The dual nature of video game innovation

Guy Parmentier

Univ Grenoble Alpes / CERAG, France
CERAG, Grenoble, France

Vincent Mangematin

Grenoble Ecole de Management, Grenoble, France

The dual nature of video game innovation

How do SMEs balance exploration activities targeting innovation and exploitation activities for improving existing products? The video game sector is made up of companies ranging from tiny to huge that are undergoing complex technological and editorial innovations. This field provides rich material for observing and understanding the tensions that exist between exploitation and exploration. This study focuses on innovation related activities in ten video game studios of fewer than 100 employees and reveals two models. The first model shows the tension between activation of existing knowledge and exploration in organizations that work in project mode, strongly supporting focus, adaptation and creativity. The other model externalizes exploratory activities, notably by calling upon editorial specialists or by reaching out to communities of gamers. It appears that artistic creation is more easily outsourced than is technological innovation.

1. Introduction

The notions of exploitation and exploration correspond to two different logics in the domains of research and innovation (March, 1991). The first uses existing knowledge and optimization of established results, while the second is a risky activity demanding creativity, inventiveness and the gamble of trial and error. O'Reilly and Tushman (2004) suggest adoption of separate and specialized structures in the simultaneous management of these two activities. This recommendation is not, however, applicable to SMEs because they do not have the financial and human resources to separate exploratory and exploitative activities. How then do these small companies assure both exploitation and exploration activities? Do they specialize in one or the other, or do they attempt to address the two activities internally?

To understand how small high-tech media companies combine exploration and exploitation, we have studied the organization of studios that develop video games. This sector is extremely rich because it combines technological innovations, and editorial creativity through the scenarios and the visual and auditory environment of the games. In addition, degrees of innovation are easily detected. Realization of a new game concept or the development of a game for a new platform can be classified as

radical, whereas production of a game series or development for an existing platform can be considered as incremental. The video industry is organized in networks around different specialties. There are console manufacturers, editors, producers, development studios and specialized subcontractors (graphics or programming studios) that participate in the value creation. We are interested in video game studios because they are small, innovative structures that must deal with both exploration and exploitation activities. Our comparative case studies examining ten French SMEs show that there are two models used by the companies to simultaneously achieve exploration and exploitation activities. Either the activities are ensured internally in a project mode, or the creative editorial functions are externalized.

We will start by analyzing the organization of studios that produce innovative games. We question whether they can simultaneously exploit technological and established lighthearted concepts while exploring new game concepts or technologies. Do these companies specialize in video game conception, development or commercialization, or are they ambidextrous and perform all these tasks internally? Our analyses of ten studios show that organizational strategies vary with two models emerging. Certain studios balance the tension between exploitation and exploration internally by working in project mode, thereby supporting focus, adaptation and creativity. Other studios externalize the editorial exploratory activities (most notably) by calling upon specialists or by working directly with gaming communities.

Case analysis shows that artistic creativity is easier to externalize than is technological innovation. Editorial innovation can be shared between various external organizations, facilitating management of the tensions between exploration and exploitation activities.

2. Innovate or reproduce: How are video studios organized?

Video game studios perpetually innovate to propose new game concepts or to better use new technological platforms. They must, however, simultaneously expand upon existing ideas to reinvigorate, improve and update their offerings. To understand how SMEs are organized, we hypothesize that exploration activities are necessary to the development of radical innovations while exploitation activities allow improvement of existing games via repetition of known concepts.

2.1 Innovation within the studios

A video game studio simultaneously manages different exploration activities to enlarge its product range while pursuing exploitation activities to update existing games (transition from FIFA 11 to FIFA 12, for example). These activities are managed via projects regrouping all the skills needed for game development (scriptwriters, graphic artists, programmers, testers, project leaders). Studios guarantee development throughout the different project phases (pre-production, production and post-production) from conception to delivery of the master (final version). Studios work simultaneously on several projects in different phases of advancement. Video game innovation can be described differently depending on the degree of innovation involved, be it incremental or radical (Abernathy and Clark, 1985 ; Durand, 1992). Incremental innovation relies on known technologies and existing game concepts. Radical innovation, on the other hand, changes the technological trajectory of the studio, defines new game concepts and updates the organization's skills. Innovation can also manifest as technical innovation or editorial innovation. Technological innovation concerns the game's motor and the realization of its different functionalities, while editorial innovation focuses on the scenario, the gameplay and graphics. Benner and Tushman's (2003) typology allows one to distinguish between exploratory activities pursued by studios when they develop games based on radical innovations addressing new clients and exploitation activities resulting in incremental innovations addressing existing clients.

The combining of technological and artistic dimensions define eight innovative situations. The first five stem from exploitation activities (1 through 5) and the other three from exploration activities (6 through 8). To achieve these different types of innovation, companies must effectively perform different activities made possible by an appropriate work structure and adequate management of artistic and development skills.

Table 1 – Innovation situations depending on the nature and degree of innovation

Nature of the innovation	Technological innovation			
	Degree of innovation	No change	Incremental	Radical
Editorial innovation	No change		Platform change (1)	Game adapted to a new-generation platform (3)
	Incremental	Continuation of the game (2)	Continuation of the game with game motor evolution or change of platform (4)	Continuation of the game on a new-generation platform (6)
	Radical	New game concept (5)	New game concept with a new game motor (7)	New game concept on a new-generation platform (8)

☐ Exploitation activities   ▨ Exploration activities

2.2   Exploration and Exploitation Activities

Video game innovation is, as we have seen, multidimensional and hybrid. March (1991) describes this exploration as experimenting with several alternatives that provide uncertain outcomes over the mid and long term and often, ultimately, have negative results. Testing new solutions leads organizations to diverge by while exploring alternatives, thus they end up exploring new universes. Activities linked to exploration require an organization to be extremely adaptable so it can transform new concepts and skills into added value. On the other hand, exploitation is refinement and extension of competencies, technologies and existing paradigms. This activity requires organizational alignment to optimize development processes. It relies upon a stable organization and regular production of new products. This distinction between exploration and exploitation activities has been repeatedly referred to in the fields of strategic management and works on innovation (Birkinshaw and Hill, 2005 ; Lewin and Koza, 2001 ; Rothaermel and Deeds, 2004).

These activities are, none the less different in nature and require certain skills and specific organizational capacities. Tushman and O'Reilly recommend a complete

separation between exploitation and exploration activities to avoid transferring optimization techniques linked with exploitation activities onto exploration activities. (O'Reilly III and Tushman, 2004). Following this logic, units specialize in each of these activities. Structural ambidexterity, referring to the fact that this sort of organization does not favor links between exploration and exploitation activities, has been pointed out as a limit associated with this sort of organization. The ambidextrous organization proposed by Tushman and O'Reilly is based upon separation of exploitation and exploration activities into distinct structural sub-units, but is not adapted to the scale of video game studios. These small companies must manage the dichotomy between innovative exploitation and exploration in a single structure, and often with the same actors.

One way of simultaneously managing these two activities is to adopt a management-by-project approach for each aspect. Companies manage different projects that are more or less exploratory, over varying lengths of time, using a variety of management and human resource techniques that simultaneously co-exist in a single unit. Ambidexterity is thus internal to a business unit. As an example, for many years the studio LEXIS NUMERIQUE produced a children's series called "The adventures of Uncle Ernest". In parallel, this studio also produced a portable phone game. They innovate and explore while assuring continuation of a historically successful product. Two sorts of innovation cohabit, sharing the same resources and ultimately nourishing each other.

Using the example of the biotech industry, it is also possible to externalize exploration activities via alliances. Exploitation and exploration activities are undertaken by legally separate entities that are linked contractually (Mc Namara and Baden-Fuller, 2007 ; Rothaermel and Deeds, 2004) with different companies specialized in different techniques. Here we cite Arkane Studio, a company that since its inception has pursued exploration and radical innovation in technological and editorial activities. This company develops innovative games for editors that in turn concentrate on financing, promotion and distribution activities.

The video game industry allows us to examine the management of exploration and exploitation in technological and editorial activities within small companies. Actors in this industry experience a situation where activities are both spread across a network and

localized in studios as projects. How then do companies innovate given the exploded nature of the industry, vast differences in company size, and frequent and complex innovation situations?

3. Field Observations

We observed the innovation process in ten video game studios (in operation for more than two years) that develop games for European or international markets. They are located in the Rhone-Alp and Paris regions in France. Six are independent development studios that create game concepts that they then sell to editors. The editor finances and commercializes the game, while the studio receives royalties from sales. These independent studios must not only be innovative editorially and technologically in their conception of new games, they also have to find editors to promote their games. The four other studios are producers, that is to say, they are independent and auto-finance their development projects, seeking distributors to commercialize their games. Their goal is to create a game that can spin off into further products, thus providing future opportunities to capitalize commercially and technically on their initial investment.

Table 2: Studio characteristics

	Age	size	Platform/type
Game producers			
Cyanide	4	30	PC – Sport
Kylotonn	3	25	PC- FPS
Lexis Numerique	14	55	PC/mobile – Kids, Platform/adventure
Nadeo	5	12	PC – Sport
Independant development studios			
Arkane Studio	6	30	PC - RPG
Eden Studio	8	100	PSP/PS2/Xbox/GameCube – Sport/adventure
NEKO	6	25	PS2/Xbox/GameCube/GBA/DS – Kids/platform
Quantic Dream	8	40	PC/Xbox/PS2 – Adventure/action
White Bird Production	2	16	PC- Adventure
Widescreen Games	6	64	PC/Xbox/PS2 – Adventure/action

RPG: Role play, FPS: Combat, RTS: Real-time strategy

3.1   A contrasting situation

Data analysis allows determination of the types of activities being managed internally (exploration, exploitation), the way in which they are managed (simultaneous, alternating) and the level and nature of the externalized activities. Table 3 presents the results of our field work. We find three groups:

Group 1: These studios and producers simultaneously manage exploration and exploitation activities, but most activities center on exploration. The studios in this group are: EDEN STUDIO, WIDESCREEN GAMES, LEXIS NUMERIQUE, WHITEBIRD PRODUCTION, and QUANTIC DREAM. Generally, externalization is weak, exclusively concerning artistic activities. These companies subcontract as means of managing production demand variations (annex 1).

Group 2: These producers alternate exploration and exploitation activities, primarily focusing on exploitation. Studios in this group are CYANIDE, NADEO, and KYLOTONN. Externalization is strong and is only used for artistic activities (annex 2).

Group 3: These studios only manage one type of activity. ARKANE pursues only exploration, while NEKO focuses exclusively on exploitation. Externalization is moderately strong and centered on artistic activities (annex 3).

Table 3: organization of exploration and exploitation activities

	Studio	exploration and exploitation activities	Externalization
G1	WHITE BIRD PRODUCTION	The studio simultaneously integrates both activities. A team created a new game while developing a new motor, while another team created a new game with the same (new) motor.	STRONG - artistic: content production. Technological : game motor, middleware
	EDEN STUDIO	Simultaneous management of the two types of activity. Currently the race game team is creating a new on-line game while the action game team is working on the extension of a game on a new generation platform.	MODERATE – artistic: graphics and sound
	WIDESCREEN GAMES	Simultaneous management of the two types of activity. Currently, one team is working on the sequel of a game with evolution of the games' motor, while the other team is developing a new game on a new platform.	WEAK - artistic: sound only
	LEXIS NUMERIQUE	Simultaneous management of the two types of activity. Currently, one team is developing the continuation of a game using the same motor while the other team develops a new game with a new motor.	MODERATE - artistic: sound and part of the conception - technological: middleware.
	QUANTIC DREAM	Preparing the continuation of a game while developing a new game on a new platform. The studio simultaneously integrates exploration and exploitation.	WEAK - artistic: sound only
G2	KYLOTONN	Creation of a first game with new game motor, while also preparing the continuation of the same game. The team is focusing on the exploration activity while also starting to practice exploitation.	WEAK - artistic: sound only
	CYANIDE	Alternating management of the two types of activity. Currently focusing on the creation of game continuations, with game motor evolution. The studio pursues exploitation alternating with exploration of new alternatives on a regular basis.	STRONG - artistic: graphics, animation and sound
	NADEO	Alternating management of the two types of activity during its history. Currently focusing on the creation of game continuations The studio pursues exploitation alternating with exploration of new alternatives on a regular basis.	STRONG – artistic: graphics and sound
G3	NEKO	Several teams work on game continuations. The studio focuses on exploitation activities.	MODERATE - artistic: graphics, animation and sound
	ARKANE STUDIO	Currently developing a new game with a new motor. The team is primarily focused on exploration activities.	STRONG - artistic: scenario, game design, graphics and sound

3.2 A specific management of projects to develop exploitation and exploration

The studios in group 1 conceive of and produce games for big editors. They are part of a network of allied providers and manage their projects of exploration and exploitation in a particular way. Bringing together the two different activities in a single structure requires a specific sort of management. It demands: a climate of confidence; supporting individuals in their different activities in pursuit of goals that are both ambitious and reachable; and clear definition of rigorous rules concerning the functioning of the organization. In these studios, creativity is supported through solicitation of ideas, allowing ample time for their development, non-punishment of failure, and active group wide participation in conception, all of which develop a climate of confidence. Parallel to this, the conception process is rigorously structured by phases with clearly identified steps (pre-production, production and testing) and a succession of smaller validation phases with measurable objectives (milestones) that maintain rigor throughout the creation process. This, in addition to a policy of human resource management adapted to the context of innovation allows the coexistence of exploration and exploitation activities within a single structure.

3.3 From mono-activity to alternating management of exploration and exploitation

Within a single business unit, the studios in group 2 alternate between exploration and exploitation projects. At the start of their activity, these studios created a very innovative game, both technologically and editorially speaking. Afterwards, they built on their earlier efforts of motor development and creation of their game universe by developing a continuation or by specializing in games using identical gameplay. To counterbalance the relational asymmetry with game editors, and to avoid the need to constantly reinvent everything with each order, these studios developed a "production mentality" from the start whereby they have production rights to produce continuations or sequels to their games or they maintain intellectual property ownership rights for their creations. In this

way NADEO, CYANIDE and KYLOTONN have financed a large percentage of their games and have commercialized them country by country via small distributors.

By alternating between activities, the studios of group 2 have used two means for capitalizing upon their skills, all the while protecting their creativity and developing innovation. They externalize part of the editorial innovation and connect directly with the creativity of gamers. Allowing gamers to imagine and develop their own game universes and scenarios is an example of another means of maintaining the needed creativity for developing innovative products. A perfect example of this is NADEO. The user community didn't propose a completely new game, but the studio created new extensions for the existing game. In the game *Trackmania*, NADEO integrated tools allowing users to create content and to exchange it and distribute it across the user community. Thanks to the content creation tools, players could personalize or create their race cars, the circuits and game rules. These sharing tools made creation accessible to all and enriched the players' experiences.

3.4 Game concepts circulate more easily than techniques

Table 3 shows that studios tend to develop technological innovation internally while they externalize part of the artistic creation, the main component of editorial innovation. ARKANE is a good example of this process. Some of their screenwriters and artists are not employed directly by the company. They work in places like Los Angeles or New York where creative industries thrive and they are in constant contact with the company via internet or frequent visits. The company internally develops skills that can be accumulated, notably technological competencies. It appears that the studios externalize creative functions more easily than technological development. Even if game content, the scenario and the atmosphere are a fundamental competence of these studios, these aspects can be conceived of and developed by independent organizations and integrated during collaboration. Internalization of creative capacity, namely artistic prowess, is not prerequisite for studios to be creative and innovative, which perhaps explains (in part) the concentration of creative resources in certain cities (Florida and Goodnight, 2005).

4. Conclusion

Video game SMEs cannot separate exploitation and exploration activities into different units. We propose three lessons for managing innovation in SMEs in creative disciplines, of which the media is part. These companies face strong technological instability and severe competition that forces rapid product updating and business model evolution.

Our research suggests that these small organizations handle the tension between exploration and exploitation in an industry that creates both editorial and technological innovation by simultaneously or alternately managing these demands across different projects. These studios simultaneously manage their teams via specific management to preserve creativity and update knowledge while exploiting acquired knowledge. The alternating tension between exploration and exploitation is less intense and is spread over time. In this case companies farm out part of the editorial innovation to specialists in the field of creation or by directly soliciting player creativity.

We also find that in a technologically unstable environment, it is more difficult to separate exploration and exploitation activities into separate business units. Development processes are perpetually evolving and each new product represents, to a greater or lesser extent, exploration. In this context, knowledge rarely has time to become formalized and explicit, but rather has the tendency to remain tacit. Separation of the two sorts of activities that call upon this knowledge happens internally and externally via different projects. As described by Birkinshaw (Birkinshaw and Gibson, 2004), the company establishes a project-mode work structure and human resources management and puts in place means of supporting focus, adaptability and creativity.

Finally, the study suggests that artistic creation is more modular than is technical creation. In the conception process, small organizations manage to isolate the artistic more easily than the technical. As a result, it is easier to externalize editorial innovation as a means to manage the tension between exploration and exploitation activities. Technological creation remains in the company, crystallizing and accumulating in the employees and in the technological developments. On the other hand, artistic creation

crosses company boundaries, taking root in an open, nourishing environment thanks to mixing and melding of outside influences.

Bibliography

Abernathy, W.J. and Clark, K.B. (1996) Innovation : Mapping the Wind of Creative Destruction. *Research Policy*, 14, 265-84.

Alvarez, S.A. and Barney, J.B. (1996) Organizing rent generation and appropriation:

Benner, M.J. and Tushman, M.L. (1996) Exploitation, exploration, and process management: The productivity dilemma revisited. *Academy of Management Review*, 28, 238.

Birkinshaw, J. and Gibson, C. (1996) Building Ambidexterity Into an Organization. *MIT Sloan Management Review*, 45, 47.

Birkinshaw, J. and Hill, S.A. (2005) A Typology of Corporate Venture Units: Exploration, Exploitation and the Locus of Innovation, *AoM 2005 Meeting: A New Vision of Management in the 21st Century*ublisher, Honolulu, Hawaï, (USA).

Durand, T. (1996) Dual technological trees : assessing the intensity and strategic significance of technological change. *Research Policy*, 21, 361-80.

Florida, R. and Goodnight, J. (1996) Managing for creativity. *Harvard Business Review*, 83, 124.

Lewin, A.Y. and Koza, M.P. (1996) Empirical research in co-evolutionary processes of strategic adaptation and change: The promise and the challenge. *Organization Studies*, 22, V-XII.

March, J. (1996) Exploration and Exploitation in Organizational Learning. *Organization Science*, 2, 1-13.

McNamara, P. and Baden-Fuller, C. (1996) Shareholder returns and the exploration–exploitation dilemma: R&D announcements by biotechnology firms. *Research Policy*, 36, 548-65.

O'Reilly, C. and Tushman, M.L. (1996) The Ambidextrous Organization. *Harvard Business Review*, Avril, 74-81.

Rothaermel, F.T. and Deeds, D.L. (1996) Exploration and exploitation alliances in biotechnology: A system of new product development. *Strategic Management Journal*, 25, 201-21.

Annex 1

QUANTIC DREAM, mastery of technology and creativity

QUANTIC DREAM is part of group 1. Created in 1997, it is a development studio that makes multi platform action and adventure games (PC, PS2 and XBox) for editors. Between 1998 and 2000, it developed an action game – RPG, *Nomad Soul,* that sold more than 600,000 copies. It was the first game to integrate a rock star, David Bowie, in its scenario. With *Fahrenheit* QUANTIC DREAM developed its second game, an adventure game that had very favorable critical reviews but met with only moderate commercial success. It was an innovative game technologically by virtue of its motor creating extremely realistic 3D scenes and editorially because it was an adventure game that functioned as interactive cinema. From its creation, the studio has pursued exploration and developed radical innovation. The studio went on to develop two new projects, one for a new generation of console based on the same editorial concept as *Farenheit,* thus innovating exploration, and a second project using the existing generation of console but using a new editorial concept, thus innovating exploitation. The studio has a high level of internal ambidexterity. The creative components are integrated in the company. The studio developed methods of specific management to direct the creativity internally. It is organized in three teams: a project team, a core technology team (R&D), and a creative team. The creative team is led by David Cage, recognized as a visionary creator of video games. The team is responsible for game concepts and design and has the mission of stimulating creativity in the studio. Creativity is literally the corporate culture and the principals focus entirely on its promotion. Good ideas are systematically tested, and the necessary time and means are dedicated to their pursuit. QUANTIC DREAM has been able to develop strong technical expertise by developing its own multi-platform game motor while nurturing strong creativity amongst its teams. Its creative leader and his mode of specific management gave him total mastery of the creativity needed to develop an innovative multi-platform game.

Annex 2

NADEO, a producer in direct contact with the players

NADEO is part of group 2. It is a PC game producer that develops and edits sports games. At its creation, the studio developed a game simulating a sailing race called *Virtualskipper*. After this success, in 2004 NADEO created *Trackmania*, an auto racing series that brought together a large and very active gaming community (more than 100 sites related to the game exist that are directly managed by the players). Players exchange circuits, cars, videos of races and organize network games. NADEO capitalizes on both game concepts and technology. The studio is moderately ambidextrous internally and pursues exploitation activities, but in the past also pursued exploration activities. NADEO develops its games with a team of 10 to 15 development engineers. Initial game conception occurs internally, but the graphics are created externally. The games' "fun" atmosphere, the possibility of creating circuits and building cars as well as the ability to export video stimulate player creativity. The games allow players to create their own game and to share and play with it with others. This lets the studio place some of the creative onus for success of the game on the players themselves. NADEO's director managed to create a privileged link with the player community. He participates in the forums, first as a player, then as a developer. The director, who designed the game, serves as a translator and spokesperson between the players and the internal development team. NADEO managed to create a privileged link with the player community that has grown up around the game and the studio has connected directly with the creativity of the players. This permanent link allows the studio to exploit its technology, concentrating more on activities of exploitation than on exploration, while maintaining a strong level of creativity.

Annex 3

ARKANE, a studio that is constantly exploring

ARKANE is part of group 3. It is a development studio that creates action games on PC, RPG and FPS platforms. Between 2000 and 2003 ARKANE created *Arx Fatalis*, an RPG set in a medieval heroic fantasy universe. It was not a strong commercial success, but it brought the studio to the attention of UBISOFT. Their second game *Dark Messiah of Might and Magic* is a FPS based on a new scenario, using VALVE's new motor Source Engine. Since its beginning, the studio has not been in a situation of ambidextry, but rather has been perpetually exploring: each development project has created new concepts using a new motor. ARKANE has a 40 person team that develops its games, 30 are internal, 10 external. Part of the most creative functions, namely the script writers and concept artists are external. This externalization is done for financial reasons, the screenwriters are from the film industry and have salaries that are much higher than the typical wages in the video game field, and for geographical reasons, the screenwriters are American (very few French companies develop RPG and FPS) making it impossible to find the needed talent locally. At the end of 2005 ARKANE created an American branch to create their future games. The studio seeks out the best talent in each domain, specialized screen writers and level designers in the States and graphic artists and developers in France. The studio has thus clearly separated the productive and creative functions, localizing them in different places and using different management methods. The innovation processes from conception to development remain, none the less, radical on the whole, even if the studio foresees simultaneously capitalizing on technological development and editorial conception in its upcoming productions.