The law of increasing su-field interactions in a system

This law in the context of CRPG concerns the increase of dynamics of intellectual and physical exchanges. Early CRPGs, such as Ultima I, were exchanging mostly intellectual, abstract terms, ontologies (substance) using specific form, such as style of dialogues (fields). The analogy for su-field model is used similarly to D. Mann ([15]) in the business context where substances are business partners and fields are communication means.

Eventually physical interactions were developed by inclusion of graphical and physical components of higher level (first 2D and then 3D environments). Control system development, by use of the mouse instead of the keyboard starting from "Ultima VI", allowed including the aspect of player's strength, agility, and precision (for example in "Morrowind" and "Arx Fatalis"). The evolution in this domain can follow the development of Virtual Reality technology, gradually including new senses and body parts of the player in the interaction with the game world.

Intellectual interactions (ideas being substance) increased their dynamics by means of artistic means such as specific game levels design (style being a field), which was very simple in the beginning because of the hardware barrier (screen resolutions, numbers of colours and computation power) and then it was much more sophisticated, allowing the artistic liberty (e.g. "Planescape: Torment"). Music in CRPGs followed the same schema. It was very simple and low quality in the beginning of the CRPGs history, in the end of the 1990s, music for games have obtained the quality level used before only in the cinema or music industry (e.g. "Fallout"). The drama context can be introduced using "cutscenes" (scripted starring of game characters using game engine capacities). A very good example is "Baldur's Gate 2" (2000), which builds its ambiance on the PC's dreams cut-scenes.

The evolution will be continued when CRPGs become part of the art as it has happened with the cinema. The community will decrease its psychological inertia towards CRPGs which are considered as toys for children, adolescents and not serious "kidults" ([16]) because of demographics as those groups treat CRPGs seriously.

### Conclusion

Despite lack of patents in CRPGs domain and relatively chaotic information structure in this industry, it was possible to match the examples of CRPG evolution paths with the TE laws of TRIZ what allows further prediction of CRPG development. It was equally possible to express artistic, intangible part of CRPGs in terms of substance (ideas, values, ontologies) and field (form of expression) what constitutes a base for many TRIZ tools and opens this part of CRPGs for potential TRIZ-based improvement. TRIZ can be used by games developers to treat software and

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[15] Mann D., "Application of Triz Tools in a Non-Technical Problem Context", TRIZ Journal www.triz-journal.com\archives\2000\08\a\index.htm, last access 1/04/2006

[16] http://www.game-research.com/statistics.asp, last access 1/04/2006

hardware problems and in addition it can treat art content and game mechanics problems. The research will be continued to match su-field interactions law with both physical and artistic part of CRPG.

All these facts indicate that the underlying approach using knowledge base and TRIZ with semantic and statistic analysis is a promising direction of research for resolution of inventive problems in domains where there are few patents and other structured data sources.

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