XEROX, APPLE, AND MICROSOFT:
The Myths and The Truths

PARC research facility at Palo Alto, California

The personal computer, or PC, is undoubtedly one of the greatest inventions of the modern world. And while Apple and Windows hold 90% of the overall operating-system market share (source), the innovations that allowed them to lead the industry were fully not their own. This article attempts to shed light on the story which is as famous as it is misunderstood: How Xerox was Xeroxed.

The brand name Xerox signified photocopying in the US, circa 1950, just like Colgate is a stand-in for toothpaste. Using the electrophotography technique, patented by law student Chester Carlson, the Xerox Corp. was the world's first company to outsource printing on a global scale and subsequently become the industry titan in the copier world. They had invented the first commercial copy machine, Xerox 914, in 1959 and spent an entire decade creating a monopoly, which owned almost 85% of the total market share across the States, gaining over 50 crore rupees in sales each year.

Although, by the end of 60s, Xerox's patents eventually expired and the management sensed the threat of cheaper companies from Japan (like Canon, Ricoh, and Sharp) overtaking their technological advantage and challenging their dominance. An additional worry stemmed from the fact that a paperless office trend might engulf the coming generations, implying the demise of a company that existed on paper.

Given the circumstances, Xerox gave a blank cheque to their chief scientist Jack Goldman to bring any new technology that could help the company to gain its previous position. Thus, the Xerox Palo Alto Research Center, or PARC for short, was born in 1970 in California. PARC's former researcher and Adobe co-founder John Warnock quotes "*The atmosphere was electric – there was total intellectual freedom.*"

Founding members at PARC's office

In this creative environment, the PARC researchers, who were the brightest in their fields and had been recruited from Stanford, MIT, and top tech firms, started their work. Within two years, they had designed the "Alto", which resembled the first personal computer. Alto was very much different than all the other computers then. At that time, user had to manually type in all the commands into a command line program. But Alto had an interactive interface called the Graphical User Interface (GUI).

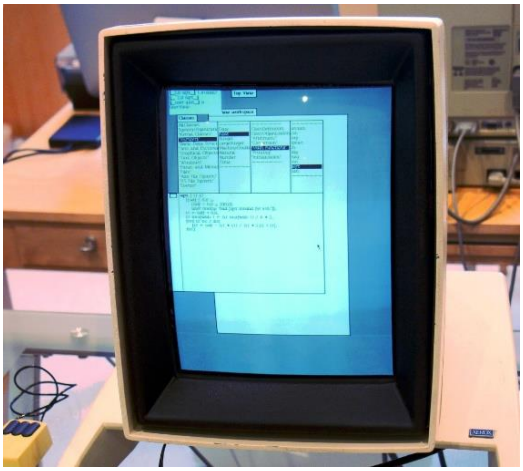
The Xerox Alto

Mouse and Keyboard

"*A mouse. Removable data storage. Networking. A visual user interface. Easy-to-use graphics software. 'What You See Is What You Get' (WYSIWYG) printing, with printed documents matching what users saw on screen. E-mail. Alto for the first time combined these and other now-familiar elements in one small computer.*" - source

Total production for Alto was about 2000 units. By the late 70s, around 1000 systems were in use at several Xerox labs and about another 500 in various universities. Xerox lead engineer Charles Thacker stated that the first unit cost the company $12,000 and for selling, the price tag might have been $40,000.

The commercial release of the computer in 1972 introduced the world to the first desktop computer with an interactive Graphical User Interface experience. Named after PARC's home city Palo Alto at California, the computer featured a window-oriented mouse and keyboard interface that we still use today. It also had facilities like email, word processing, and event reminders - all controlled by the cursor. Simply put, Alto was well ahead of its time.



The famous Graphical User Interface or GUI

But, even after all these technological advancements there was only one problem, and that alone was the cause of what Xerox is today and what it could have become.

The Xerox management was not interested in any of the PARC's inventions. The company managers at upstate New York saw no reason to focus on anything other than its massively successful line of copier machines, they were too blind to see any of these marvelous developments. As per them, the Alto was an "*overly complicated workstation*" that would cost $40000 per piece. The only thing Xerox managers were interested in were the printer and copier innovations. While they did eventually get what they wanted in the form of the new Xerox 9700, the developers of PARC were far from happy. As it seemed like all their breakthroughs had gone to waste, some of the researchers left the company while some joined the other rising tech firms at Silicon Valley.

Although in the middle of all these chaos, PARC made some name among the technocrat people, and this is where Apple and Steve Jobs came into the picture.

At that time some of the Apple engineers already knew about PARC and its technologies like the ethernet or mouse. Bill Atkinson, an engineer from Apple, during his undergraduate, had heard about "Smalltalk". Smalltalk is an object-oriented programming language designed by Alan Kay, Dan Ingalls, Adele Goldberg. These PARC scientists had implemented this programming language in Xerox Alto's operating system. And along with Atkinson, there were some more Apple employees whose had learned about the mouse technology eventually.

In 1979 there were two visits by groups from Apple to PARC. Steve Jobs was on the second one. Initially Jobs was very skeptical of the whole thing and refused to visit PARC himself as he was busy with Apple's Lisa and Macintosh projects at that time. But after many of the Apple employees went there to see the technologies, he agreed to go, and the rest is history. This trip was the turning point to the life of Jobs and Apple. The three technologies that he had encountered, were each groundbreaking on their own - the first Graphical User Interface for computers, inter-networked Alto computers, and Smalltalk object-oriented programming. Jobs stated "*I was so blinded by the first thing they showed me, which was the graphical user interface. I thought it was the best thing I'd ever seen in my life.*" Here's the 1995 interview clip of Jobs talking about his visit to Xerox PARC: video

After the initial meeting, Jobs arranged for the entire programming team from Apple to be given full technical and theoretical demonstrations. And in exchange of that, he proposed a deal to sell 100,000 shares of Apple for a million dollars to Xerox. Some people at PARC thought that this whole idea was nothing but madness, but eventually Xerox accepted the deal. He was given a couple of tours and he ended up standing in front of the Alto, PARC's prized PC.

Adele Goldberg, one of the researchers of PARC at that time and founder of PARC Place Systems, already suspected what Jobs' visit means, and what his intentions behind all this could be. She also tried strongly to warn the managements of Xerox about this. Although Jobs had no idea that Goldberg had tried to convince her bosses against doing the presentation. She argued against doing it for three hours.

"*He (Steve Jobs) came back, and I almost said 'asked', but the truth is 'demanded' that his entire programming team get a demo of the Smalltalk System and the then head of the science center asked me to give the demo because Steve specifically asked for me to give the demo and I said no way. I had a big argument with these Xerox executives telling them that they were about to give away the kitchen sink and I said that I would only do it if I were ordered to do it cause then of course it would be their responsibility, and that's what they did.*"

- Adele Goldberg

Adele Goldberg

Larry Tesler

Another scientist from PARC, Larry Tesler, who also took part in the demo quoted,
"*After an hour looking at demos, they understood our technology and what it meant, more than any Xerox executive understood after years of showing it to them.*"

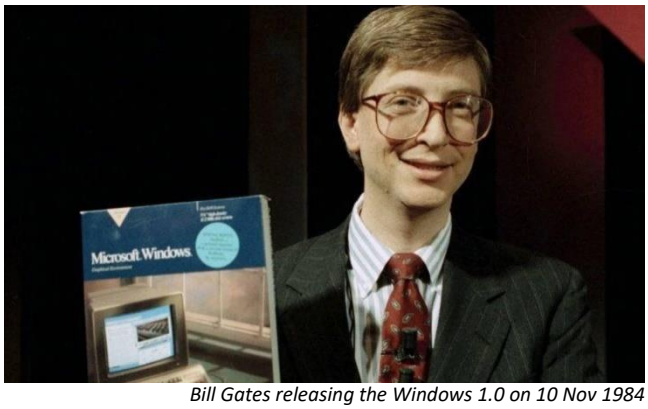
Here's a clip of him talking about the event: video

Now at the same time, in the early 80s, Steve Jobs needed help from Bill Gates for Apple's Macintosh project. Microsoft, a company that had designed the MS-DOS operating system for IBM PCs, was invited to be the first third party software developer for the upcoming Macintosh. Andy Hertzfeld, a then Apple engineer and author of "Revolution in the Valley: The Insanely Great Story of How the Mac Was Made", tells that when Apple recruited Microsoft, Jobs feared that "*it might try to copy our ideas into a PC.*"

Bill Gates and Steve Jobs in 1981

Much like Apple, some of the PARC employees also choose Windows after Xerox, and Bill Gates was also well aware of the Xerox Alto and its other innovations. Steve Jobs knew this, and he made Microsoft sign a contract as a part of their deal in 1981. "*Steve made Microsoft promise not to ship any software that used a mouse – until at least one year after the first shipment of the Macintosh*", says Hertzfeld, which the contract stated would happen in 1983.

But the release date of Macintosh got pushed back and it would not debut until 1984. Meanwhile in November 1983, Microsoft took this advantage and made a surprise announcement at Comdex, the then industry's premier trade show. Microsoft had made a new operating system for PCs using an exact interface like the Mac's – "Windows". Along with it, a mouse-based word processor called the "Microsoft Word".



Bill Gates releasing the Windows 1.0 on 10 Nov 1984

Now, that was another aspect of the story involving another brilliant engineer from the Xerox, Charles Semonyi, who was an integral part of the Bravo program, which was a very basic form of what would later become the MS Word. During Xerox's downgrading phase, along with many other scientists Semonyi also was approached by Gates and later hired him.

He was mainly hired to build the very first version of the Microsoft Office Suite from his work at PARC on the bravo project. Regardless to say that this was a grand success and until this day MS Office Suite still remains one of the flagship products of Microsoft. According to their 2021 financial year, it made up almost 25% of the Microsoft's total revenue (source).

Charles Semonyi using the Xerox Alto

But Jobs just "went ballistic", he demanded an explanation saying, "*I want him in this room by tomorrow afternoon, or else.*" Later when Gates came alone, he found himself surrounded by Jobs himself and 10 other Apple employees. "*You're ripping us off!*" Jobs shouted.

But Gates looked him in the eye and said something that the tech world would remember forever: "*Well, Steve, I think there's more than one way of looking at it. I think it's more like we both had this rich neighbor named Xerox and I broke into his house to steal the TV set and found out that you had already stolen it.*"

Because of all these, in 1988 Apple sued Microsoft. But Gates was not legally wrong, one could argue about the moral aspect of this, but legally Gates never broke any of the signed agreements. As a result, six years later the court threw the case out, and cleared Gates of any wrongdoing.

Now the most important question here is whether we can consider what both Steve Jobs and Bill Gates did as theft. Actually, they have done nothing wrong, or didn't steal anything from anyone. One could say that they were inspired by the ideas and innovations of PARC. But as James Turner says, "*literally no code was taken, I mean not a single line of code.*"

And later when asked about it, Bill Gates said "*The main 'copying' that went on relative to Steve and me is that we both benefited from the work that Xerox Parc did in creating (the) graphical interface - it wasn't just them but they did the best work*", during an AMA (Ask Me Anything) session on Reddit (source).

One more thing to mention is that PARC was not the first research center Xerox had. They had already one in Rochester, New York, where the head quarters were located. And they were focused on expanding the company's copier business. And this was the major problem, the 3000-mile distance between the Xerox headquarters in Rochester and PARC in Palo Alto, California made it hard for communication between the PARC team and the managers in the New York. Also, the management was only interested in the ideas that could help Xerox to sell more printers and no new innovations.

But nevertheless, it's obvious that without the contributions of Xerox PARC, many of the technological we take for granted today, would never have been possible. It was responsible for more than 4 trillion dollars of market cap innovations, but today Xerox's market cap is just 2.5 billion dollars. As Jobs said, "*it could have been as big as IBM plus Microsoft plus Xerox combined and the largest high-technology company in the world.*"

I would like to end this article with a quote from American philosopher Ted Nelson which summarizes the whole story in one line. He says, "*In order to sell the printers, they threw away the universe.*"

- by

Suvankar Das

MCA, Siliguri Institute of Technology

Email: suvankar_das@outlook.com
LinkedIn | GitHub