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# *Entrepreneurship, Creativity, & Organization*

*Text, Cases, & Readings*

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# **The Videogame Design Process**

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## *The Videogame Design Process*

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The videogame industry depended on game designers who combined creative artistry with technological sophistication. A typical game could take from 6 to 18 months to complete.

The design process resembled the creative people who carried it out. David Crane, a well-known and idiosyncratic designer, put it this way in a *Wall Street Journal* article: “Most of the time we’re joking. Only one out of 50 crazy ideas will ever become anything. A tree falls down, try to get out from under it—obviously, nothing will come of that. But that’s how we come up with the original game ideas.”<sup>1</sup> This same article stated:

Each designer has his own particular work habits and creative techniques. David Crane always starts by creating visual images after thinking of an idea for months—or getting struck by one overnight. He rushed back from a Chicago business trip to start work on the game *Freeway* after he saw a befuddled man trying to run across busy Lake Shore Drive in rush-hour traffic.

Mr. Miller, on the other hand, starts with concepts. “There’s a lot of discussion among the designers about what might make a good game, and we have a list of maybe 40 to 50 ideas,” he says. “Yet most of the games we do aren’t on the list. They come about because a designer gets inspired.”

Armed with an idea, Mr. Miller does some rough sketches of what he wants the playing fields of a game to look like, and he writes a brief description of how it is supposed to play. Then he retires to the mostly unfurnished living room of his nearby home, gets comfortable in a padded rocking chair, and spends days alternately staring out the window at trees and painstakingly writing an initial 10 to 20 pages of detailed computer code on small sheets of green paper.

“Writing code for me is like writing English,” Mr. Miller said. “I’m fluent in about a dozen computer languages.” Each of Mr. Miller’s late games had about 2,000 to 3,000 separate instructions which were eventually “burned” onto a computer chip to provide the look and playing features of the games.

The designer spent two months writing and rewriting computer codes, producing about 200 pages of handwritten notes, and a five-foot stack of computer printouts. Then, after getting suggestions from other designers, he programmed his work into Activision’s main computer to generate mountains, tanks, and other visual features and colors on-screen. For the next two months, he worked on playability, making the video and audio features of the game challenging without being impossible.

This case was prepared by Associate Professor John Kao.

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For the last two months, Mr. Miller and his colleagues played the game for hundreds of hours to debug and polish it. “After I finish a game, I really hate it, and I don’t want to see it again for months,” Mr. Miller says.<sup>2</sup>

Atari came up with its own way of dealing with the creative process. One industry historian recalled, “Many of the best times occurred not in Sunnyvale, but at Atari’s think tank in Grass Valley in the Sierra foothills, where Nolan Bushnell, founder of Atari, sent his brightest employees to consider the company’s future. Hot tubs, pot, and private shuttle flights between the two valleys were the modus operandi there—or so legend has it.”<sup>3</sup> One designer described Grass valley as “a place to dream up new ideas in a very unstructured work environment. It’s very imaginative. Most of Atari’s best ideas came from there.”<sup>4</sup> Nolan Bushnell spoke about Grass Valley in these terms: “The basic architecture for everything came from there. Oddly enough, the engineering department at Atari was constantly sniping at the Grass Valley operation, and vice versa. They basically detested each other. According to the Sunnyvale crew, Grass Valley was full of prima donnas who couldn’t make anything work—which was true in part, but they happened to be good technologists. Excuse me—great technologists.”<sup>5</sup>

Bushnell, who planned a comeback in the videogame business when his noncompetition agreement with Atari expired, commented on Atari’s design process: “Atari’s done everything right in manufacturing and marketing. But it’s done poorly in designing. Their current equipment is obsolete because it was designed nearly eight years ago and hasn’t changed at all.” Atari’s approach, as he saw it, lay in creating better games and graphics for more exciting games. But that was not a strategy, declared Bushnell. “That’s ‘innovate me some more like you did last year’ and that’s wrong. They should be doing what I’m going to do.”<sup>6</sup>

David Sudnow described the creative environment at Atari in the following terms:

There I was on the Atari premises, and here were these rather speedy and excited young guys and gals in jeans and sneakers with Rembrandt prints and psychedelic posters in their offices, pianos and guitars lying about, Bartok coming out of this room, the Stones out of that, more TV sets going at once than in ten Sears, Roebucks put together, more technology and color and instruments and charts and sounds and knobs and controls and computers of every conceivable description than you’d ever see under one roof outside Silicon Valley, programmers literally sleeping in vans in the parking lot so they’d stay close to their consoles. And with the enthusiasm and animation any corporate manager would give away his American Express card for, they’re laying out the lovely little grammars of these microworlds for me, speaking with such expertise and command and exhilaration as we went through the rundown of strategies and angles and hints, I figured myself in the presence of an artist’s colony of the first magnitude, Black Mountain of the eighties, everyone working their brains off, chipmunks chipping away colors, movements and sounds into a whole marvelous assortment of new instruments.<sup>7</sup>

Lee Hauck, a noted game designer with Gremlin Industries, had his own point of view on the game design process:

He learned what didn't work—brainstorming sessions, for instance. "They've been absolute disasters. Games by committee are like most things by committee." He had a concept of what made a good game designer. "A lot of them come from computer disciplines. But they might come from other places, too, like people who write cartoons." The ability to work within the limitations of the medium is critical. "A movie screenwriter probably wouldn't work out, because in movies he doesn't have the problem of making it run on cost-effective hardware. Anything you want to do in a film you can do. But here it's gotta be achievable at low cost."

Hauck said Gremlin has a number of company game design groups. "But mainly we're looking to our programmers to supply ideas. If anybody even looks like he has an aptitude for games, we give him his head, let him do whatever he wants for a while." He estimated that ninety-five percent of such efforts hadn't succeeded. "But you only need a few winners to justify it. The trouble with creativity is that you can't teach it and you can't schedule it."

Hauck had strong convictions about those things that historically had fueled his own creativity. "I'm a big believer in the subconscious. The times when I've created the best is when I'm working the hardest doing the most. Going to seminars, reading books. Listening to jazz. Talking to people. Walking around arcades. The more inputs you can cram into your subconscious, the more it works for you, and pretty soon the ideas start coming."<sup>8</sup>

Alan Alcorn, one of Atari's original designers, felt that constraints stimulated creativity. In his words, "you get more juice out of a lemon when you squeeze it."<sup>9</sup>

According to an article in *Business Week* on the videogame design process:

Ideas begin in brainstorming sessions, normally held somewhere away from the company. No idea is too far-fetched, because no one knows what crazy idea will set off sparks in someone else and ignite the next hit game. "We talk about a Halley's comet game, for example," says Siu Kuen Lee, an Atari designer, "that would show a black screen and once every 76 years a light would flash across." This may sound far-fetched, but so did a multisegmented worm—an idea that led to one of the top games of 1982, Centipede.

Ideas can also come from other games, noted Larry Kaplan, a vice president at Atari. "To write a good game is difficult. It takes a long time, a lot of test marketing."

Robert Brown, vice president of engineering for Starpath in Santa Clara, California, said, "One way we choose games to design is by seeing what categories are popular in coin-op [arcade] games and trying to develop something in that category that is a new twist."

Game ideas also come from movies—directly, as when Disney got in touch with the Midway Manufacturing Co. of Chicago, a Bally subsidiary and asked it to design a game based on the movie *TRON*. "It gets to the point where you can't get through a movie without thinking, "Boy, that would make a good game," observed Bill Adams, director of games development for Midway.

Game ideas also come from real-life situations, particularly sports. "Sports games are easier to do," said Bob Whitehead, cofounder of Activision, "because they are well defined. A more original game has to evolve, so it takes more time."

Reality can also present a pitfall for a game designer, because mistakes are obvious. At Atari, a game nicknamed Foul Ball reached the marketing testing

stage before anyone discovered that the designer, who did not understand the rules of baseball, was treating strikes as balls.

Some designers start with a picture rather than a concept for game play, then think of ways to interact with their graphics.

"I got interested in drawing pictures," said John Perkins, who designed *Artillery Duel* for Astrocade, Inc., Columbus, Ohio. "I started out with a desert and put cactuses all over it, then I drew a hill and put rocks on it, then trees. The idea for the game, shooting over the mountain, evolved as a way to interact with the scenery."

One complaint of game designers who left Atari is that too many game ideas were originating in the marketing department. "A videogame is a creative thing, like an artist with a palette full of colors," said Mr. Alcorn, who is still under contract to Atari, but on the inactive roster. "The artist has control of the medium; I can smear paint on a canvas, and it's not going to look like a picture. Take a marketing guy, someone who is nontechnical and doesn't understand the medium, he tries to design a game, and it's inefficient."

One example of a marketer's idea for a game, Mr. Kaplan says, is *Polo*, designed by Carol Shaw, a former Atari designer who is now with Activision. Mr. Kaplan related, "Ray Kassar [president of Atari] was into cosmetics. 'Hey,' he said, 'cosmetics is a \$4 billion industry. Why can't we get a piece of that with videogames?' Warner commissioned clothing designer Ralph Lauren to come up with a perfume and put his name on it and call it *Polo*. They had a line of cosmetics and wanted this *Polo* cartridge as a come-on in the stores." The perfume was not a hit on the market. The videogame was not sold.

If marketing people cannot always identify a good game, engineers are quick to admit that they cannot either. Engineers often love games that the public hates, and are bored by games—like *Pac Man*—that the public loves.

After ideas are generated and a priority list is drawn up, designers choose or are assigned an idea from the list. Perhaps half of the ideas are eventually attempted as games, says Lyle Rains, an Atari vice president for coin-op. Half of those or less are completed, he says and half again are produced.

Graphics artists become involved, doing storyboards for game ideas and working with designers to develop the graphics that will be put up on the screen. In the early days, artists were not necessary—paddles and a ball did not take much artistic ingenuity—but game graphics today have much more detail. Some programmers are artistically talented and will design their own graphics, and this can work very well, because they know the limitations of the system. But Roger Hector, president of Videa and a graphics artist, says it is difficult to find people who are both technically competent and artistically creative. The solution lies in a team approach.<sup>10</sup>

## VIDEOGAME DESIGNERS

In a review of videogame designers, the editors of an engineering industry publication wrote:

The videogame industry is a test bed for engineering design in which there is no cookbook to design from. The research-and-development cycle must be kept short—under six months. Designs are personal. Designers admit they sometimes cannot read each other's code or even each other's schematics.

According to industry sources, there were only 100 full-time videogame designers, and of those, only about 20 in the United States were considered superb.<sup>11</sup>

What made a good videogame designer?

“You have to be a good engineer,” said William Grubb, president of Imagic. “You have to have specific knowledge of that microprocessor you’re working with and that comes from formal education and experience; it takes time to learn the idiosyncracies of the system. And you have to be able to combine art with engineering, to be able to understand what is fun, what will titillate your markets. Not every engineer used to thinking logically has that ability.”

Donna Bailey, who designed Centipede for Atari . . . agreed, saying, “There’s a lot of trendiness and pop culture that goes into games. Many programmers have trouble with that so they can’t do games.”

According to an Atari promotional videotape, a designer had to be an engineer who was also an artist and a musician. “You can’t do games if you are a scientist type; you have to think artistically of what the computer can do,” one Atari designer said. “I’m creating a world in which my game will live.”

People moved into the games industry from many engineering places—automotive, electronics, instrumentation, larger computer systems, defense, and semiconductors to name a few. Many engineers joined the industry straight out of college.

Game designers were difficult to stereotype. “This industry takes all kinds,” said Alan Alcorn. “You must have the ability to work with some very perverse people, because the best take strange forms.”

On the one end, he said, are people like Steven Jobs, now president of Apple Computer. “He showed up on our doorstep, and the personnel lady said we should either call the police or hire him, because he’s brilliant,” Mr. Alcorn recalled.

Harold Lee, who designed the first game on a single chip for Atari, “came out of the hills of Los Gatos dressed in leather like a Hell’s Angel and said he was going to work with us,” Mr. Alcorn continued. “He drove a chopper to work and drank Ripple wine.”

On the other end of the spectrum were people like Robert Brown, a former Atari employee and executive vice president of Starpath. He had a Ph.D., was bespectacled, and a very straight guy, Mr. Alcorn noted.

Once designers got into the games industry, it was hard to imagine them doing anything else. Brian Johnson, a designer with Fox Video Games, said, “I’ve thought it might be fun to come back in the next life as a rock ‘n’ roll singer, and videogames seemed as close as I’ll get to that in this lifetime.”

Were videogame designers the new generation of pop stars? Activision promoted its designers heavily. Jim Levy said he considers game designers “rock stars.”

Atari, on the other hand, never willingly released the names of its game designers, some said for fear that they would be hired by another company. The Atari designers liked a little recognition, so they often buried their names in their games. It took work and memory that would have been used for additional game features, but they considered themselves artists, and artists signed their creations. Atari used to review games and take the signatures out; they have stopped that policy.

Designers learned to hide their tracks and beat the censors anyway.

Larry Kaplan, Atari vice president of product development, said he designed Superbreakout for the Atari 800. After a certain sequence of keys, the screen displayed: “I love Suzie and Benji too.” He listed other signed games for the Atari VCS: Adventure with Warren Robinett’s signature in a secret room; Yars Revenge with Howard S. Warshaw’s initials appearing at one point and ending the game; Defender with the attackers turning briefly into Bob Polaro’s initials very late in the game; and Missile Command, with Bob Fulop’s initials appearing if the player loses the game immediately in game 13.<sup>12</sup>



Perhaps the most divergent approaches to dealing with and motivating creative people were those of Imagic and Activision.<sup>13</sup> Imagic stressed team projects and market testing. Designers wrote computer motion and control programs, but graphics and sound effects were created by other specialists. Imagic also emphasized interaction between marketing and design staff. Product development made use of collective brainstorming sessions followed by concept testing, in which storyboards and game descriptions were produced and tested with a group of young players. Activision, on the other hand, stressed the independence of the creative designer. Fewer than ten nondesigners had access to the design lab. Each designer was responsible for all aspects of game creation, although designers frequently consulted with each other.<sup>14</sup>

Many other philosophies existed about how to select and motivate talent. For example, Namco, a Japanese videogame company, had an unusual approach to finding the people it needed. It advertised in magazines for reformed juvenile delinquents and grade-C students. Masayo Nakamura, president of the company, stated, "For game designers, the knowledge acquired in school is not so helpful. I want people who think in unusual ways, whose curiosity runs away with them, fun-loving renegades."<sup>15</sup>

On the topic of creativity, Nolan Bushnell stated, "I believe that there is no real correlation between hard work and good results. I think good work is an effective blend of leisure and work. You need leisure for perspective and work for execution, but all execution and no perspective will give you a bad product. I want all my engineers to have that perspective, even more than I want them to work hard—which may be a funny thing to say."<sup>16</sup>

An important trend in videogame design rested with the increasing sophistication of frameworks aimed at explaining the psychological phenomena common to all videogames. Chris Crawford of Atari described key variables in terms of pace, endowing the computer with the ability to produce "reasonable behavior" in response to human opponents, and limiting the information that is available to the player.<sup>17</sup> Malone of the Xerox Research Center spoke of variables such as the meaningfulness of game goals, the uncertainty of outcomes, the multiplicity of goal levels, the randomness of the program, the use of hidden information revealed selectively, fantasy, surprise, and appeals to curiosity.<sup>18</sup> Definitive studies on videogame psychology awaited the next generation of research.

The future of videogame design may be profoundly affected by new technology. Reports indicated that software to help players design their own games is now available. One such product, *The Arcade Machine*, was a software package for the Apple and Atari home computers that retailed for \$59.95. A "shape creator" developed visual images in various colors. The program also created "explosions" and defined the playing field through a routine called the "path creator." Time limits and target scores could be altered. A "load save" feature allowed the weary game designer to break for food and sleep.<sup>19</sup>

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