BAEP 563 Final Paper

Apple Vision Pro

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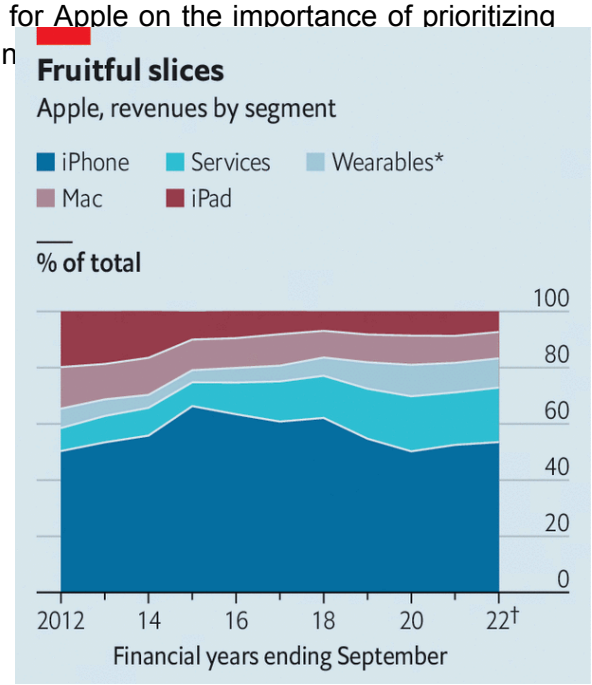
Introduction

Primarily due to the iPhone's launch, Nokia lost 90% of its market value in six years and never recovered from it. Nokia's sluggish response to the smartphone revolution highlighted a fundamental failure to innovate in line with evolving consumer preferences and technological advancements. Instead of swiftly new interfaces and ecosystems, Nokia remained tethered to its outdated platform, ultimately losing ground to competitors. Secondly, Nokia's strategic decisions, such as its ill-fated partnership with the Windows Phone, underscored a lack of foresight and a tendency to place misguided bets on unproven strategies. Lastly, internal turmoil, including changes in leadership and organizational restructuring, further hindered Nokia's ability to foster a culture of innovation and adaptability. 17 years after the iPhone's launch, Nokia's downfall serves as a cautionary tale for Apple on the importance of prioritizing corporate innovation in an extremely competitive techn



During the peak of the iPhone, the device made up two-thirds of Apple's revenue. In 2022 this was down to half. Now, after a decade and a half of expansion, the global smartphone market has plateaued. 2023 holiday sales for Apple were down 20% year-on-year, an all time low. Apple has hedged their bets by building the ecosystem with great devices like AirPods, the Apple Watch, and in recent memory, making investments in services such as Health and Apple TV+.

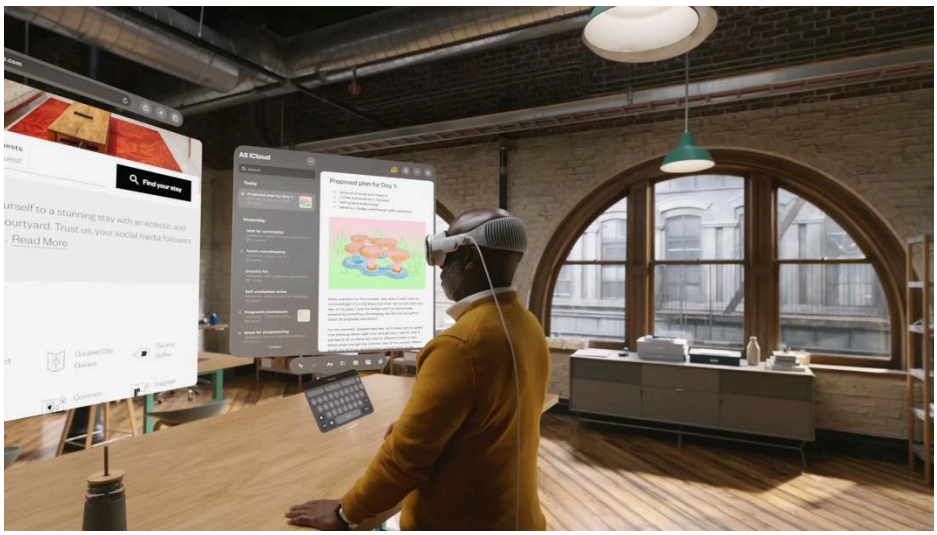
The story of Apple's decade-long, $10 billion, attempt to build an electric vehicle, known as Project Titan, is one of ambitious vision, technological challenges, and ultimately, failure. Apple first started exploring the electric car market in 2014, seeing an opportunity to disrupt the automotive industry much like it had done with the iPhone in the smartphone market. The company's initial vision was to create an electric vehicle that would challenge Tesla's dominance, with advanced features like a giant TV screen, powerful audio system, and adjustable windows. However, Apple struggled to settle on a clear direction for the project. It oscillated between designing an autonomous, self-driving car to compete with Google's Waymo, and reverting back to an electric vehicle with advanced driver assistance features. Apple also explored various partnership opportunities, considering acquiring Tesla, Mercedes-Benz, BMW, Ford, Volkswagen, and others, but failed to secure a manufacturing partner given the company's insistence on maintaining full control over the project.

From the Govindarajan and Trimble article on 'Forget Borrow Learn', I can see how Apple missed out on two (or dare I say three) of the challenges faced by businesses in corporate entrepreneurship:

- **Forget**: Apple's iPhone penetration in the US is a commendable 61%. But only 10% of those users own an Apple Watch. Half of all MacBook users are from small towns and rural areas. Apple's major revenue came from the average Joe who could afford $27 per month for a device + service charge on their Verizon plan. This is not the Joe that can afford a lease on a $100,000 Apple Car.
- **Borrow**: The F-B-L model suggests that companies should borrow only those assets that provide a competitive advantage. While Apple could bring a great digital user experience, infotainment etc, those are not the core competencies of a car. Apple did not know automobile manufacturing, autonomous driving (AV), or even EV batteries and drivetrains, and could not build a differentiated partnership if it had to rely on partnerships for all key components.
- **Learn**: Apple has always had a strong design ethos and has been known to design for where the market is heading rather than asking what people want right now. In fact, they even create product lines like Air Pods that killed the AUX port. It is easy to criticize Apple for trying to build a car for a decade without any feedback, but that's how they have always done things, and it has worked for them. The complexity of a car that is both AV and EV is what is unprecedented, even for Apple.

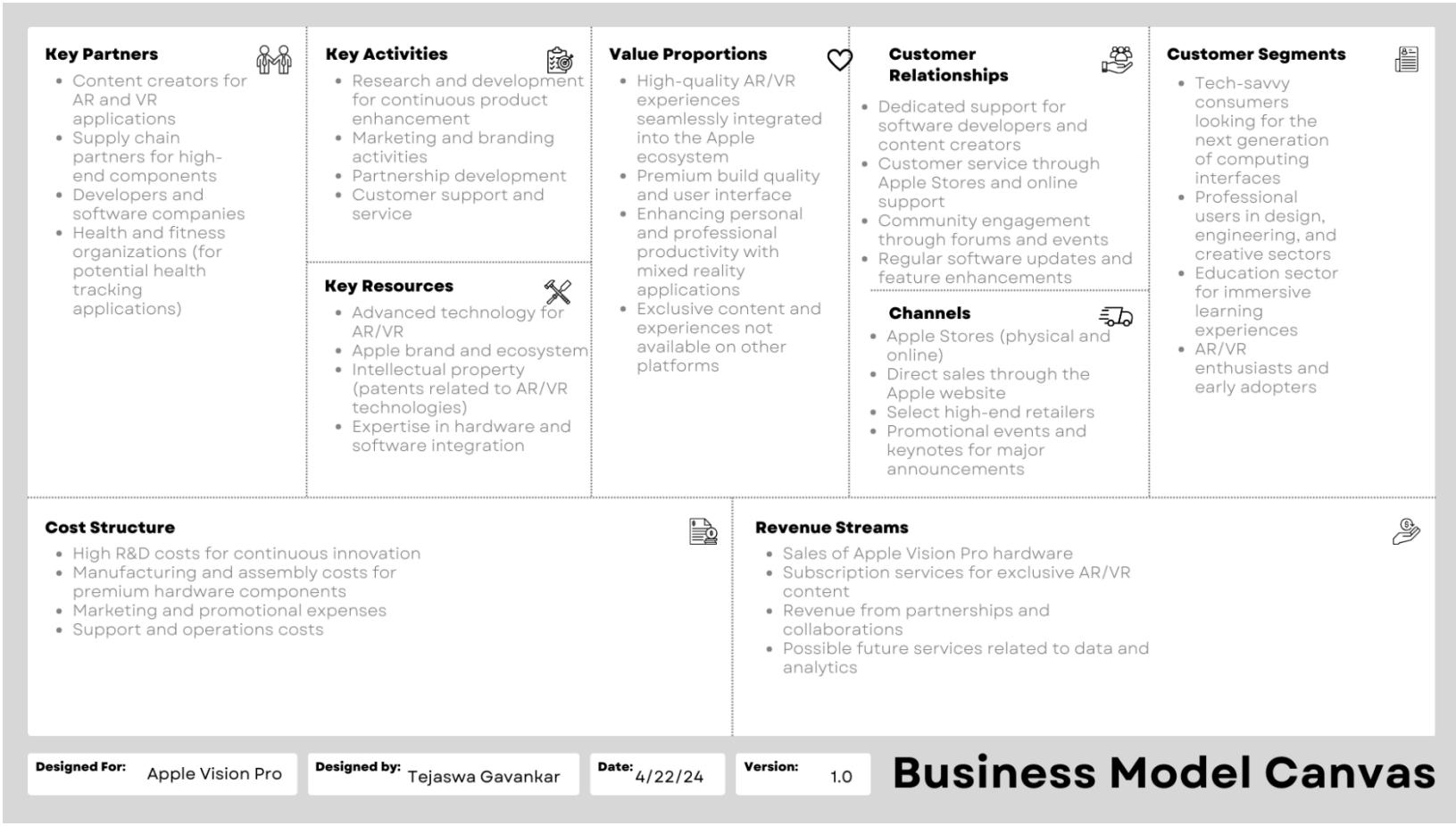
In the world of Generative AI, Apple's story is yet to be written. Unlike its rivals, Microsoft (OpenAI), Google (Gemini) and Meta (Llama), Apple does not have a foundational model. In the last month, Apple has been in talk with Google and OpenAI to license their LLMs for future iPhones. Apple's in-house LLMs are an order of magnitude less 'knowledgeable' than industry standards. It is interesting to note that Google has already deeply integrated a wide range of AI features into its latest Pixel smartphones. These include AI-powered camera enhancements, battery and brightness optimization, real-time language translation, smart keyboard suggestions, and advanced photo and video editing capabilities using generative AI. Apple is probably looking to launch similar features given the capabilities of the A18 chip that can allow efficient on-device AI processing.

The Solution



The Apple Vision Pro features a sleek, ergonomic design typical of Apple's aesthetic, emphasizing comfort and usability for extended wear. It integrates advanced display technology with high-resolution screens to deliver vivid and immersive visual experiences. The hardware is designed to be lightweight, despite its powerful capabilities, making it suitable for various applications, from gaming to professional design. The Apple Vision Pro is positioned as a premium product, with

pricing reflecting its advanced technology and the high-value proposition it offers to both consumers and professionals. It is marketed as a device that not only enhances entertainment and productivity but also pioneers new forms of interacting with digital content.



Business Model Canvas Overview of the Apple Vision Pro

State of the XR Market

The VR headset market has been a hard one to crack. Oculus rose to fame in 2013. A decade later, it is still far from mainstream. However, it is experiencing steady growth, with various players offering products at different price points and functionalities. At a high-level, the competition can be classified into:

1. **Meta Quest Pro**: A leading competitor from Meta, the Quest Pro is a powerful VR headset focused on gaming and professional applications. It features high-resolution displays, hand tracking controllers, and a library of VR games and experiences. However, it lacks the integrated 3D camera and the seamless blended reality features of Apple Vision Pro. The latest Quest 3 headset is priced at $499.

2. **Other Major Players**: Companies like HTC, Valve, and Sony PlayStation also offer VR headsets with varying features and target audiences. These headsets generally prioritize gaming experiences and offer a wider range of price points from $299 - $799 compared to the $3,500 premium positioning of Apple Vision Pro.

I was able to try other VR devices this semester, but the Visio Pro is miles ahead

A key differentiator for the Vision Pro is its quality. Apple offers the ability to overlay digital elements onto the physical world. This allows users to interact with virtual objects within their real environment. The headset also eliminates the need for traditional controllers. Eye tracking enables users to select virtual objects simply by looking at them, while hand tracking allows for natural gesture-based interaction within the virtual world.

Inward

While I was unable to find details about Apple's "Processes". I did look at the Apple organization form the Resource – Process – Priority lens framework and found that the resources and priorities at Apple strongly align with what is needed for an organization to succeed in corporate entrepreneurship. These have been illustrated in the Organizational Structure, Resource Allocation, and Culture sub-sections of this section.

Past Innovations

Apple has to be credited with the best commercialization of the technologies of our time. From music, cell phones, tablets, laptops to semiconductors, their user experience and brand is carefully managed. In light of this, let's look at how Apple has handled its previous launches.

Apple famously avoids leaks by tightly controlling information leading up to the launch event. This allows them to fully control the narrative and ensure their messaging is delivered with maximum impact. However, months before the official unveiling, Apple begins dropping subtle hints and clues about upcoming products. This creates a sense of mystery and anticipation that keeps consumers and tech enthusiasts engaged.

Their launch events are meticulously crafted presentations that showcase the product's design, functionality, and how it will seamlessly integrate into users' lives. They focus on the emotional connection users will have with the product, rather than just technical specifications. Even after the flashy launch, live demonstrations continue to press the message. They are a cornerstone of Apple's launch and showcase the product's capabilities in real-time, allowing firsthand experiences.

Organization Structure

Conventional wisdom in business history and organizational theory suggests that as entrepreneurial firms expand and become more complex, they typically transition from functional to multidivisional structures to align accountability and control and prevent decision-making bottlenecks at the top.

Thus, one would expect that a large company like Apple would have transitioned to a business-unit structure a long time ago. However, Apple continues to adhere to a functional structure, despite its exponential growth in revenue and complexity. Senior vice presidents oversee functions rather than specific products. CEO Tim Cook occupies the sole position on the organizational chart where design, engineering, operations, marketing, and retail converge for Apple's main products. There are no traditional general managers within the company, who traditionally oversee the entire process from product development to sales, assessed by P&Ls.

These are the reasons why I believe such a structure can foster a culture of innovation even in a large company:

1. **Flexibility and Adaptability**: Functional structures can be more flexible and adaptable to changes in the business environment. Because functions are separate from specific products or business units, it can be easier to reorganize or reallocate resources in and out of innovation projects.

2. **Specialization and Expertise**: In a functional structure, employees are grouped based on their expertise and functions, such as marketing, finance, operations, etc. In a culture that values employees based on their expertise and specialization, rather than the performance of a business unit, employees are incentivized to upskill themeselves, which often means working on cutting edge technologies like the Apple Vision Pro.

3. **Clearer Career Progression**: Functional structures typically offer clearer career progression paths within each function. Employees can see a clear trajectory for advancement within their area of expertise, which can improve morale and retention. This reduces the risk employees face when they sign up for innovation projects that may not see the light of day such as the Apple car program. Notably, the bonuses of senior

R&D executives are based on companywide performance numbers rather than the costs of or revenue from particular products.

Resource Allocation

In the past decade, Apple has significantly increased its investment in research and development (R&D), with spending soaring from approximately $3 billion to over $26 billion. This surge has propelled Apple to become one of the leading patent filers globally, boasting 2,300 patents awarded in the U.S. in 2022 alone (with more pending approval). This surpasses Meta's patent count by a factor of 2.3.

During the unveiling of the Vision Pro device this time last year, CEO Tim Cook revealed that the device is backed by over 5,000 patents. Remarkably, reports indicate that the development of the Vision Pro commenced as early as late 2015. This means that approximately 30% of the patents awarded to Apple since 2018 are attributed to the Vision Pro alone. Considering this substantial investment in R&D and the prominence of the Vision Pro project, if we allocate 30% of Apple's total R&D expenditure of $135 billion during this period to the Vision Pro project, it amounts to a staggering $41 billion investment in the development of the Vision Pro.

Workplace Design

In my research about Apple, I came across a concept we had not covered in class – workspace design's role on corporate innovation. Apple's new "Apple Park" is designed with painstaking attention to detail to maximize opportunities for creativity and collaboration and to capture founder Steve Jobs' complex vision for the space. It is designed to be a workplace where people were open to each other and open to nature, and the key to that would be modular sections, known as pods, for work or collaboration. There are more connections between floors than any other office space and cafes are combined and humongous to make people cross paths with each other rather than have siloed breaks.

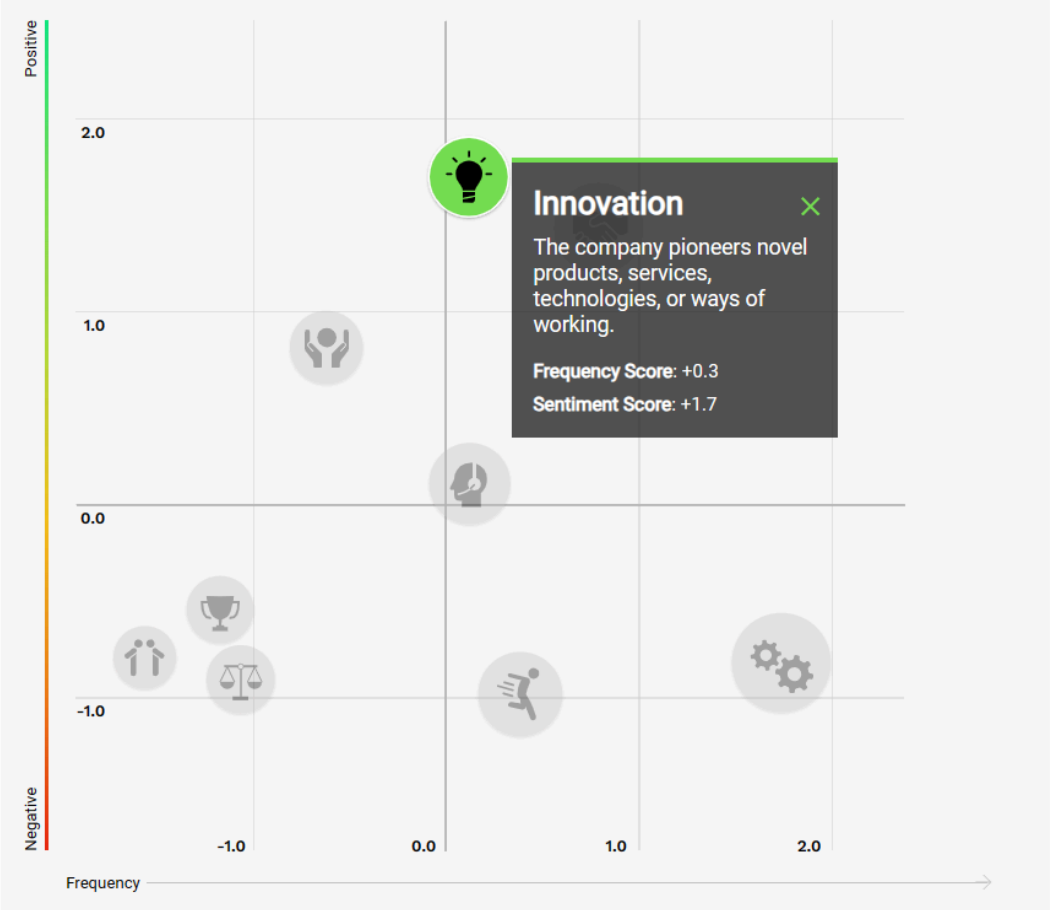
Many other innovative companies have invested in biophilic design. The most popular example being Amazon's Spheres in Seattle. The building features a four-story, curving "urban forest" that houses over 400 different trees. Open Office Layouts are another age old concept of open spaces with minimal partitions, encouraging collaboration and idea-sharing. Googleplex is famous for its open office layouts. My last employer also had green spaces across the building,

often adjacent workdesks that helped me feel more relaxed when working. We also had open seating, allowing employees to mix up their environment and also reducing barriers between different levels in the organization.

On a side note, as discussed in the ‘Past Innovations’ section, secrecy is a big part of Apple’s corporate innovation process. While this is great for marketing, I wonder if an atmosphere of secrecy can limit and reduce morale among employees that are all supposed to work under one ‘function’.

Culture

While consensus-building is a widely used method for decision-making, Apple employs a top-down approach where leaders play a crucial role in approving product decisions. This hierarchical model facilitates swift and decisive action, thereby streamlining the innovation process. Apple's leaders possess a deep understanding of the company's vision, ensuring that product decisions are in line with the overarching strategy. This method reduces delays stemming from prolonged discussions and empowers teams to focus on execution, resulting in quicker time-to-market.



According to 10,226 Apple employees, the most positively discussed cultural value is innovation.

And in a world driven by user feedback, Apple stands out by placing significant value on internal expert design reviews. Rather than relying solely on external customer feedback, Apple recognizes that the signal-to-noise ratio is much higher when insights come from experienced professionals within their organization. Internal experts possess in-depth knowledge, understand the company's vision, and can offer insights that align with the overall product strategy. By tapping into their expertise, Apple elevates its design process, leading to more refined and cohesive product experiences.

Outward

Apple, unlike most tech companies, can afford to wait for years for the Vision Pro to make money, if need be. Apple pared back its first-year sales expectations from one million units to 400,000. For context, the Apple Watch sold an estimated 12 million units during 2015, the year of its launch. Analysts said the AirPods sold between 14 million and 16 million during the first year, 2017, then surged to 60 million in 2019.

Developers

Apple knows all too well about the critical role of applications and what developers can do for the success of their devices. Thus, Apple began laying the foundation for the VisionOS years in advance. Apple has been investing in augmented reality (AR) technology for years, starting with the introduction of ARKit in 2017. This laid the foundation for the transition from 2D digital computing to 3D immersive spatial computing. Apple is providing developers with familiar tools and frameworks like Xcode, SwiftUI, RealityKit, and ARKit to create spatial computing experiences for the Vision Pro. This allows developers to build on their existing expertise.

Consumers

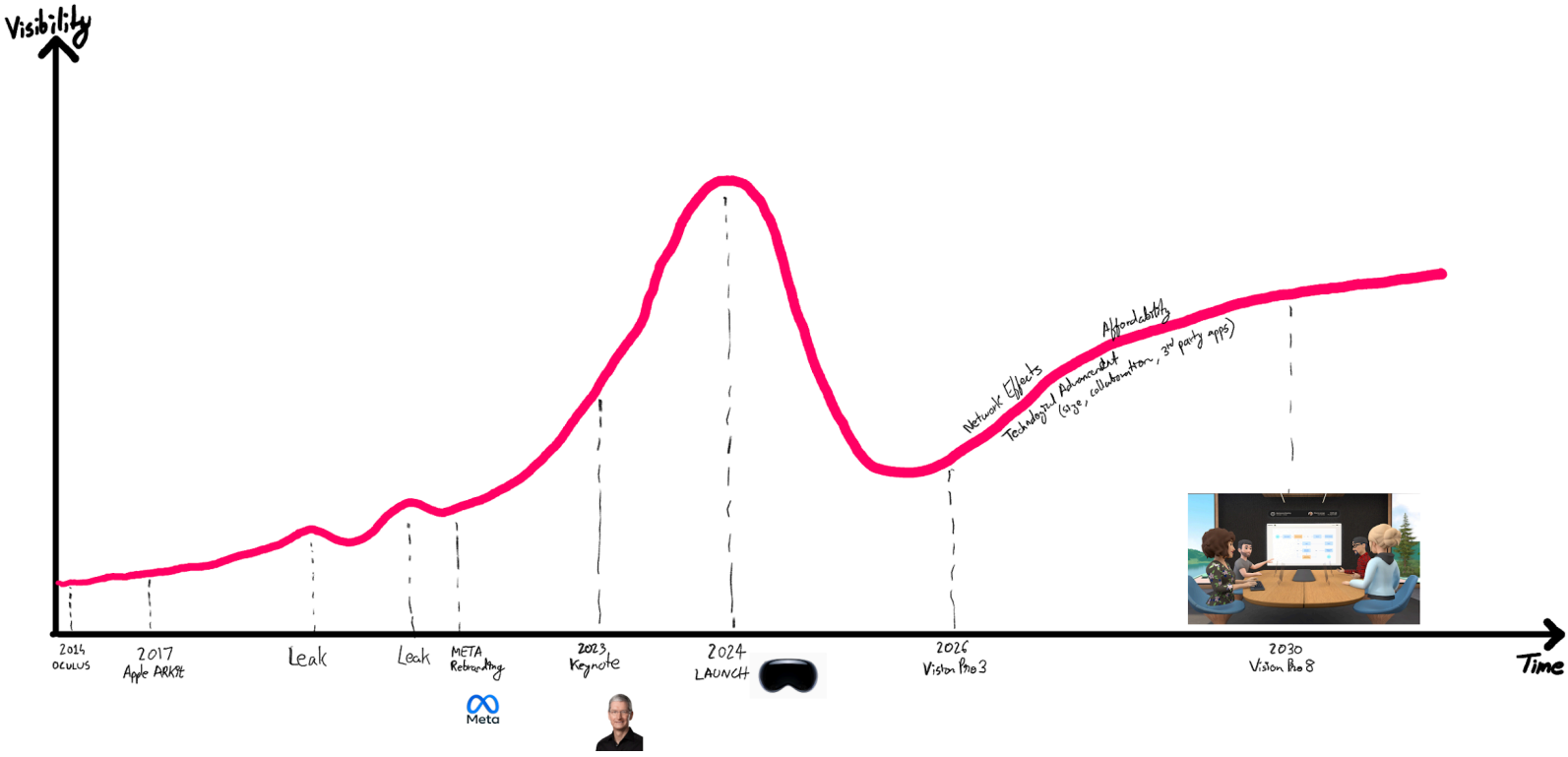
Even though Zuckerberg bet the farm on the metaverse, most consumers outside of gaming and early tech adopters did not know what spatial computing could do for them. Apple knows that it would face a similar challenge. Thus, Apple is offering extensive in-store demos for the Vision Pro, allowing customers to go through a 25-minute experience that includes facial scanning, custom setup, and guided exploration of the mixed-reality features. As part of the research for this paper, I tried the device out at the DTLA Apple Tower Theater store and asked staff some questions. The price laddering for prescription inserts, higher storage, etc add up very quickly!

Spatial Computing

Although Mixed Reality (XR) was a largely accepted term to describe what the Vision Pro does, Apple still christened their technology with a new name – ‘Spatial Computing’. By introducing a new term, Apple is trying to define what spatial computing means and how it fits into the technological landscape. This could be a strategic move to separate themeselves from the XR competition and position themselves as leaders in their field. This is a typical Apple tactic of trying to control the narrative and terminology around its products. Past examples of this include the Retina Display, Unibody design and AirDrop.

Hyping it Up

The Gartner Hype Cycle is a graphical representation of the maturity, adoption, and social application of innovation. I’ve examined the Vision Pro's timeline through the lens of the Gartner Hype Cycle, to provide a clearer understanding of its technological evolution and market perception over time.



Vision Pro Hype Cycle – by Tejaswa

Starting in 2014 with the launch of Oculus, the Vision Pro likely entered the "Technology Trigger" phase of the Hype Cycle. This is where a new technology generates interest and publicity, but often lacks a proven practical application. Oculus's introduction would have been the spark, leading to early media coverage and industry excitement.

Between Meta's rebranding and Tim Cook's keynote last year, the Vision Pro might have been ascending towards the "Peak of Inflated Expectations." This phase is characterized by a flurry of public excitement and media hype, though there may be a lack of successful practical applications. This peak could indicate a period where the market expectations were significantly high, possibly driven by speculative success and potential use cases.

Moving forward, the launch earlier this year may represent the beginning of the "Trough of Disillusionment," where initial interest wanes as experiments and implementations fail to deliver. During this stage, producers of the technology shake out or fail, investments continue only if the surviving providers improve their products to the satisfaction of early adopters.

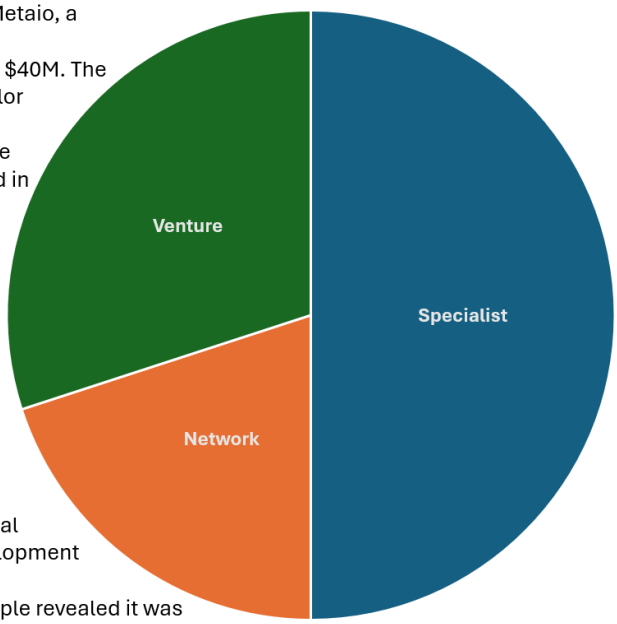
My prediction is that a steady increase in popularity will begin in another 2-3 years, entering the "Slope of Enlightenment" phase. Here, instances of how the technology can benefit the consumer start to crystallize. This period is typically marked by a second wave of adopters who are more conservative and pragmatic about their expectations from the technology, focusing on practical applications. This slope will be made possible by technological breakthroughs that make the device lighter, more affordable, growth of the developer ecosystem, and network effects with consumers. This moves them the Vision Pro into its "Plateau of Productivity." This

suggests that the broader market is beginning to adopt the technology more widely as the benefits of the technology become widely demonstrated and accepted.

Innovation in Digital Economies

The Marion and Fixson article talks about four modes of innovating in a digital economy –specialist, venture, community, and network. The article recommends that organizations learn to play in multiple modes simultaneously with the GE balancing community and venture mode. I found Apple balancing three of the four modes!

- Apple has been on an XR acquisition spree since 2015 when they acquired Metaio, a R&D units of Volkswagen
- In 2017, they acquired Vrvana for $40M. The startup had the ability for true color renders of the physical world.
- Last year Apple acquired Mira, the startup whose technology is used in the Mario Kart ride at Universal!



- Apple pushed the envelope of product design with the Vision Pro.
- It spent about $20 billion in the design of this device and likely employed 1000s of people for a decade.

- Apple has been running free virtual sessions covering visionOS development for developers.
- During the WWDC23 keynote, Apple revealed it was working to support the Unity engine on visionOS, which would make portability between XR experiences far more practical

Apple plays in three modes for the Vision Pro innovation

Conclusion

In summary, Apple's journey through the corporate entrepreneurship landscape has been marked by both groundbreaking successes and notable setbacks. The company's strategic decisions, such as the ambitious yet ultimately unsuccessful Project Titan, illustrate the complexities and risks inherent in pioneering new territories within technology. However, Apple's sustained investment in research and development and its ability to continually innovate across various sectors underscore its enduring commitment to pushing the boundaries of what is technologically feasible.

Moreover, Apple's organizational structure, which promotes flexibility and specialization, coupled with its strategic resource allocation, ensures that innovation remains at the core of its business model. Apple's massive investment in R&D, evidenced by its staggering $41 billion allocation

towards developing the Vision Pro alone, demonstrates its commitment to innovation. The company's top-down decision-making culture enables swift execution aligned with its strategic vision. As Apple introduces paradigm-shifting products like the Vision Pro, its strategic investments in developer tools, consumer education through immersive demos, and redefining product categories highlight its comprehensive approach to entrepreneurship.

Despite potential short-term hurdles predicted by the Gartner Hype Cycle, Apple's deep reserves of capital allow a long-term outlook for the Vision Pro's success. The company's historical excellence in commercializing transformative technologies positions it to drive spatial computing into the mainstream. Ultimately, Apple's sustained corporate entrepreneurship stems from its capability to blend technical ingenuity with brilliant marketing, while fostering an innovative culture through tactical organizational design choices.

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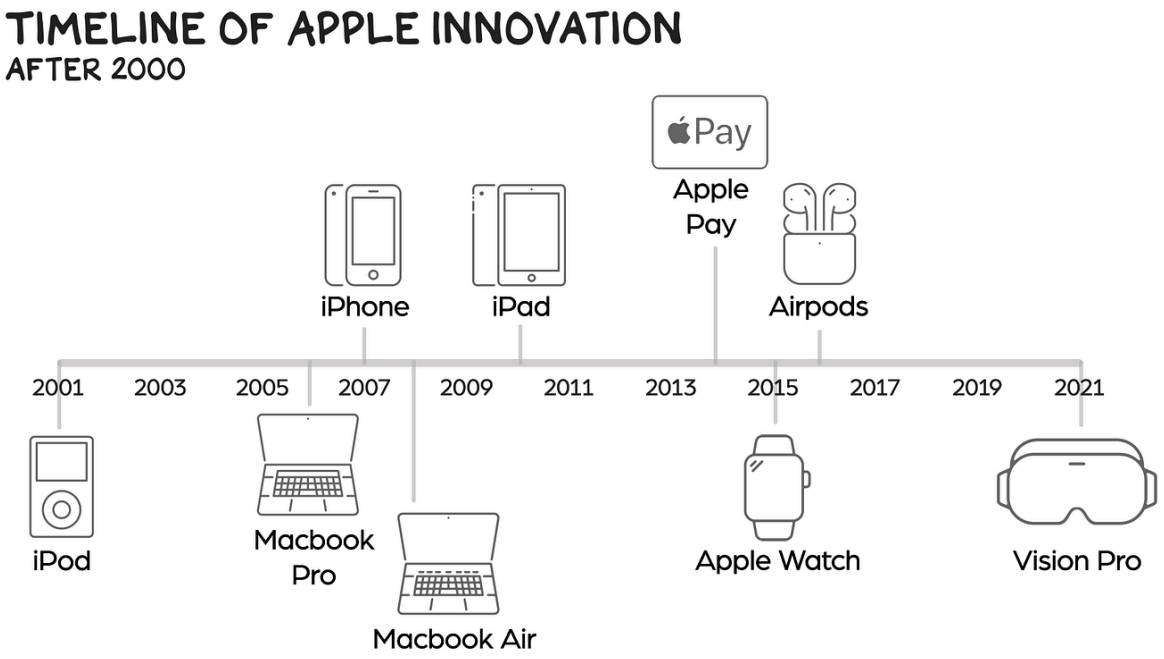

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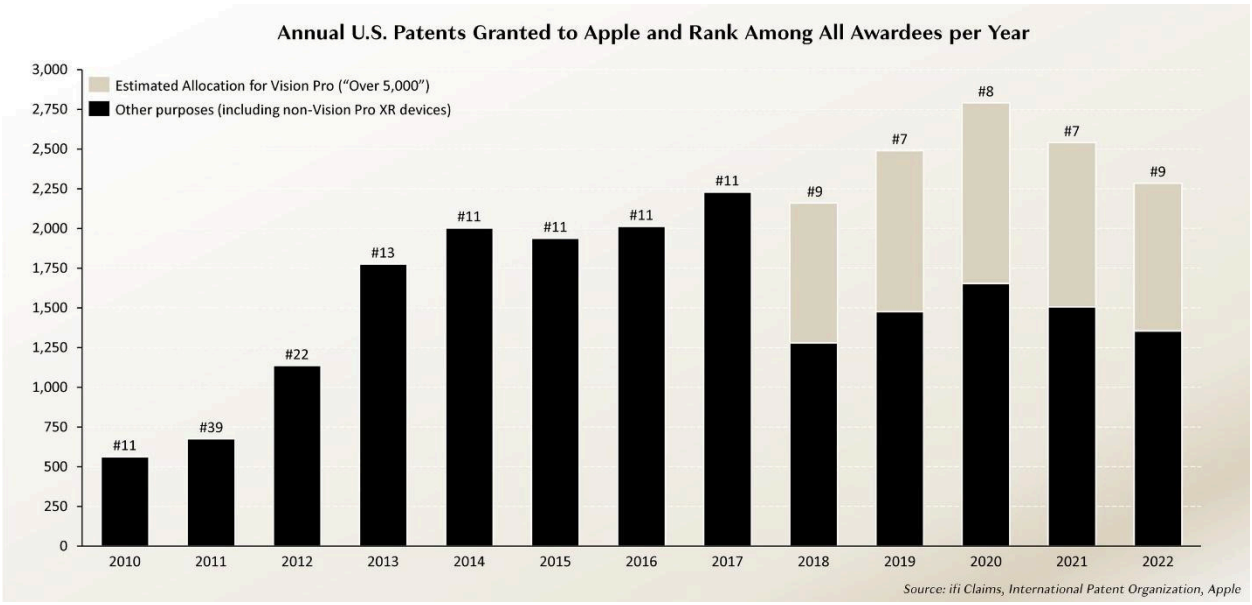
Annual U.S. Patents Granted to Apple and Rank Among All Awardees per Year
Estimated Allocation for Vision Pro ("Over 5,000")
Other purposes (including non-Vision Pro XR devices)
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2,500
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