

The collaboration curve:
Exponential performance
improvement in
World of Warcraft

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Introduction

The online game World of Warcraft (WoW) has become a global phenomenon, with markets in North America, Asia, and Europe. It is by far the most popular massively multiplayer online game (MMOG) and has experienced exponential growth in subscriptions, with more than 11.5 million total active subscribers. While other online games have built big followings only to see declines in subscription growth, World of Warcraft has continued to thrive.

A primary reason for the game's lasting appeal is its ever-evolving nature. World of Warcraft constantly changes and morphs not just as a result of the actions of game developers but in response to those of the players as well, making it unpredictable, challenging—and exciting to play. This characteristic of the game makes it an intriguing simulacrum for the real world—and a fascinating laboratory for emerging trends in learning, collaboration, and performance improvement. As gamers grapple with an ever-changing, ever uncertain in-game environment, they are pioneering new techniques and practices that may prove highly relevant to the business world.

Consider, for example, the broad “knowledge economy” springing up around the game consisting of discussion forums, wikis, databases, and instructional videos. Here the players share experiences, tell stories, celebrate (and analyze) prodigious in-game achievements, and explore innovative approaches to addressing in-game challenges. This “knowledge economy” is impressively wide and deep: in the US alone, the official forums hosted by game creator Blizzard Entertainment contain tens of millions of postings in hundreds of forums. And those are just the forums hosted by Blizzard. Independent forums are proliferating at an even faster rate.

Here's what's intriguing: the more participants—and interactions between those participants—you add to this knowledge economy, the faster the rate of performance improvement goes up. My colleagues at the Deloitte Center for the Edge call this effect the “collaboration curve.”

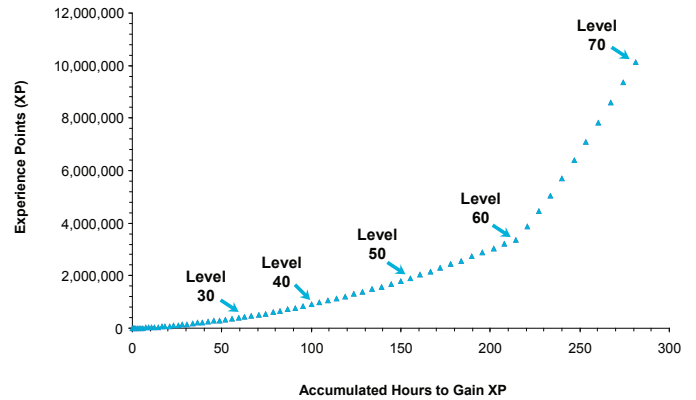
In sharp contrast to diminishing returns experience curves, the collaboration curve suggests that learning and performance can be scaled, paving the way for a new era of scalable learning and performance to supplant the age of scalable efficiency, the limits of which have become increasingly clear.

The collaboration curve is emerging not just in online gaming but also in open source software development, amateur astronomy, online music remixing, big wave surfing, open-education, and other fields of endeavor.

In World of Warcraft, participants riding the collaboration curve have experienced exponential performance improvement, clearly demonstrated by the character leveling (the rate at which player advance through ever-more –difficult “levels” within the game) multiplied times the experience points (XP) they gain as they do so.

As shown in Figure 1 players gain more experience points as they progress through increasingly difficult levels, leading to higher performance as measured in XP/hr.

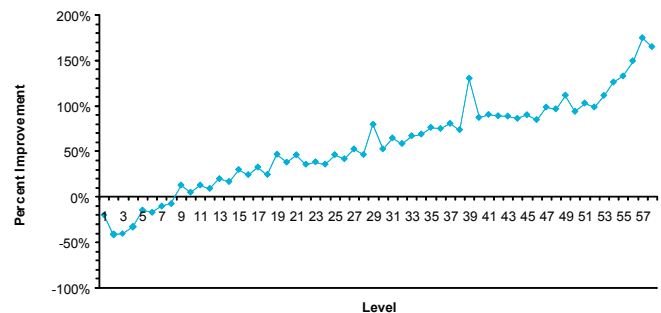
Figure 1: Hours to gain experience points (XP) in WoW



Source: Palo Alto Research Center (PARC) Play On <http://blogs.parc.com/playon/>; Deloitte Analysis

It can be argued that XP/hr increases with the levels and that can be observed in any other MMOG as well. But what makes WoW interesting is that performance as measured by XP/hr is improving over time. Comparing the XP/hr metrics measured in 2005 and 2007 for levels 1 to 59, we found that there has been a significant improvement in game performance from levels 10 to 59.

Figure 2: XP/hr improvement by level between 2005 and 2007



We also observed that in 2005 players took more time to clear levels 10, 20, 30, 40 and 50 as the XP/hr at these levels was lower than the levels prior to or after these levels. This could be due to the fact that these levels changed the game significantly and hence the players took more time to figure out the dynamics of the game. But such drop in XP/hr was not found in the 2007 data, suggesting that the players at these levels already knew the ways to get around the newer challenges.

Such improvement in performance could not be attributed to repeat players alone as the number of active subscribers increased from ~3 million in 2005 to ~9 million in 2007. The near doubling of performance at various levels, considering such drastic increase in number of players, can be explained by network effects and the collaboration curve¹.

¹“Introducing the Collaboration Curve”; Harvard Business Blog by John Hagel III, John Seely Brown and Lang Davison; April 08, 2009. <http://blogs.harvardbusiness.org/bigshift/2009/04/introducing-the-collaboration.html>

Collaboration curves mobilize a large group of diverse participants to interact and innovate within a carefully designed and nurtured environment—what the Center for the Edge calls a “creation space”—leading to amplified, even exponential, performance improvement. The collaboration curve holds significant strategic potential for business. Companies that can attract a critical mass of participants to a creation space can set in motion increasing returns to performance that competitors will find difficult to replicate or displace.

Collaboration curve in WoW

WoW is a complex and a challenging game that requires players to participate in teams (guilds) and coordinate the raids to win over the challenging dungeons. Moreover, the game changes with players’ actions making it even more complex. So there are no set solutions for winning over the challenges in the game.

The Players in WoW organize themselves as part of guilds (50 – 500 players) and raid teams (25 member teams within guilds). They work together as a team on raids and develop skills and tacit knowledge. This tacit knowledge exists within the raid team and is not easily transferable even to the greater guild, as each member of the guild has different skill set. To transfer the knowledge created during raids, the players create wikis, blogs, and forums for their guilds where the raid teams share their experiences with the greater guild members. So in the next raid instance a different 25 member raid team could build on prior raid experience. The guild keeps building on the knowledge created in every raid, till it figures out the best way of wining the dungeon.

These guilds are like smaller teams within an organization that working together on most challenging issues, creating tacit knowledge and sharing that knowledge across the team. Just like in the real world, these teams are very effective in creating tacit knowledge, but the advantage that WoW guilds have over real world teams is that they have access to tacit knowledge created by hundreds of other guilds. There is a broader knowledge economy within WoW which includes thousands of wikis, forums, blogs, video sites and databases. The makers of WoW, Blizzard Entertainment, alone support over 300 blogs and there are many countless blogs created by players. There are millions of posting across all these websites which discuss the various game challenges and share the knowledge created by players within the game.

The players also develop dashboards, skill management spreadsheets and other tools that are helpful in improving game performance. These tools are then shared with the community, and the community helps in improving the tool by making it applicable to broader players and levels. One example of such tool is the “Raid Resource Planning” tool, which is a tool created by a guild to manage its resources for each raid. This tool was so popular across the community that most guilds stating using this tool and eventually Blizzard integrated it into the game.

Knowledge economy within WoW represents a powerful form of Open Innovation as it overcomes the tradeoffs that most Open Innovation platforms face which are:

- Either organize in teams that create tacit knowledge but find it difficult to scale these teams
- OR
- Build scalable environments like Innocentive where many participants share their explicit knowledge but find it challenging to create tacit knowledge

WoW community has the ability to create tacit knowledge across scalable platforms with millions of participants organized in smaller teams. This is the key aspect that has led to collaboration curve and exponential performance improvement in WoW community. Players within WoW do not see their guild boundaries as their limits to sharing knowledge and seeking innovation. They seek ways to connect with talent wherever it resides through the numerous websites, and focus on learning and knowledge sharing. This leads to accelerated learning for all the players as the best known solution is readily available to everyone. All players can learn from this solution, apply it to their own situation and create their own knowledge or uncover other possible solutions. Once more solutions are uncovered, the players share it back with the community hence amplifying the knowledge available with the community. This type of innovation that is not constrained by institutional boundaries (i.e. guilds) and is accelerated and amplified by sharing knowledge within a community is a type of institutional innovation.

An example of institutional innovation within WoW is development of a spreadsheet for managing the min/max performance strategies.

Figure 3 represents a spreadsheet that was developed to manage the min/max strategies by the top players. In the high-end raid instances, small gear adjustments, often just a point or two of damage or hit rating, can mean the difference between success and failure. Hence a spreadsheet was created by the top players to manage the min/max strategies and the effectiveness of their skills in the raid. A player with 1400 DPS (damage per second) skill but performing at 950 DPS in raids could use this spreadsheet and performance logs to understand the short comings. Then before the next raid the player could figure the min/max gear required for that particular raid and then gear up accordingly. This strategy ensured that the player picked the right skills for gearing up for the raid and increased individual performance during the raid.

Figure 3: Spreadsheet for managing min/max strategies

Though this spreadsheet was initially developed by the top players it was quickly picked up by the players of lower levels. While the earlier instances/levels are much more forgiving and small variations in gear do not seem to make huge differences, players of lower levels still adopted min/max strategies and created tools to help assess gear and skill combinations at all levels.

As more and more players adopted this spreadsheet, they made improvements to its functionality, improving the overall relevance of the sheet to all players at all levels.

The forum which initially posted this spreadsheet in October 2007 has had more than 3700 replies, more than a million views and about 5216 link backs from other articles. The feedback from the community regarding the spreadsheet and its use has helped in improving the functionality of the spreadsheet.

Institutional innovation within WoW

Carefully nurtured and monitored creation space with WoW has led to the institutional innovation that we are observing today. Our research indicates that there are three elements required for institutional innovation to occur in creation space: participants, interactions and environments. We examine how these three elements contribute to the development of creation space within WoW.

Participants

Participants are essential elements of the creation space, especially a critical mass of participants who learn through the creation space and contribute back their innovative thoughts.

WoW has more than 11.5 million active subscribers, and contrary to popular belief, the majority of the players are not teenagers but between the ages of 24 and 39. Though the majority of players are male, they come from diverse backgrounds. It is common within guilds to find a wide age range, many differences in class and political orientation, racial and ethnic diversity, and a wide geographic range.

For example, GLA, a mid-sized raiding guild has roughly 150 members, ranging in age from 13 to 58, with members in four countries, and representing more than three dozen states in the US. Members are students, work as technical/IT professionals, in sales, as truck drivers, as supermarket checkers and baggers, in education, and in government. Politically, members identify themselves as staunch conservatives, liberals, libertarians, republicans, greens, independents, and democrats.

As a result, even though the demographics of game spaces may be less diverse than the general population, the opportunity to spend significant amounts of time with people that would rarely have contact with each other in any other environment, makes these spaces have an effective diversity.

How does WoW manage to attract and retain such diverse population in its online communities? First, lowering the barriers to entry for new players. Next, helping players improve their performance by providing objective and frequent performance feedback. Then, challenging the players enough to keep them engaged with the game.

Blizzard Entertainment keeps the barriers to entry low by offering free trial downloads for new users. WoW community lowers the barriers further by clearly explaining the task at hand at lower levels and the best possible way of learning the skills required at lower levels. The forums explaining the tasks and tricks at each level are rated and colored differently to make it easier for new users to learn quickly.

Next experience points within the game provide objective and real-time feedback to the players. As the players progress through levels and gain skills they get more experience points and move to higher levels. At higher levels players start using dashboards and metrics to measure their performance in a game. These metrics allow players to think through the improvements they need to progress to the next levels. These metrics are also used for recruiting players into a guild and assigning them specific tasks in the raids.

Another form of feedback within WoW guilds has been after action performance reviews. One of the most interesting tools developed by players has been WoW Web Stats, a tool for statistical analysis of combat logs which allows players to perform after action reviews of raids. These tools provide a remarkably sophisticated analysis that allows players to assess not only individual performance, but also comparative assessments in and between classes of players, as well as how each player performed. Figure 4 shows one such performance measurement log used in after action reviews by GLA guild.

Figure 4: A snapshot of after action performance review charts



These performance evaluations can be used to determine if players meet or exceed standards for more advanced content, but they can also serve as complex diagnostic systems for helping players improve individual performance as well as to find ways to make more substantial contributions to the group. In GLA, WoW Web Stats was used both to assess performance, but also help guide players into developing necessary skills that would be required for more advanced content.

As the players progress through the game, the game gets progressively more difficult. Players' current skill sets are no longer sufficient to overcome the new challenges, and they need to learn new skills and gain new tools. By keeping the game challenging at all times, WoW ensures that the players are not bored of the game as they are constantly engaged in the game.

Interactions

The amount of interactions and the information produced on a daily basis about WoW is staggering. In addition to the more than 300 forums run by Blizzard for WoW, there are tens of thousands of guild forums, thousands of independent and specialty forums, and a number of high profile sites which attract millions of visitors on a daily basis. These visitors are able to observe the various interactions that are going on, ask specific questions about the instances, raids or other related topics, rate various topics based on their usefulness, reply to questions from other participants, announce recent successes, recruit new members to the guild, post videos and do many such activities that improve the information contained in the knowledge economy.

For example, a forum such as WowHunters, started in November 2006, has more than 57,000 posts on the subject on how to play the Hunter class in WoW. That forum is independent of Blizzard Entertainment (which also has an official forum for the Hunter class) and has no affiliation to any particular guild, server, realm or group inside the game or out. Similarly, there are countless blogs which offer very specific advice on topics such as particular specifications for particular character classes. One such blog, resto4life.com, provides information and resources for Druids who are set up as healers.

One of the most interesting cases is the use of machinima or filming events in WoW. These films are produced frequently and hosted on numerous sites. One of the largest, warcraftmovies.com, for example, currently hosts more than 26,000 videos (6,459 hours of video) representing 5,444 different guilds.

These generally take one of two forms: celebratory or educational. Celebratory films usually document a guild or player succeeding at a particularly difficult challenge or documenting an unusual strategy as a proof of concept. Educational films are generally aimed at teaching players or guilds how to improve.

While it is impossible to catalog the full scope of information resources available, there are a few overall comments that bear mentioning:

- Almost all of these resources are driven by user generated content. Very few resources fit the standard model of publication or broadcast

technologies (and those that do, such as Wowinsider.com are not considered as game resources)

- The most frequently utilized resources are forums, wikis and databases, all technologies which privilege new information and are able to rapidly adjust to change, while at the same time providing an historical record or archive of past data or information.
- Editing and vetting is a community operation. Players take it upon themselves to comment upon, test, and validate information, and generally have the ability to either remove or correct inaccuracy or comment upon it in meaningful ways and provide evidence or support to contradict it.
- Information moves virally throughout the network, meaning it travels quickly, but also with large amounts of redundancy. New discoveries, for example, will show up almost simultaneously in dozens or hundreds of forums, making it easy for guilds or players to find it and put it into practice quickly.

The value of the large scale knowledge economy that WoW has produced is not just the amount of information or the richness of it. The value of this knowledge economy is in its flexibility and its use of technologies that adapt well to change and which can be developed in a decentralized manner and still produce results that can be disseminated widely.

Within the immense knowledge economy surrounding the game, players need to be able to find, sort, prioritize, and convey information to the guild quickly and effectively. Guild sites often employ message forums and wikis to allow members to find relevant information and disseminate it quickly. One of the strongest skills that guilds bring to the game is the ability to collect, synthesize, and process information that the guild may need at a moment's notice. Guild members in raiding guilds are, generally, tapped into different aspects of the WoW knowledge economy. A guild of 40 active raiders is able to scour the network for information that is relevant for a particular challenge. The redundancy within the network means that information of high value or relevance is likely to be repeated and passed on, showing up in multiple sources.

Information that is not time sensitive or likely to change quickly, is often then preserved in more traditional forms, such as web pages, wikis or even documented in videos that can be shared within the community. Information that is time sensitive is likely to be found in forums, where it can be discussed in the present, but will naturally fade to the archive as it is no longer discussed.

It is standard for high end guild leaders to share information with each other about particular challenges, strategies or techniques, particularly after they have completed them. Players may also have other resources, such as personal connections to other players or guilds, or experience from previous guilds they have played with which can be used by their current guilds to problem solve.

Information is disseminated through nearly every imaginable venue. Information resources tend to exist on a continuum, depending on the

degree to which they need to be preserved. Information that is not likely to change or which can serve as a basis for further discussion is usually set in a fixed form and tends to be archived in well known spaces such as WoWwiki, wowhead, thottbot, or stickied in forums.

Environment

Carefully nurtured environments are essential to ensure that participants are attracted to the creation space and boundless knowledge is created in the community. The environment has three key elements including platforms, governance protocols and incentives structures. These three elements of the environment need to be carefully designed at first to enable participation and then grow with the community to support the needs of the community.

Platforms

Platforms with WoW are mostly technology platforms. First, the game itself is a platform that is instrumental in attracting millions of players. This platform is owned solely by Blizzard Entertainment and any modifications, upgrades or improvements are only done by Blizzard Entertainment.

Second, Blizzard Entertainment has opened up the APIs to the game, so that outside programmers could write applications/tools that can be used in the game. Many programmers have made use of these APIs and have developed applications/tools that assist players in WoW environment. Blizzard does reserve the right to shut down any applications/tools that it thinks provides unfair advantage to the players. Also, Blizzard reserves the right to incorporate popular applications/tools into the main game platform.

Last, the wikis, forums, blogs, video share sites, databases and all other social interaction websites are platforms that are used to reduce the interaction costs of the users. These platforms exist to share the information on the large scale and help the players learn, play and contribute on a real-time basis. There are over 300 such platforms that are maintained by Blizzard entertainment and thousands more that are maintained by the players.

Governance protocols

Governance protocols are required to make sure that the environment is considered fair by all the participants. Governance protocols could amount to admission, expulsion or decision-making protocols that ensure that one or more participants are not favored in the environment.

For WoW one such protocol that ensures that the players are not cheating is called "The Warden". It scans the computer to gather data on open programs on the players' computer and sends it back to Blizzard servers to compare the list against programs that are known cheating programs. The data collected by Blizzard acts like evidence against the cheating player and is used for further disciplinary actions. The Warden has helped Blizzard in controlling "Bots" designed to make the game play against the game and uncover the various ways of overcoming the challenges and gaining

experience points. Though some consider "The Warden" as a breach to their privacy, many believe that it keeps the game fair for everyone.

Blizzard also controls the types of APIs that can be developed and used in the game. There are certain APIs that Blizzard has banned from the game and certain ones that it has incorporated into the game.

Apart from the governance protocols that have been put in place by Blizzard Entertainment, the players also have governance protocols. Players' governance protocol across servers follows a simple rule: everyone participates by choice. There are no tangible rewards for participation, but there is an expectation that one does participate and that one responds when called upon.

Guilds have certain governance protocols which are used to control the participation of its members. High performance guilds mandate that their players raid for 3 – 4 nights a week and not take off more than 2 nights in a row. On the other hand, casual progression guilds do not have such stringent participation rules.

The social nature of the game creates a particular sense of trust among players. That trust is the result of emergent norms which structure much of what constitutes play in the game. Perhaps the clearest example is the way that loot is divided among players. When a monster drops loot in an instance, the loot is just enough for 5 players and hence a decision must be made about which of the 5 players receives the loot. WoW has an option to "roll" on the item, meaning each player presses a button and a random number is generated as their "roll." Whoever has the highest number receives the item. When the item drops, however, the player is given two options: need and greed. If a player selects need, their roll will be given preference over all other players, unless they roll need as well.

There is an understanding among players that one only rolls "need" for items that are specific to your class and which constitute an upgrade for you. It is conventional for players to ask the group for permission to roll need. In that sense it is almost a sacred act, one which is reserved for special circumstances. There is almost no circumstance where it is inappropriate to "greed" an item, but to "need" it requires special acknowledgement from other group members.

Players refer to violations of this ethic as "ninja looting," and frequently will announce in very public forums or chat channels when it happens as a warning to others not to play with any player who commits such an infraction.

Incentive structures

There are three primary incentives for players to spend their time in a raiding guild. The first is to acquire new and better gear, which is only accessible by participating in raids. There are a number of complex systems for the distribution of gear, mostly aimed at rewarding participation. Because the top level gear cannot be bought, sold, or traded, players must participate in the killing of the boss monster to be eligible to receive the top gear. In addition to abilities, gear in Warcraft also is a marker of status and is visibly recognizable to other players.

Equally important is the social status of being part of a progression guild and what that symbolizes. Players wear a “guild tag” in game, which allows others to see their guild affiliation. Membership in elite guilds signifies a player’s skill and talent and provides social status.

The primary motivation for players to engage in high end content, however, is the sense of accomplishment from completing a complex task in a team environment. No single player can take credit for the success of the team, so credit is equally divided among all participants. Overcoming enormous obstacles and challenges serves as a bonding experience for players and is often cited as some of the most powerful experiences and memories of the game. When players leave a guild, they often reflect on the memory of defeating a particular boss or completing a challenge and refer to it as a peak experience.

Institutional innovation in business world

Carefully designed and nurtured environments, participants and interactions have led to institutional innovation and exponential performance improvement within WoW. This has ensured that player performance improves significantly over time and they are able to overcome the challenging situations within the game by collaborating and co-innovating. The number of tools, methodologies and strategies created in this game are mind boggling. The existence of such powerful creation space has undermined the ability of other game makers to dislodge WoW from the position of most played MMOG. WoW will likely continue to dominate this market as long as Blizzard Entertainment keeps challenging the most experienced players while nurturing the existing knowledge economy.

Such Institutional innovation is also possible and effective in the business world. Eclipse Foundation and SAP SDN are two examples of Institutional Innovation in the business world.

Eclipse Foundation is an open source platform that is focused on building commercial platforms for growing markets. It has close to 200 member companies that vary in size, from a small one person startup to big blue chip companies like IBM, Nokia, and Cisco. Eclipse Foundation was donated to open source consortium by IBM in late 2001. At that time, Eclipse was just an IDE tool for Java users. But as the IDE market matured, its members sought

ways to apply the knowledge and frameworks within Eclipse Foundation to adjacent markets. This led to the development of embedded tools integration platform, and then the runtimes platform. Now Eclipse is trying to build platforms for industry verticals like healthcare IT. There are close to 100 open source projects, with over 60 million lines of code and over 500,000 posts within the Eclipse Foundation. Eclipse Foundation board has carefully nurtured the environment, participants and interactions to make sure that co-innovation and collaboration is encouraged within the community. This has led to sizable market share for Eclipse Foundation and rapid innovation within the community.

Both WoW and Eclipse Foundation communities have exceeded their initial expectations in term of innovation within the community. Both these communities continue to innovate and get better over time. Institutional Innovation is the underlying strength of these communities and they will continue to dominate their market till their robust ecosystem continues to exist.

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Below the surface of current events, buried amid the latest headlines and competitive moves, executives are beginning to see the outlines of a new business landscape. Performance pressures are mounting. The old ways of doing things are generating diminishing returns. Companies are having harder time making money—and increasingly, their very survival is challenged. Executives must learn ways not only to do their jobs differently, but also to do them better. That, in part, requires understanding the broader changes to the operating environment: Decoding the deep structure of this economic shift will allow executives to thrive in the face of intensifying competition and growing economic pressure. The good news is that the actions needed to address near-term economic conditions are also the best long-term measures to take advantage of the opportunities these challenges create. For more information about the Center’s unique perspective on these challenges, visit www.deloitte.com/centerforedge.

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