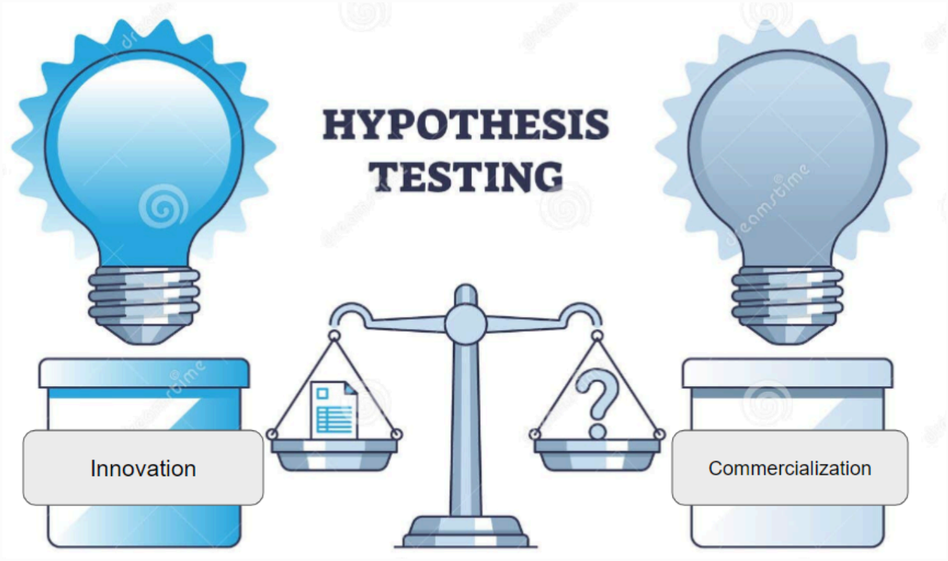
EVOLUTION OF GUI

A Case Study of XEROX, Apple, IBM & HP

Hypothesis

"Does innovation alone lead to success?”



We will present a compelling case study of four iconic companies: Xerox, Apple, IBM, and HP, and their journey in developing and commercializing Graphical User Interfaces (GUI).

Scope of the project

- Evolution of GUIs
- Key Innovations and Principles
- Financial Impact
- Market Appeal and Commercialization
- Unconventional Approaches

Case Study Methodology

Triangulation:

Case analyzed from **Technological**, **Financial**, and **Strategic Perspectives**.

Data Collection:

Use of diverse data sources:

- **Historical Records** (e.g., GUI technology development timelines).
- **Financial Reports** and **Market Data**.

Reasoning Approach: Abductive Reasoning +

What is GUI?

A **Graphical User Interface (GUI)** is a way for users to interact with computers or devices using visuals like **icons**, **buttons**, **windows**, and **menus** instead of typing commands or using text-based interfaces.

Timeline

Year	Event	Details
1973	Xerox Alto	The first system with a GUI featuring a mouse, windows, and icons. Not commercially available but highly influential.
1979	Steve Jobs Visits Xerox PARC	Jobs observes Xerox Alto’s GUI innovations, influencing future Apple products.
1981	Xerox Star	The first commercially available GUI-based system with windows, icons, and a mouse. It failed due to high cost and poor marketing.
1983	Apple LISA	LISA was launched on 19th Jan. It is widely regarded as the first mass-market personal computer with a graphical user interface (GUI).
1984	Apple Macintosh	Priced at $2,495, featuring a cost-effective, user-friendly design with GUI elements inspired by LISA.
1985	HP 9000 Series 300 Workstations	Introduced early graphical interfaces, building on HP's workstation technology.

Interaction of Xerox and Apple

- Engelbart conceptualized the GUI and developed the first prototype, the NLS (On-Line System), at Stanford Research Institute (SRI).
- Xerox PARC developed Alto, the first computer system featuring a GUI with windows, icons, and a mouse. However, it was used only in research settings and was not commercially released.
- Steve Jobs with Apple team visited Xerox PARC, for a demo of Smalltalk on Alto. Jobs offered Xerox **1 00,000** pre-IPO Apple stock worth **1 million** dollars win exchange for a demonstration.
- Adele Goldberg resisted the demo but was ordered by Xerox executives to proceed.

> *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 centre 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, Founder, PARC Place Systems

- Apple integrated Xerox's GUI ideas into LISA, the first commercially available GUI-based computer, followed by the more affordable and successful Macintosh, democratizing the GUI for the public.

Name or Identity of Group	Shares Owned		Shares to Be Sold	Shares to Be Owned After Sale	
	Number	Percent		Number	Percent(1)
Broventure Company, Inc.	200,000	.4%	5,000	195,000	.4%
Continental Illinois Venture Corporation	1,792,000	3.6	224,000	1,568,000	2.9
Fifty-Third Street Ventures, Inc.	240,000	.5	40,000	200,000	.4
First Century Partnership	380,952	.8	100,000	280,952	.5
Hellman, Gal Investment Associates	600,000	1.2	100,000	500,000	.9
~~Hixon Venture Company~~	~~362,864~~	~~.7~~	~~51,000~~	~~311,864~~	~~.6~~
Xerox Corporation	800,000	1.6	80,000	720,000	1.3
Total	4,375,816	8.7%	600,000	3,775,816	7.0%

Image from the Apple Computer IPO prospectus

Larry Tesler telling about the Steve Jobs Visit to PARC

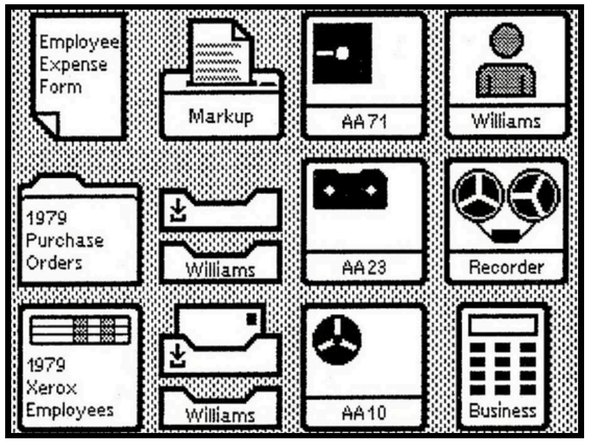
Hitesh

Key Innovations & Principles

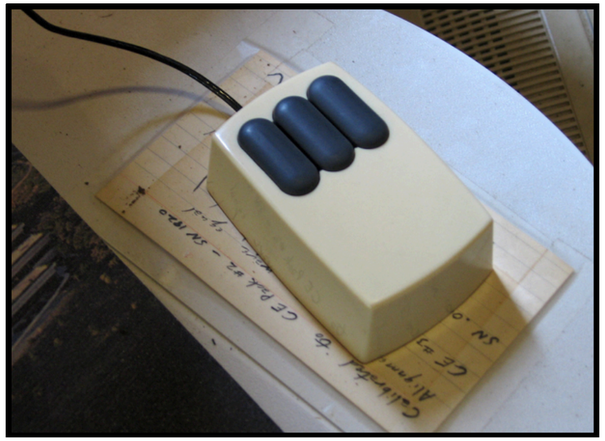
XEROX
-Innovation of GUI changed the computing world
-It changed how users interact with a machine
-**WYSIWYG** (What You See Is What You Get)

Features:

- Overlapping windows
- Icons
- Mouse pointer



XEROX Alto GUI



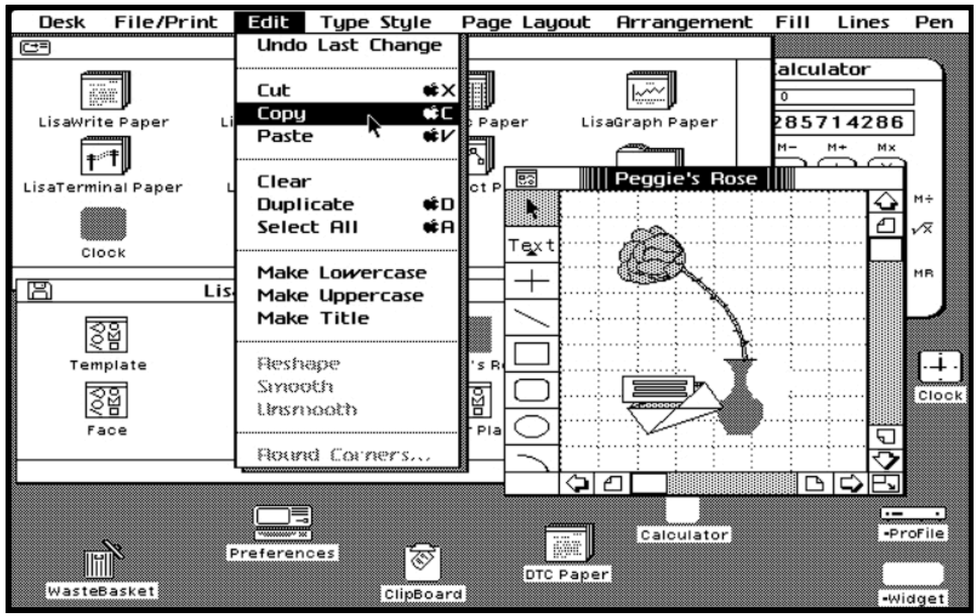
XEROX Alto Mouse

Key Innovations & Principles

APPLE

- The first GUI based computer released for commercial market segment
- Price : $9,995
- LISA had much improved hardware compared to XEROX Alto, thus improving computation.

  Macintosh brought GUIs to the public market segment.
- Price - $2,495 at a much lower price compare to LISA.
- Apple Macintosh introduce features like:
  - Icons and Overlapping Windows
  - use of mouse navigation
  - Introduced Menu Bar and Pull Down Menus
  - Improved Hardware and Display.
- It made computer much more user friendly for everyone even for non tech-users



GUI design of LISA

Key Innovations & Principles

HP

- HP 9000 series 500 workstations were released (in 1982).
- HP-150 was one of the earliest computers to incorporate a touchscreen GUI.
- It used infrared technology to detect touch.
- This was a precursor to the touch-based interfaces widely used today.

HP 9000

IBM 650

IBM

- IBM was the first successful commercial computer designed initially as an extensionof the IBM punched card system.
- BM collaborated with Microsoft to develop OS/2, including a later version of GUI. (1987)
- IBM's innovation was in making GUI systems more accessible for businesses and professionals, emphasizing multitasking and stability

COMPARATIVE ANALYSIS

Feature	Processor	Memory (RAM)	Storage	Display	Input Devices	Operating System
Apple Lisa (1983)	Motorola 68000 @ 5 MHz	1 MB	5 MB hard drive, dual "Twiggy" 5.25" floppy drives	12-inch monochrome (720 x 364 pixels)	Mouse (single-button) and keyboard	Lisa OS
Apple Macintosh (1984)	Motorola 68000 @ 7.8 MHz	128 KB	400 KB 3.5" floppy drive	9-inch monochrome (512 x 342 pixels)	Mouse (single-button) and keyboard	Macintosh System Software
IBM OS/2 (1987)	Intel 80286 @ 6-12 MHz	256 KB - 16 MB	Hard drive support (varied capacities)	Typically used with VGA, EGA, CGA monitors	Mouse and keyboard	OS/2 (later versions also supported Windows)
Xerox Alto (1973)	Custom CPU (microcoded Data General Nova-like)	128 KB	2.5 MB removable cartridge hard disk	(606 x 808 pixels) monochrome	Mouse (3-button) and keyboard	Alto OS (custom)
Xerox Star (1981)	Motorola 68000 @ 8 MHz	384 KB	10 MB hard disk, 8" floppy disks	(1024 x 808 pixels) monochrome	Mouse (2-button) and keyboard	Star OS (custom, influenced by Alto)
HP 9000 (1982)	Motorola 68000 @ 8 MHz (initial model)	256 KB - 16 MB	5 MB or higher hard drive	(1024 x 768 pixels) monochrome or color	Mouse and keyboard	

Financial Impact

XEROX

- **Alto Development and Limited Impact:**
  Production (Initial)= 80 units @ $10,000
  Total Production(10 years) = 2,000 units $32,000 per unit.
- **Xerox Star System and Pricing:**
  The Xerox Star=25,000 units @ $16,000 per unit
- **Low Market Penetration and Performance:**
  Xerox Star's sales were relatively low. High cost led to failure.
- **Missed Commercial Opportunity**

Apple

- **Significant R&D Investment:**
  Lisa's R&D expenses totaling $50 million.
- **Stock Dilution**

Public offering price(1)		$22.00
Net tangible book value, before offering(2)	$ .42	
Increase attributable to payments by new investors	1.53	
Pro forma net tangible book value, after offering		1.95
Dilution to new investors(3)		$20.05

- **Pricing and Sales:**
  Lisa(1983)= $9,995(Failure Due to High Price)
  The Lisa 2 (Competitive Prices)
  Lisa 2/5 =$3,495
  Lisa 2/10 = $5,495.
- **Macintosh Pricing and Sales**:
  Macintosh (1984) = $2,495 ,affordable than the Lisa.
  Strong Sales: 70,000 units sold within the first 100 days.
- **Long-term Impact:** Despite the initial high costs and stock dilution, the investment in GUI technology paid off.

Financial Impact

IBM

- **Pricing and Sales:**
  - IBM PC (1981) =$1,565 Sold 200,000 by 1982
    (low production costs.)
    market share drop from 40% in 1984 to under 25% by 1987.
  - OS/2(1987)

Low Market Penetration, high development costs, captured only 10% of the market by 1994, compared to Windows' 80%.

  - ThinkPad(1992) =$ 4,350
    Sales:1 million units by 1995,
- **Stock BuyBack** (1985-1990)

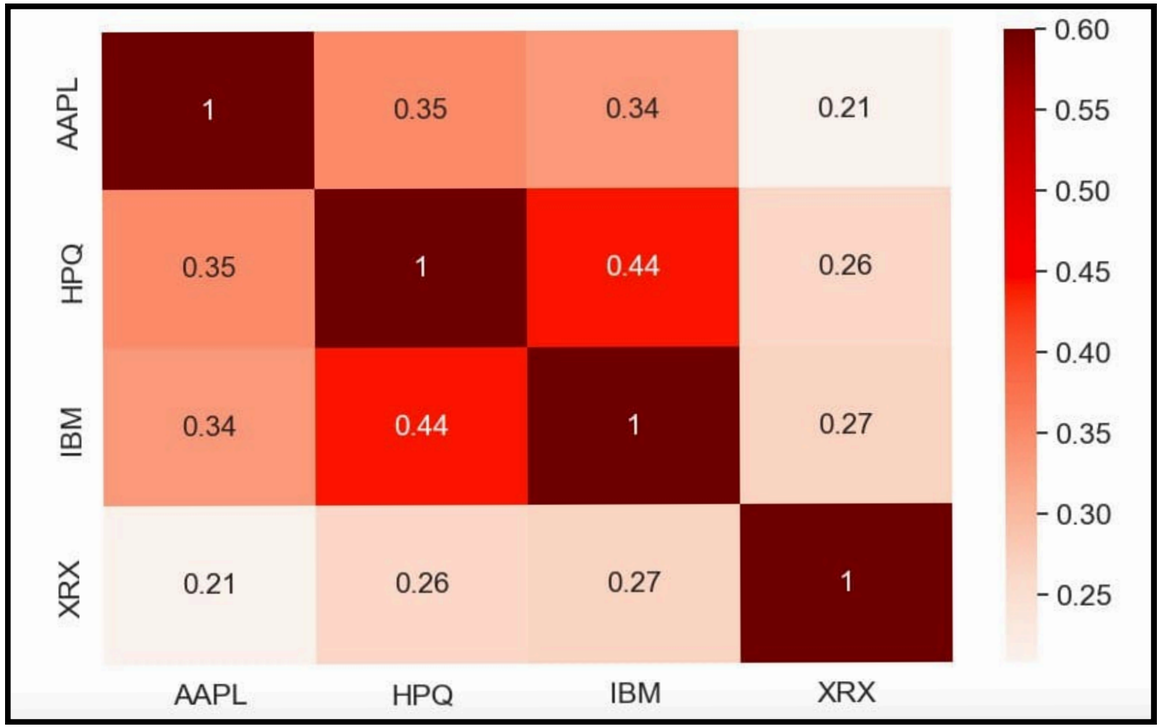
Buyback of 50 million shares reduced its capitalization by 8%, but a 75% stock price drop followed.

HP

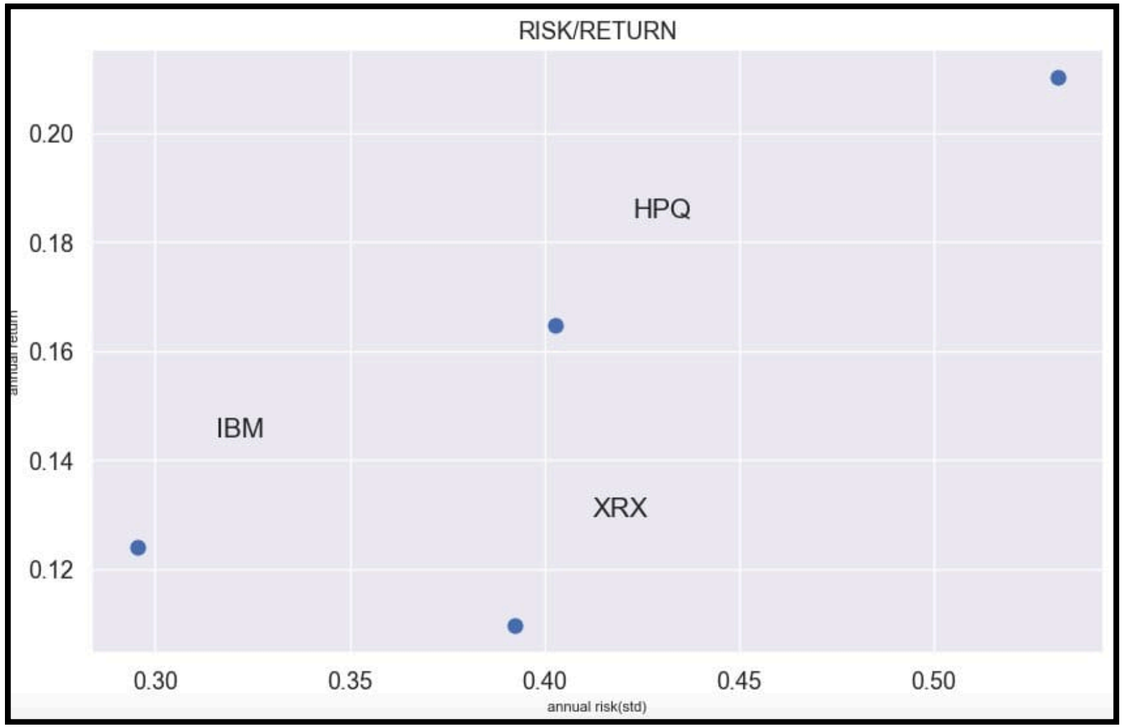
- **HP's workstation revenue:**
  - $6.505 billion @1985 → $13.23 billion @1990.
- **Market Expansion:**
  - Alignment with Windows' GUI
- **Pricing Strategy:**
  - Premium-priced
- **ROI:**
  - Strong ROI from Aerospace, Automotive etc.
- **Long-term Impact:**
  - HP’s PC division significantly boosted overall revenue

For the years ended October 31 In millions except per share amounts and employees	1998	1997	1996	1995	1994
U.S. orders	$ 21,338	$ 18,837	$ 17,181	$ 14,686	$ 11,692
International orders	25,166	24,316	21,708	17,999	13,658
Total orders	$ 46,504	$ 43,153	$ 38,889	$ 32,685	$ 25,350

Financial Impact



Correlation Matrix (1983-2000)



Investment Risk and Return (1983-2000)

Market Appeal and Commercialization

XEROX

- Xerox Alto focused on research and delaying commercialization.
- Xerox Star (1981) was the first GUI system, but high cost and business focus limited its appeal.
- Both influenced Apple’s LISA, Macintosh, and Microsoft Windows, driving GUI adoption.

HP

- Focused on technical professionals and high-performance sectors.
- Collaborated with vendors for CAD and 3D modeling.
- Sold workstations to large organizations through solid client relationships.

Apple

- They targeted both consumers and creative professionals.
- Broad appeal is key to long-term success.
- The "1984" ad positioned the Macintosh as user-friendly through innovative marketing.
- Apple marketed the GUI to empower creativity and simplify computing

IBM

- Priced at $1,565, the IBM PC (1981) quickly gained popularity.
- Charlie Chaplin's marketing and open systems led to 750+ software packages.
- Market share dropped from 80% to 20% by the 1990s due to rising competitors
- Sold PC division to Lenovo in 2005, focusing on technological services and consulting.

Unconventional Approach

XEROX

- First system with windows, icons, and a mouse.
- Introduced WYSIWYG (What You See Is What You Get).
- Focused on research over market success, missing the personal computing market.

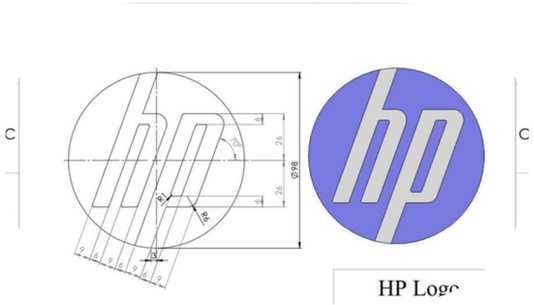
Apple

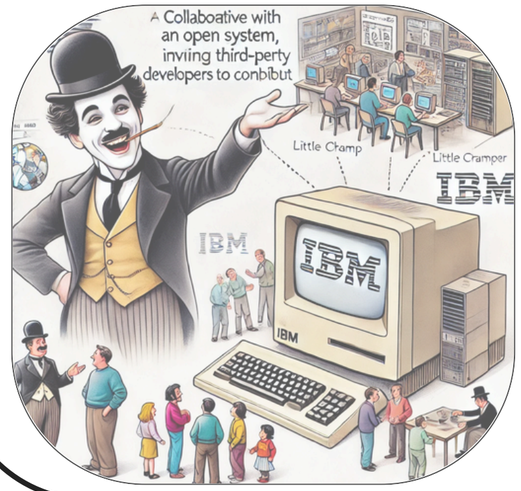
- Steve Jobs incorporated Xerox PARC's GUI into the Lisa (1983) and Macintosh (1984).
- Made GUI intuitive, affordable, and aimed at mass consumers.
- The iconic 1984 Super Bowl ad positioned the Mac as a symbol of freedom and creativity, making GUI a cultural phenomenon.

Unconventional Approach

HP

- Specialized in engineering markets with custom GUIs for CAD and 3D modeling.
- Focused on niche industries, not mass consumers, becoming a key player in technical fields. Adapting BLUE OCEAN strategy





IBM

- Opened the IBM PC to third-party developers, creating an industry standard.
- Used Charlie Chaplin ads to humanize tech and promote the PC as a user-friendly business solution.

SUMMARY: From Pioneers to Innovators of GUI

Xerox: The Visionary

- **Milestone:** Developed the first GUI at PARC (Xerox Alto, 1973).
- **Challenge:** High production costs and a focus on enterprise users limited market reach.
- **Outcome:** Pioneered concepts but failed to capitalize commercially.

Apple: The Game Changer

- **Milestone**: Integrated GUI from Xerox into Apple LISA (1983) and Macintosh (1984).
- **Success Factors:** Affordable pricing, user-friendly design, and innovative marketing.
- **Outcome:** Achieved mass adoption and set industry standards for consumer computing.

SUMMARY: From Pioneers to Innovators of GUI

IBM: The Cautionary Tale

- **Milestone:** Entered the GUI space with OS/2, leveraging strong resources.
- **Challenge:** Late entry and strategic missteps led to failure against competitors.
- **Outcome:** Highlighted the importance of market timing and execution.

HP: The Specialist

- **Milestone:** Focused on professional workstations with GUI elements (HP 9000 series).
- **Strategy:** Targeted niche markets in engineering and design, achieving profitability.
- **Outcome:** Limited consumer appeal but solid success in specialized fields.

consumers.

Adaptability

Responding quickly to market changes and evolving customer needs.

Consumer Trust

Building long-term, loyal relationships with customers through reliable and transparent business practices.

Revisiting the Hypothesis

Does Innovation alone leads to Success?

- Cost Leadership
- Brand Perception
- Quality Assurance
- Consumer Trust
- Adaptability

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Ctrl + Innovate

Alt + Market

Delete Doubts

Thank you!