The Dynamics of Co-Creation in the Video Game Industry: the Case of World of Warcraft

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Abstract: These latest years have seen both an increasing development of Users Generated Content (UGC) on the Internet and a growing number of free transactions of these contents through online communities. The video game industry shares this general trend and we shall examine it in detail through the example of a worldwide success game, World of Warcraft (WoW). This massively multiplayer online (MMO) game exhibits two specific economic characteristics. The first one is that the original content is produced by a game developer who keeps intellectual property rights while leaving open to players some possibilities to modify that original content into an enhanced content. We call this innovation process, which involves both the participation of the producer and of consumers, co-creation. Based on a typology of the different UGC in WoW, we specify the meaning of co-creation and put forward some arguments on the players' motivations to co-create and their consequences on the attractiveness of the gameplay to the players' community. The second characteristic is that co-creation is not limited to the design of the game before its marketing. It is a continuous interaction between players and developer even after its marketing. This dynamic process requires both regulatory actions by the developer and a new industrial organization to distribute these UGC through the WoW players' community.

Key words: open innovation, online community, video game, innovative user, customization

I n 2008, World of Warcraft (WoW) reached 11.5 million subscribers in the world after a constant increase in its community since its release on the US market in November 2004 and in February 2005 in Europe [1]. It is currently the world's largest Massively Multiplayers Online Role Playing Game (MMORPG) [2] and holds 62% of the MMORPG market [3]. How can we account for the success of WoW? We shall see that Blizzard, the editor of WoW, succeeded in developing strong relationships with a large fan-based community and set up a model of innovation based on opportunities created

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[1] December 2008 figures. Source: http://www.millenium.org

[2] The term MMORPG was coined by Richard Garriott, the creator of Ultima Online in 1997 which is the first game of the genre (source: wikipedia).

[3] April 2008 figures. Source: http://www.mmogchart.com/Chart7.html. Retrieved on 2008/09/24. Bruce Sterling Woodcock.

by online knowledge sharing. To what extent does WoW development bring new insights in innovation strategy and in research on organization in fields such as open source software and users as co-innovators?

To shed lights on these issues, we begin by briefly explaining the nature of the game and outline its main characteristics in the 1st section. In the 2nd section, we explain the main framework of the organization of the innovative process. Then, we proceed into empirical details to examine the co-creation process from the supply and demand aspect of this innovation market. In the 3rd section, we consider the management and the regulation of co-creation by the editor of the game and we finally conclude.

■ General and specific characteristics of the game WoW

WoW development took five years during which half a million fans participated in the long running pre-release public beta version [4]. The story of WoW is the sequel of the story of another game called 'Warcraft III: The Frozen Throne', a successful offline video game launched by Blizzard a few years ago. Building up on an already existing community which knows the Warcraft Universe and peering it to the development of WoW ensure Blizzard the success of its game under development. Other characteristics of the game detailed hereafter also account for its success.

Similarities with other MMORPGs

In an MMORPG, there is a large number of players who interact with one another through a virtual character traditionally in a medieval fantastic virtual world. These elements are developed using quests, monsters and loots [5] to conquer a land. The characteristic of a MMORPG is the persistence of its world: since the game is usually hosted by the game's editor on servers, it continues to exist and to evolve while the player is away from the game. To play the game, the player must buy a cd-rom or download it online to install the interface and the access to extensions of the game on his computer.

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[4] World of warcraft, Des McNicholas Feb 21 2005, Australian PC Authority. Source: http://www.pcauthority.com.au/Tools/Print.aspx?CIID=21664. Retrieved on 02/02/2009).

[5] Loots are rewards found by players on bodies of dead monsters or dropped by monsters when they die.

Then, to connect to WoW network, there is either a fixed monthly subscription fee or a fee per-hour. Two kinds of game are proposed on different servers: PvE (player alone or with a group plays versus the environment, generally monsters) or PvP (player versus player). Most players choose PvE [6]. Then players create and customize visual aspects of their character among ten races and nine classes from either Horde or Alliance factions. Fighting with mobs [7], exploring the environment and completing quests for NPCs [8] are the ways to increase abilities and to earn experience points, to earn in-game money and objects of different qualities. Quests involve generally killing creatures, gathering a certain number of resources, finding a difficult place to locate an object, speaking to various NPCs, visiting specific locations, interacting with objects in the world or delivering an item from one place to another. Each time the experience bar is completed, the player levels up. When the highest level of the game is reached, the player can "stuff" *ie.*, he can acquire new arms or new armory better than old ones that will enhance his character [9]. The higher the quality of the object, the more difficult it is to gain it. One reason is that the drop rate is lower for high-quality drops. A second reason is that they can be found only in dungeons which require grouping up with other players and also require many attempts to succeed in killing the bosses. Harder challenges in WoW require players to group together to share their diversified competencies to defeat them. Usually, based on his type of character, each player endorses one of the following traditional roles when playing in a group: a *tank* (it absorbs enemy blows and protects other members of the team), a *healer* (it is responsible for keeping up the health of the group), a *DPS* (or damage per second) (it is specialized in inflicting damage), sometimes a *CC* (or crowd control) (it temporarily controls the opponent and makes him lose his control of actions and abilities) and finally a *buffer and debuffer* (it uses abilities that affect the team or the opponents).

These harder challenges usually take place in dungeons. Dungeons are also called "instances" because each group of players enters a separate copy (or instance) of the dungeons, defeats its own enemies and gets its

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[6] In PvP, a maximum number of other players must be killed to win honor points. According to his relative number of honor points, the player increases or decreases his grade weekly. PvP is more time-consuming than PvE.

[7] Mobs are mobile objects (for example, a monster, an animal, another player, an enemy).

[8] NPCs stand for Non Player Characters who are managed by computer and have predetermined reactions.

[9] Having a specific stuff is in itself not a realistic objective because bosses randomly launch objects that can be needed or not.

own treasures or rewards). Generally designed for small groups of five characters, most difficult dungeons require players to team up in a raid. A raid is a larger group of up to 40 players). However, participating in a raid requires a lot of investments for players: it is time-consuming to prepare players before entering the instance (sometimes many hours), to organize the roles of each player within the group and to manage the group inside the dungeon. Players must be very motivated as it often requires many attempts during the same week to succeed. At this level, new tools are required (such as a chat channel to organize the group, etc.).

In addition to playing the game and conversing on forums provided by Blizzard, WoW players often participate in the virtual community in creative ways. Players create artistic content (fan artwork, comic strip style storytelling [10],[11], videos based on the game (called machinimas)) or technical content (creating new tools to customize the game). A general chart exists to regulate the fair play of participants by censoring contents dealing with violence, sex, racism, etc. or contents that forbid cheating while playing the game [12].

Specific characteristics of World of Warcraft

WoW online experience is tailored towards a large audience and a complete immersion in the game environment even for casual players. Reaching a larger audience means simultaneously satisfying different motivations to play the game such as for example watching other characters, talking with other players, building a strong character, having fun, exploring geography, doing raids, playing in solo, playing in groups to tackle more challenging quests, winning honors or reputation among the community, displaying technical or artistic skills, etc.

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[10] Source: blizzard fan artwork web page
(http://www.blizzard.com/us/inblizz/fanart/ScreenShot.html), Blizzard Entertainment. Retrieved on 2008-07-27. Source: world of warcraft comic strip site.
(http://www.worldofwarcraft.com/community/comics.html). Blizzard entertainment. Retrieved on 2008-03-28.

[11] Each month, a prize is given to one exceptional comic strip. The winner gets a copy of the WoW Battle Chest signed by both Vice President of Creative Development and Art Director, and a WoW 60 day pre-paid time card.

[12] Further details are given later in this paper.

These motivations act as many constraints for Blizzard while designing the gameplay. The access must be easy to understand, must not display too much information and early quests must be easy to play but at the same time sharp enough to hold interest. Blizzard relies on different means to lower barriers to access the game: 1) it increases the levelling rate for low levels to create incentives to keep on playing; 2) the character never dies but becomes a ghost at a nearby graveyard and can resurrect by moving from the graveyard to the place where it died or by another player who is a healer. The penalty cost of dying is low, consisting mainly of the cost of time to come back to the place and the cost of repairing damaged armour. It highly increases incentives to play since it takes time to build up a character and it would be tiresome to restart a new character each time it dies [13]; 3) the system of "rested bonus" increases the rate of gaining experience points after the player has spent time away from the game. This makes the game more accessible to casual players who are able to play for short periods while still achieving something.

Blizzard also aims at harnessing its players' community and at favoring immersion by using a new incentive mechanism: peer production. Blizzard released the WoW standard game with a free Application Program Interface (API) that allows users to customize the interface by creating new add-ons. Add-ons are small programs embedded in the interface that help players to do some specific tasks or to display information not available in the standard version of the game. Add-ons are different from "mods" which are also community based innovations. Mods modify the gameplay in itself and can become an entirely new game [14]. We shall see in next sections that add-ons lie at the very heart of the dynamics of co-creation in WoW.

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[13] Another reason would be that dying can also occur for technical reasons (after a bug in the game or following a connexion problem to the server) that are independent of players' will and for which they cannot be incriminated.

[14] Since the game Warcraft II, Blizzard released free "world editors" with its games. The most popular user-made modification is DOTA (Defense of the Ancient) for Warcraft III. Other non MMORPG games such as The Sims, Half-Life or NHL2001 (to name a few) also contain toolkits to modify the standard game. One of the most popular 'mods' is Counter Strike, an "Online First Person Shooters" genre freeware, created by Half-Life. In this regard, add-on developers for WoW do not use software to develop video game such as Game Maker. However, they share the same organization as the community of Game Maker which is open and where players can share the games they have created and their experiences.

■ Organization of innovation as co-creation

A new mix between collective and private incentives

There is a general movement to use the creative potential of consumers (VON HIPPEL, 2001, 2002). The idea that the user can be considered as an innovative resource refers to community sourcing in open innovation literature (LINDER *et al.*, 2003; CHESBROUGH, 2003). A traditional way of involving players participation is in the development of the game before its marketing. For example, while developing the gameplay, Blizzard shares the game with its fans in the testing phase via open and closed betas. This enables debugging and balancing the game for the fans. It is also a means motivating fans to participate in the launching of the game.

A more recent approach deals with design toolkits for users. It involves outsourcing certain design and innovation tasks to consumers. Relying on consumers to design a work can be justified by the theory of sticky information: the required information is shared by both producer and consumers and is costly to acquire, transfer and use (VON HIPPEL, 1994). In that case, the producer provides customers with 'toolkits for user innovation' to enable them to design customized products for themselves. One of the first industries to place emphasis on empowering its customers was the computer game industry indicating that this field is at the forefront of applying the toolkit approach (JEPPESEN & MOLIN, 2003). Blizzard innovation consists of small computer programs that enhance the interface of the game. They are called add-ons. Contrary to physical product design by online consumers' community, WoW players' contributions fit their individual needs perfectly. Indeed, the advantage of digital innovations designed for digital use is that both innovators and users can immediately test them and can modify them consequently. Perfect fitting to players' needs is a source of higher delight (CLEMONS *et al.*, 2003) as well as enhanced player's participation and loyalty. This is a central point in a game designed to be played on a long term perspective and with continuous interactions among players. This practice makes sense when consumers have heterogeneous needs and it is costly to design and produce an option for each average player in each submarket segment (FRANKE & VON HIPPEL, 2002). Outsourcing innovation to players is also a means to hyperdifferentiate the game at lower costs while maximizing the potential

sources of innovation [15]. Blizzard develops the gameplay and invests at minimal level to develop the interface. The benefit is that the product is tailored to the individual needs of the consumer (THOMKE & VON HIPPEL, 2002; VON HIPPEL & KATZ, 2002; VON HIPPEL, 2001). This approach enables to understand deeper customers' behaviours, to identify upcoming trends and to reduce the failure rate of new extensions. Innovative consumers' integration in the development enables Blizzard to save time and cost (FÜLLER & HIENERTH, 2004). In the case of WoW, it is also linked to the strategy of reaching a larger audience with casual players. A game which is too complicated from the start would indeed be offputting to non hardcore gamers. Proposing a simple interface is a way to lower barriers to entry for beginners and casual players. At the same time, motivating participation by higher level players may account for leaving the interface to customization open. This can account for the possibility for players to further develop and integrate customized add-ons. This point is central for Blizzard since the value of the game is based on its audience [16]. This is also important to players to keep some flexibility while playing the game and to be able to change and adapt their tools to the targeted quests and objectives. Finally, outsourcing development of add-ons to players seems to increase both producer and consumer surpluses.

Boundaries of the innovative firm are blurred in this new hybrid organization where collective and private incentives are mixed as in open source software (OSS) development. The OSS literature provides for complementary theoretical grounds to analyze the WoW development model. Open source software are made freely by an online community of developers who collaborate to develop a product adapted to their specific needs and make these changes available to all freely. Their modifications are based on General Public License (GPL) and are generally made by a technically skilled minority of lead-users (HUGHES & LANG, 2006). These are the common points with the structure of the WoW add-ons developers' community. It will be examined in detail in the next paragraph.

However the main central difference with OSS organization is the meaning of the collective project in WoW that greatly impacts on the sharing of incentives among Blizzard and the community of players. VON HIPPEL & VON KROGH (2003) show that open source software development is a hybrid model of innovation mixing private and collective incentives. These

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[15] In WoW, there are currently about 5000 active add-ons.

[16] See also HUGHES & LANG (2006).

authors position OSS between pure private development (developers use their own resources to privately invest in new code) and pure collective (the code is available freely to the public). WoW development mixes collective and private incentives differently. In WoW, development is shared between Blizzard and players with two layers of interaction. A first layer common to OSS includes the community of add-ons developers. But there is also a second layer where add-ons developers continuously interact with Blizzard to innovate. This second organizational layer which does not exist in OSS organization lies above the first layer and is managed by a commercial firm, Blizzard. Blizzard indeed develops the gameplay privately under copyright terms (though beta tests are open) and it provides tools for User Interface Customization. The game is therefore only partially open to modifications. In economic terms, we would say that Blizzard develops the product and players develop enriched complementary services called add-ons [17]. In terms of incentives, this organization is less open than OSS organization. We would therefore position WOW between pure private development and OSS development.

In the next two paragraphs we examine in detail the organization of the two layers described above.

Supply of add-ons and organization of developers' community

We propose to examine the rationality behind add-ons supply by skilled players and how user-innovators organize themselves into free revealing communities. There are common principles shared with OSS development but also new specific characteristics linked to the nature of the software, precisely a game.

Why do players develop add-ons for WoW? One answer lies in the detailed examination of the basic progression of a team and in the management of information while fighting against a big monster (called a boss). Motivations in this case are collective-centered. Here are the standard different phases encountered by the players:

- *Phase 1:* it consists of preparing the attack. Roles are distributed and the team checks that there is the right number of players in each class of

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[17] We shall see further down that Blizzard sometimes re-appropriates some successful add-ons made by players by including them slightly altered in extension packs.

characters. Then, the arms, the abilities, the equipment and the protections are checked

- *Phase 2:* the tank (generally a warrior) who is more resistant to attacks takes the aggressiveness (aggro) of the boss by provoking him. The boss focuses on him while other players also attack the boss. The tank is healed by a healer (generally a preacher).

- *Phase 3:* when aggro is great enough, damages per second (dps) start to damage the tank and healers must continue to heal the tank. But if dps are too high or if healers give too much healing, they can attract the aggro of the boss and because they are less resistant they can die easily. The management of the threat is vital and was not implemented by the basic interface. It was made possible by an add-on called 'Omen Threat Meter' which displays the list of aggro of the boss [18].

- *Phase 4:* the team manager needs tools to assess the performance of the team to enhance its organization for the next attack.

In consequence, there is a need to manage the information system of the game to play it, be it at the individual or at the group level. This information requirement is compulsory when fighting in raid. Fighting some bosses sometimes requires 20 to 40 players who did not know each other before teaming up. In consequence, the organization of the team and the strategy quickly becomes very complex and time-consuming. Add-ons used in teams' actions are useful when reaching high level quests to increase efficiency and reducing time spent in preparation and organization [19]. Beginner players may only need some individual-centered add-ons that help to manage information about their character and their close environment. There are three types of add-ons based on their usages: add-ons to manage personal information on my character, add-ons to get information on others players, on monsters or on objects and add-ons to exchange information with other players or to obtain specific information while playing. While levelling up, they will adjust and optimize their bundle of add-ons and will add group-centered add-ons. Players generally consider add-ons as a means to enhance their gaming experience and to empower the game. New add-ons not included in the standard interface must be developed. Add-ons makers are high-level players with programming skills who are highly motivated to enhance their gaming experience (CHARLIER & DENAIS, 2008). An add-on

[18] Finaly Blizzard implemented a modified version of it in its latest extension 'the Wrath of the Lich King'.

[19] See also CHARLIER & DENAIS (2008).

is a small computer program aiming at modifiying the interface [20]. Motivations to develop add-ons lie mainly in the interest of the game, in intrinsic rewards (personal learning, enjoyment of programming) or in collective rewards (such as guild acknowledgment). The evolution of the gameplay after each new extension contributes to keep up motivation to develop add-ons. Like in OSS organization, the initiator of the add-on is also responsible for its maintenance. Contrary to OSS organization, all players can potentially share all tasks relative to add-ons management in WoW: authors, co-authors, testers, downloaders and updaters. Once the add-on is released, its source code is often available under GPL to all players. Nevertheless a player must have the consent of its author to modify existing add-ons.

Unlike OSS organization, there is no hierarchy among developers to assess the value and the quality of the add-on. Uploading an add-on is totally free and the add-on is a ready-to-use service. Contrary to OSS organization, there is no need to have a 'social integration' of uses with different status (core developers, etc.) because the add-on is a small size program. It is developed by one or two players compared to standard software which requires larger teams of developers. Another difference with OSS organization is that free-riding is not a central issue in WoW developers' community [21].

Authors have strong incentives to share their new add-ons with the community of add-ons developers to have feedback, to identify bugs and fix them quickly. It is a win-win game to share innovations among add-ons developers in the development phase. Contrary to OSS literature, the free-riding by simply user players is not relevant when playing the game. The reason can be found in the nature of the add-on itself. Being enhanced services for a multiplayers game, add-ons increase also the value to its developer when it is shared. Sharing add-ons is very often compulsory when playing in a group. Since the gameplay requires collective efficiency in usage, the group must share the same tools to be able to manage the

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[20] Files in LUA make the main part of the add-on. Then it is completed by XML language (or Wow UI Designer which generates automatically XML code) to organize the graphical display of the add-on and to give information on the use of the add-on. The add-on has also its own interface built with pictures in .jpg. There is a file .toc (table of contents) to index the add-on and have the version number of the game for which it is compatible. If it is not the latest version, it will not work. Lastly, it is possible to integrate some API functions in the add-on to keep it functioning while information is changing in the game.

[21] See VON HIPPEL & VON KROGH (2003) about free-riding in OSS organization.

information system at the group level [22]. This notion of collective usage efficiency is not present in OSS literature where developers do not share their usages

WoW add-ons are mainly uploaded on websites dedicated to project developers. In addition to blizzard forums, the two dominant websites were: WowAce and Curse [23]. They have recently merged to form a new portal called CurseForge.com dedicated to developers [24]. CurseForge is a site created by add-on developers for add-on developers [25]. Its goal is to provide the add-on author with the tools he needs and with a better user experience in order to make creation easier [26]. There are tips, FAQs and guides. It is possible to request assistance, to share ideas and see if someone is interested in doing them, to talk about projects and to request help from other developers. On CurseForge, there are currently 3549 projects for WoW with different status like in OSS organization (alpha, beta, planning, released). On this site, it is now possible to upload screenshots of the add-ons. This is very helpful to assess the usefulness and the working of the add-on. CurseForge rewards authors of popular add-ons with purchase coupons, with time playing cards or other advantages. The aim is to become a monopoly in the development and distribution of add-ons. Barriers to entry for other portals are high since the number of developers is limited. There are three types of network effect on the supply side of add-ons. The first effect is based on the information exchange and help within the community of developers and players. The more developers upload their add-ons on CurseForge, the more attractive CurseForge becomes for new developers: there is a virtuous circle of add-ons innovation. This network effect increases the monopolization of CurseForge. The second network effect deals with the monopolization of CurseForge. It recently merged with WoWAce, its main rival competitor for WoW add-ons. To increase the network effect among add-ons developers of the two sites, they decided to share a common library

[22] See also FRANKE & VON HIPPEL (2003) about the incentive to share with players who do not develop add-ons.

[23] At the beginning, Hubert Thieblot started to create the website of Curse, the guild he founded in 2005. He centralized add-ons created by players on this site. Less than 18 months later, it was the most visited site by the WoW community, the first add-ons data base and a profitable firm with a business model based on advertisement. After raising 4.2m€ funds in 2007, today Thieblot is the CEO of an enterprise established in San Francisco.

[24] The name is inspired from Sourceforge.net, a site which hosts OSS projects.

[25] The co-founders, Kaelten (administrator of WoWAce) and Ckknight, are long-standing members of add-ons community and creators of many add-ons (source: CurgeForge.com)

[26] Visiting CurseForge at http://www.curseforge.com makes one aware how it is developer-centric and professional.

of commands. The third network effect is at the level of players' communities. To increase its domination on the supply side of add-ons, CurseForge diversified into other MMO games such as Warhammer Online (588 projects), Age of Conan (107) and Runes of Magic (24). The diversification of developers' networks not only contributes to increase its attractiveness but also its monopolization.

The distribution of add-ons has evolved according to the same organizational scheme. It is managed by a second website called curse.com examined hereunder.

Demand for add-ons and distribution: usages and P2P

A common point with OSS development is their distribution. Add-ons can be downloaded for free on a website. The main distribution portal is www.curse-gaming.com (which also merged with its WowAce counterpart in 2008) with 4.5m unique visitors monthly for 85m of viewed pages and about 5200 add-ons [27]. The portal provides with statistics and a lot of information on add-ons [28]. Aggregating fragmented information on add-ons is a means to increase their attractiveness to players. Unique access to numerous add-ons also increases downloading efficiency for players who increasingly use add-ons. The more players download add-ons from a unique site, the more it is recommended to new players (word of mouth effect). This contributes to increase the attractiveness of the site not only on the demand side but also on the supply side due to an increase in demand.

On the Curse site [29], add-ons are classified according to certain categories: *Interface enhancing* (graphic interface by adding or deleting parts and different information), *bars* (to add, modify and suppress action bars and add new functionalities), *messaging* (to add new options for chats, mails and messages), *classes* (to automatize or make easier competencies and capacities management of one class); *Battle* (to ease battle);

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[27] Other add-ons hosting sites are WoWInterface.com (http://www.wowinterface.com), WorldofWar UI section (http://ui.worldofwar.net) and Blizzard WoW forums (http://forums.worldofwarcraft.com).

[28] Each add-on is represented by a dedicated page with all useful information (date of last update, author, number of downloadings, dependencies, and a screenshot of the add-on, etc.), a link to download and a help to install it, comment by users and possible problems of the add-on.

[29] Source http://wow.curse.com/downloads/wow-addons/default.aspx). Retrieved on 02/03/09.

Inventory/Objects (managing inventory, stocks of objects and add information in the tooltip (which contains information that appears when a character or an object is targeted); *maps* (new functions to world map and minimap); *PvP* (to enhance confort during PvP); *Quests* (to enhance quests window); *Raid*; *others*. However, this list is not useful to reach understanding of the usefulness of add-ons. We propose a matrix to match the types of add-ons to the types of players in relation to their level. An add-on can be purely cosmetic (*e.g.,* changing the color of the bar), can provide additional information or can make complex calculations. A player can be a low or high level casual or a hardcore.

Table 1 - Matrix of usages of add-ons according to the types of players

Types of players ⟍ Nature of information	Casual	Hardcore	Usages with levelling up with experience
Analytic add-ons	- Real-time simple information (comparing equipment, level, damages, healing, etc.) - Access to data base of quests, monsters, items - Radio chat on common channels - Optimizing of actions (sales/purchases)	- Real-time complex calculation - Managing critical information in raid (threat metering, dps, statistics on performances) - Highly specialized add-on for guild management (common channel, organizer, search and statistics) -Optimizing the display of add-ons on the screen	↑
Descriptive add-ons	- Cosmetic add-ons (changing the color, the music, etc.)	- Entertainment add-ons (playing a game within WoW, MSN for WoW)	
	- Basic information to play the game (maps, localization of objects, information on equipment, on time, on bank account, etc.). - Basic management tools (*e.g.* searching for objects within many bags).		

Source: The author

Add-ons providing with descriptive information (*e.g.* information on characters and mobs, on equipment, time, money, on the required level to accomplish quest, a chart of dungeons, bonus and lost life points in real time and information about players in need of healing) are required for players of all types and all levels. Add-ons providing analytical information are required for high level players. When levelling up and gaining experience (the vertical arrow), players add analytical add-ons. They help them in managing real-time information and information shared in small groups. Hardcore players need more information and at the same time more specialized information. In addition to the previous basic tools, they need real time complex information on raids (*e.g.* damage and healing done by each member of the group, alerts on different phases of the fight with the boss, a real-time estimate of one's threat level relative to that of the tank to manage the dps optimally), Then, players can download highly specialized add-ons dedicated to team or guild management (*e.g.* common channel and calendar to organize special events, to get statistics on the guild members, to register raid statistics about players' performances).

Add-ons usages evolve in relation to the level and to learning effect of the players. At the same time, using new tools increases individual experience and makes it more attractive. A hardcore player needs the same add-ons as a high level casual player but must add specialized add-ons to be used in raids.

These tools are useful to increase efficiency and to optimize individual's information system or team management. Consequently, the objective of creating add-ons is not always to improve existing ones but also to customize a certain individual type of playing. Customized interfaces are so popular and efficient that players are really put at a disadvantage when they do not use them (CHARLIER & DENAIS, 2008). Distribution and use of add-ons are wide because there is no barrier to entry for players. Add-ons are public goods exchanged in a P2P mode. It is very easy to download an add-on and change it on the margin according to one's needs [30]. The player can therefore choose which add-ons are useful or not while starting to play. It is also easy to clean out useless add-ons. The integration of add-ons within the game is a low cost activity. Since barriers to entry on downloading add-ons are low, it is also easy for players to test an add-on and check if it matches

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[30]   Once   downloaded   in   a   specific   repertory   of   the   game   (C:/World   of Warcraft/Interface/AddOns), the player must activate it at the next connection to the game by clicking on it on the page where he chooses his character.

his needs. However, having add-ons is not completely cost-free. Add-ons must also be updated by users after each new extension or patch from Blizzard because they modify the API. Therefore players must regularly download the latest version of the add-ons they use to make them compatible with the latest version of the gameplay. Main add-ons work with different patches but some incompatibilities can nevertheless remain.

Having an interface which is too customized makes the game difficult to play for two reasons. There are limits to customization. The first limit is the central processing unit (CPU) and the size of the screen that limits the number of simultaneously used add-ons. Some bigger add-ons consume too many CPU. Players are forced to optimize the display of their bundle of add-ons on the screen. The second limit is the cost to update all add-ons that increases with the number of add-ons[31]. In consequence, players face both updating costs and management cost of their add-ons. Even for a high level player, there is an optimal number of downloaded add-ons because there is a tradeoff between 'efficiency/beauty' gains and managing costs[32].

■ The management of the dynamics of co-creation

In this section, we shall examine how the process of co-creation evolves with time and how Blizzard is involved and impacts on the dynamics.

Innovation within the gameplay and the interface by the editor to maintain attractiveness and motivations for players

Blizzard must continuously innovate within the gameplay to keep on motivating its high level players. The basic reason why innovations both on the side of the producers and the consumers are at the heart of video games lies maybe in the intrinsic nature of video games. Innovation flourishes where "design spaces that are more open and expandable are freer to evolve into new functionalities" (BALDWIN *et al*., 2006, p. 25). Consequently, the rate of innovation may increase in response to new design subspaces from new extensions of the basic game. There are indeed

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[31] It is possible to update bundles of add-ons on Curse or Wowmatrix but it does not always work well.

[32] Some add-ons are developed to manage the optimal bundling of add-ons.

great margins to modify the original game as we have seen with WoW. At the same time, modifications have a direct impact on the value generated by the gameplay because they extend it. WoW game cannot be considered to be a finished product but an incomplete product continuously enriched both by motivated players and by Blizzard. Dynamic of innovation by Blizzard takes three forms: 1) regular releases of patches on the current version of the game, 2) diversification of players' objectives to satisfy a larger and heterogeneous audience, 3) launching new extensions of the game. All these actions impact on the developers of add-ons who must update them or create new ones. Let proceed into details of each type of innovation. The lightest in terms of investment intensity is the release of patches. To manage the daily motivations of its players' community, Blizzard regularly edits some patches. Patches aim at balancing regular character, fixing the game, introducing new quests, new areas, new monsters, some special festivities (like Halloween, Christmas, etc.) and debugging and regulating technical problems (see also next paragraph). But as the game becomes mature, Blizzard searchs for new consumers as well as keeping motivation of existing ones. In patch 3.0 implemented in July 2008, Blizzard created a new experience within the gameplay called 'achievements system'. It is a new system of objectives complementary to the traditional system of completing quests. It aims at satisfying both casual and hardcore players. This system is also implemented in the last extension of the game to increase its popularity among players. Its originality is to offer 'horizontal' personal objectives rather than 'vertical' objectives of the standard quests. More than 500 achievements are introduced. Rewards are purely cosmetics and fun to exhibit within the game. There are specific achievements (for example, to change haircut, to achieve a dungeon without dying within a limited time with a limited number of players in the group). Others require progression and need repetitive actions (e.g. to find ten different pets). Finally, success in achievements opens 'meta-achievements'. Achievements are possible in all categories (PvP, dungeons and raids, crafts, quests, events, world exploration, reputations and general). The list will be enlarged with future new extensions. Blizzard makes a lot of communication on successes in achievements. WoW displays a comparison of one's achievements with other players, it announces accomplished achievements with a jingle both in our guild and among friend's players and it displays a board of honors. This system is a purely honorific system. It is open to all players whatever their levels. It can be considered to be another means to increase valorization of players and therefore their participation and motivation in the game.

To manage attractiveness for high level players, Blizzard must also develop an entirely new world within the game. It is like developing small gameplays consisting of discovering a new continent for players. It is done through extensions of the game that are released every one or two years. The first expansion pack called 'The Burning Crusade' released in January 2007 adds two new races of characters, several new instances and new lands, a new battleground for player vs. player combat, and potentially dozens of hours of new content for players overall. The second extension called the 'The Wrath of the Lich King' released in November 2008 involves characters and events which took place within the game "Warcraft III: The Frozen Throne". The Wrath of the Lich King delivers a new class, a new continent, a new profession, new factions to join or combat, a non-instanced battleground scenario, improved graphics and effects, and hundreds of new creatures, spells, weapons, items, dungeons, and quests [33]. They extend the geography of the world, create new races of characters, new options, new races, new abilities for players and enable high level players to continue their ascension to new quests while getting new rewards [34]. Each extension opens the right of access to a new area of the game. However, it is still possible to continue playing the previous version of the game without buying the last extension. The marketing of expansion packs is based on a fine screening of the online community of players and the evolution of its interactions. Screening is indeed an active part of the development effort (PRÜGL & SCHREIER, 2006). The value of the game is the value of its community and this justifies that the community has the heaviest weight on the evolution of the game. WoW lead designers often implement changes based on community recommendations. Blizzard also offers fans guided tours of their headquarters and hosts an annual convention for their fans called Blizzcon. It is an opportunity to test and to provide some information on its future extension and to watch carefully the reaction of its fan community.

With an increasing number of players, developing new realms also enables to relieve the burden on existing servers while upgrading them. Both patches and extensions impact on the add-ons developers and add-ons users. When Blizzard modifies the code or an API, it can raise some incompatibilities with existing add-ons developed for previous versions of the

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[33] 2,8m players bought the second extension on its first day of release. It is sold at 35€ and the subscription price costs from 11 to 13€/month in Europe and 13 to 15$ in the USA.

[34] In the first edition of the game, the maximal level attainable by a player was 60, in the second edition it was 70 and in the third edition it is 80.

game. An error message is then displayed on the screen. To prevent this inconvenience, Blizzard usually warns authors of add-ons to give information in advance about its coming modifications. Add-ons developers have therefore time to update their add-ons to make them compatible with the latest version of the game. Generally, only most used add-ons are updated. Then on their side, add-ons users must also update them by downloading the latest version of their add-ons [35]. Patches and extensions also give opportunities to add-ons developers to create new add-ons.

Blizzard also improves the interface by enhancing existing tools or by creating new ones based on recommandations by players or based on massive usage. Re-appropriation of successful add-ons is not a direct copy of the add-on available on the Curse. It is rewritten and differs in some aspects. A first reason may be the respect of authorship of the add-on developer. According to Charlier and Denais (2008), a second reason is that the quality of players' generated add-ons is heterogeneous and makes it often difficult to integrate them directly in Blizzard Interface without any modifications. However, add-ons developed by players on portals provide Blizzard with a real-time market survey of the development and usages of add-ons. Blizzard can then decide which add-ons can be integrated to match players' usages at best. Here are some examples of re-appropriated add-ons by Blizzard:

- 'EQCompare': it compares equipped inventory items against items in chatframe hyperlink and bags/bank;
- 'FastQuest': it is partly integrated in WoW interface. It provides information on how many monsters remain to be killed. Thisinformation is shared among members of the group;
- 'WoW Cartographe' or 'Atlas', integrated as an interactive atlas in October 2008. It includes air journey, craft masters, zone levels and dungeons;
- 'Omen Threat Meter' integrated in the last extension pack The Wrath of the Lich King to measure the threat.

Blizzard actually re-appropriates few add-ons. Many different reasons can be accounted for:
- it is costly to develop and integrate thousands of add-ons;
- players get accustomed to some add-ons. They are locked-in and it takes time to change and use its counterpart developed by Blizzard. For

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[35] Some software available on www.wowmatrix.com can automatically update a bundle of most popular add-ons.

example, a 'voice chat' which allows a player to talk while playing is now integrated in WoW by Blizzard. But we observe that the add-on 'TeamSpeak' still remains massively used by the community (CHARLIER & DENAIS, 2008).

As it has already been explained, successful add-ons cannot be assessed only by the short term cumulative number of downloadings but on a cumulative long term basis. Many reasons can be put forward: 1) the number of downloadings does not reveal the real usefulness of an add-on. It can be temporarily useful in one phase of the game where a dominant part of players are and can be abandoned later on, 2) highly specialized add-ons (those useful in a raid for example) are used by all players taking part in the raid to ensure compatibility, whether they like them or not. If a big proportion of the raid team uses a certain add-on, other players must use the same whatever its efficiency, 3) some add-ons are complementary to others (that is to say they enable to manage other add-ons). If their maintenance is stopped, no complementary add-ons can be used anymore, 4) A very good add-on can be abandoned because its author stopped its maintenance and players must use an inferior substitute, 5) even the highest downloaded add-on on a long term basis (like 'Omen Threat Meter' or 'Questhelper') are "relatively" small in relation to the 11.5m of players in the community. This means that the usefulness of an add-on depends mainly on the evolution of in-game usages by the players' community and not so much on its instant number of downloads. Finally, we can observe that the usefulness of add-ons is changing in dynamics: one add-on can be very useful when starting the game and others become useful when levelling. Moreover, it is possible to change add-ons according to the type of quests. For all these reasons, a systematic re-appropriation of add-ons is not an efficient strategy for Blizzard.

Finally, both innovations within the gameplay and within the interface continuously interact with each other and contribute to the dynamics of co-creation and its evolution. This dynamic keeps players involved in the game at both individual and collective levels.

Regulation of the dynamics of co-creation

Being the owner of WoW, Blizzard must control the usages of the gameplay by players. Regulation aims at managing and maintaining the involvement of the whole community of players in the game and to provide

enjoyable moments. Indeed, if some actions allow for greater and more immediate rewards than skillful gameplay, the real game involvement becomes greatly diminished. Regulation also includes the maintenance of the game and of the servers and patches. Controls are made through game moderators (GM) who supervise the world and through public information (most employees are also players). GMs have access to features and information on the game that are not available to normal players. On Blizzard forum, players can also inform Blizzard about suspicious behaviors or suspicious actions.

Blizzard actively controls actions which alter the gameplay. These actions can be: an artificial increase in the economy of the game, server instability, enabling access of a third party player to one's account, abusing of bugs in a way to gain advantage over other players (because it has severe impact on the economy of the game or because it can deliberately crash a server), abusing in-game mechanism (to use to one's advantage one limitation of the game (using a mechanism of the game in an unanticipated way), third party program (which causes repeated crashes, sends viruses or spies to other players' accounts), malware uses of add-ons (to gain an advantage over other players are forbidden), manipulating data base and extracting non public information or manipulating information exchanges on the server [36].

Blizzard controls undesirable add-ons through the API (Application Programming Interface) which supervised the "design space" of add-ons. API indeed delimits the open spaces for add-ons developers. Blizzard developers can lock certain functionalities of API that the unauthorized add-ons use to block its usages. However, this practice is not as easy since a specific API can be used both by an unauthorized add-on and an authorized add-on. Therefore, Blizzard faces a tradeoff while regulating its gameplay. Blizzard does not publish a list of available API for each WoW versions but provides information on changes in XML and LUA on its forum about customized interfaces [37]. Generally, two kinds of add-ons are forbidden:

• The use of "bots" [38] or automated programs. They are add-ons which allow the player to accumulate wealth or experience without playing because his character accomplishes automatically easy tasks such as non-stop killing

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[36] See also http://www.wow-europe.com/fr/policy/exploitation.html

[37] However, some benevolent players update this list.

[38] This term is used for "robots".

of mobs or moves. Bots became illegal 4 months after the first release of WoW [39].

- • The add-ons that allow for complex actions in one click. One example is an add-on called 'decursive' which allows with one click to find which players are sick, select them and launch a spell. Another example is the add-on called 'Emergency Monitor' that allows for healing a player with one click. The use of Decursive use was highly visible in WOW because it has been used for many months by all players participating in raids (CHARLIER & DENAIS, 2008) [40].

Nevertheless, we can observe that this type of regulation is quite seldom.

Blizzard forbids also the selling of WoW in-game contents (character, money, items) for real money on eBay or on personal websites. This claim is based on the WoW terms of use which clearly states that all contents in WoW are Blizzard's property and cannot be sold. Beyond intellectual property issues, a fundamental economic reason for stopping these kinds of transactions is that they create damage on the fair play of the gameplay and on experiences of fair players. If they become massively used, they can totally destroy the interest in playing the game and consequently its economic value. That is the reason why Blizzard is very pro-reactive on this point. Players found guilty will loose their characters and accounts and can endure legal actions by Blizzard [41].

Lastly, Blizzard forbids third party program which includes files or programs that are not part of WoW application and which confers in-game advantages (such as increasing movement speed or doing certain actions in a manner not permitted by the conception of the game). This includes also all programs which enable to access information normally not accessible to players or to modify some files of the game (except modifications on the user interface). These programs do not use API defined by Blizzard developers and can therefore modify the gameplay. They are considered to be cheating programs [42]. To fight them, Blizzard posted an anticheat chart

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[39] See also WoW site (06/29/2005). Source:
http://worldofwarcraft.judgehype.com/index.php?page=archives_mois&mo=06&an=2005
Retrieved on 03/02/09.

[40] It is forbidden since the patch 1.10 (29 march 2006). Source:
http://worldofwarcraft.judgehype.com/index.php?page=commentaires&n=8916.

[41] "Blizzard goes to war" (December 2004). Source:
http://terranova.blogs.com/terra_nova/2004/12/blizzard_goes_t.html

[42] See http://forums.wow-europe.com for more informations.

on WoW website [43] and now uses an anticheat software (called Warden) which works simultaneously with the game and operates 'limited scans' on the player's computer. It checks the use of a third party program and pirate program [44]. If a third party program is detected Blizzard can close the account of the player without warning.

■ Conclusion

In this paper, we pointed out a new hybrid innovation model used to develop the most famous MMORPG: World of Warcraft (WoW). WoW development strategy mixes both private and collective incentives to match customers' needs in a dynamic process called co-creation. The gameplay and the interface of the game are continuously evolving under community of players' actions and editor's reactions. Co-creation is a form of continuous dynamic customization. It shares some theoretical characteristics both with the organization of open source software development and with the use of 'users as co-innovators' in development. Its also reveals specific institutional, regulatory and economic characteristics compared to traditional innovation models making us think of the birth of a market organization of innovation (with its supply, its demand and its regulation) within or around the good produced (the game WoW). Based on the market share of WoW, it seems that co-creation is a win-win game. In this paper, we have laid down the premises of an economics of innovation by online players in the MMORPG video game industry. Nevertheless opportunities remain to look further inside the process of co-creation and its possible generalization. Specifically, some topics about the management of a growing online community deserve deeper investigation. They deal with links that have been suggested among economic variables such as the learning effect of players, the levelling of players, the hybrid players' community, the market share penetration of the game, the degree of outsourcing creation to players, the role of user generated artistic and technical contents. These links need more exploration in future studies

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[43] See http://www.wow-europe.com/fr/policy/anticheat.html for more information.

[44] 'Wow declares war against automated play', *Sydbey Morning Herald* (2008-03-28). Source: http://www.smh.com.au/news/technology/wow-declares-war/2008/03/28/1206207360290.html?s_cid=rss_technology). Retrieved on 2008-03-29.

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