

The Symbiotic Relationship Between App Developers and Platforms: A Ten-Year Retrospective

Preface

It is often easy to forget the journey once we arrive at the destination. We forget the bumps in the road and often overlook factors that made the trip possible. The app economy's trajectory is no different. In nearly a decade of existence, the app ecosystem has grown exponentially alongside the rise of the smartphone. Valued at \$950 billion,ⁱ the app economy is driven by app developers and innovators who depend on platforms like Apple's App Store to reach consumers around the globe. In 2017 alone, 3.4 billion people spent 1.6 trillion hours using apps across a variety of platforms,ⁱⁱ and the reach of software applications continues to grow. This paper offers a look at the journey and the symbiotic relationship between app developers and platforms that drive the app economy.

I. Introduction

Much has changed for consumers and developers since the early days of software applications. In the early 1990s, consumers were tasked with the challenge of locating and then traveling to a brick-and-mortar store that happened to sell software. Once internet connectivity became a standard feature in most private residences, consumers began to download applications from the comfort of their homes without having to step foot in a physical store. Still, the golden age of PC software pales in comparison to the size and scale of the mobile app revolution during which software developers evolved into app developers. Today, software titles in Apple's App Store for iOS and Mac exceed 1.5 million.ⁱⁱⁱ

Before the ubiquity of mobile platforms, the software ecosystem ran on personal computers. This forced early app companies, often with teams of one to two developers, to wear many hats to develop, market, and benefit from the sale of their products. App companies were not only required to write code for their products, but they were also responsible for:

1. managing their public websites,
2. hiring third-parties to handle financial transactions,
3. employing legal teams to protect their intellectual property, and
4. contracting with distributors to promote and secure consumer trust in their product.

The skillsets required to manage the overhead of online software distribution were often not "core competencies" of small development companies, and the additional steps cost app developers valuable time and money, with little tangible benefit.

In the internet economy, immediate consumer trust is almost impossible without a substantial online reputation and not attaining it spells death for any app company. However, what does "trust" mean? In this context, trust refers to an established relationship between the app company and consumer where the consumer demonstrates confidence to install the app and disclose otherwise personal information to an app company. Prior to platforms, software developers often had to hand over their products to companies with a significant reputation to break through the trust barrier.

Bungie—developer of popular games Halo, Myth, Oni, and Marathon—chronicled in 1996 the difficult and sometimes oppressive distributor requirements placed on software developers that predated the platform ecosystem. When dealing with retail distributors, Bungie was required to guarantee a competitive price, pay 3-6 percent of sales as a marketing fee in addition to \$10,000 for product launch marketing, pay shipping to deliver their products to distributors, and agree to buy back unsold products.^{iv} Once contracts were negotiated, software developers were often required to spend additional money so that in-store catalogs would feature their product or retail stores would place their product on an end cap display, all before consumers even saw the products.^v

However, with the advent of the smartphone, the experience Bungie described is now a relic of the past. The iPhone, in its brief history, has revolutionized the economy at large and established a symbiotic relationship between Apple and developers on its App Store platform. And in the decade since the App Store's introduction, those developers and app companies contributed both to the overall success of the iPhone and improved its functionality for consumers.

II. Life Before the iPhone

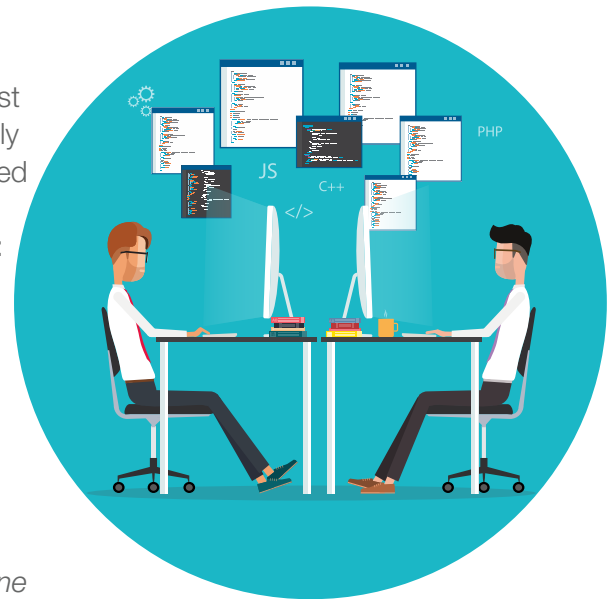
By the early 2000s, broadband became more commercially available to everyday consumers through cable and DSL, which provided internet access at faster speeds than dial-up.^{vi} With these advances, the internet completely transformed the marketplace and how consumers received goods and services, particularly in the music industry. For example, consumers started using peer-to-peer file sharing services from companies like Napster or LimeWire to get the latest track from their favorite artist. This system was problematic because it violated U.S. copyright law,^{vii} and consumers oftentimes risked that the file they were downloading had malware in it. However, when Apple launched iTunes, it provided an alternative for consumers using those services and revolutionized the way we buy music — now a consumer could buy any song they wanted from the comfort of their own home without violating copyright law or worrying about unintentionally downloading malware.^{viii}

No more than two years later, both YouTube and Facebook launched their sites publicly, further increasing the demand for faster consumer broadband^{ix} and making broadband-enabled services more integral to our daily lives.^x This ubiquitous use of broadband in the wireline context ultimately resulted in more people insisting on constant and instant access to the internet, which would require an incredible amount of data and power. However, no mobile device delivered such a service.

Instead, consumers depended upon several devices that provided varied services. Traditional cell phones were used primarily for calls and to send SMS messages, but they did not provide much in terms of internet-based services (e.g., checking email or accessing websites).^{xi} Personal digital assistants (PDAs, like the Palm Pilot) served mainly as scheduling devices that allowed for limited internet access where consumers could check their email or surf the net, but the consumer experience was nowhere near that of a contemporary smartphone.^{xii} To listen to music, consumers relied on MP3 players, such as an iPod. The consumer was left to oscillate among several devices throughout each day to perform compartmentalized tasks.

In 2003, Steve Jobs first described a device to consolidate all these capabilities at the inaugural All Things Digital conference.^{xiii} On September 7, 2005, Apple partnered with Motorola to release its ROKR E1 device.^{xiv} This device merged the telephony capabilities of a traditional mobile phone with the added feature of an integrated iTunes music player with a 100-song memory and limited Bluetooth capability.^{xv}

Two years later, on January 9, 2007, Apple's announcement of the first iteration of the iPhone hit the tech industry with a sonic boom.^{xvi} Shortly thereafter, in 2008, Apple launched its App Store, and Google launched its competing Android Market, which created an entirely new internet-enabled economy that incorporated a new group of small businesses: app companies.^{xvii} The cycle of innovation was on vibrant display as we went from having broadband-capable PCs, to the inclusion of compartmentalized and task-specific devices, to the first all-in-one iPhone in the span of just six years. Today, that cycle continues with third-party apps driving innovation.



III. Life of a Software Developer Before the iPhone

How software developers established consumer trust before the iPhone

Before the introduction of the iPhone, software developers had to build consumer trust slowly and at great expense, and that trust was and remains essential for a software developer to bring a product to market.^{xviii} Most did not have a widely recognizable brand to endorse the software. Prior to mobile platforms like the App Store or Google Play, software developers often had to break through the trust barrier by handing over their products to companies with a significant reputation.

Even shareware products that could be digitally distributed would end up partnering with trusted brands to gain consumer trust.^{xix} For example, in 1996, the developers of computer game Ultimate Doom contracted with Chex cereal to augment their consumer base. Developers converted their game software to create the child-friendly game Chex Quest that the cereal company usually affixed to its boxes.^{xx} Today, consumers can download most of these games for free on platforms like the Apple App Store, Google Play, or independent game-specific platform Steam. These platforms not only lower cost by taking care of the significant overhead involved in selling their product, but they can also reach consumers beyond those who buy a particular brand of cereal or another trusted product.

But the trust mechanism provided by the platforms is not merely an aspect of size. Consumer trust requires constant maintenance and vigilance because loss of trust hurts both the platforms and the developers who depend on them.^{xxi} The immediate consumer trust embedded into platform brands worth billions of dollars^{xxii} allows developers to clear the critical hurdle of achieving trust from consumer adoption.

How software developers dealt with piracy before the iPhone

Before the age of platforms, software developers struggled to safeguard their intellectual property (IP) against piracy and theft. Software companies faced serious challenges in protecting their products in retail stores because the licensing codes remained active and easy to steal. Once developers overcame the significant barriers to bring their products to market, they were faced with the threat of piracy and theft which limited their volume of business and hurt their bottom line. In 2006, the Business Software Alliance found that, on average, U.S.-based software developers lost \$7.28 million in revenue per year.^{xxiii}

Before software developers could leverage dispute resolution mechanisms provided by platforms, developers were left with the oppressive burden of copyright infringement litigation in federal court, which could leave the legitimate IP owner with several thousand dollars per month in legal fees and months or years of time diverted from company matters. Software developers and copyright holders continue to benefit from platforms' cost-effective avenues, such as their dispute resolution mechanisms referenced above, to distribute and protect the integrity of their products.

IV. The iPhone is Born and So Too the App Developer

On June 29, 2007, Apple made the first iteration of the iPhone available for purchase.^{xxiv} Beyond making calls and sending text messages, apps opened a new world of innovation and opportunity for smartphones. Today, smartphones outnumber the world's population,^{xxv} and more than 80 percent ^{xxvi} of Americans own, and depend on, smartphones. The rise of smartphones is inextricably linked to apps because apps give value to platforms on smartphones.

Though it is hard to imagine an iPhone without apps, the first iPhone did not host the third-party apps we use today.^{xxvii} Then-Apple CEO Steve Jobs encouraged third-party app developers to develop software for its Safari web browser,^{xxviii} but this vision was short-lived.^{xxix} In October 2007, Apple announced that it would provide a software development kit in 2008 that would allow third-party developers to upload their apps,^{xxx} and in July 2008, Apple launched the App Store that revolutionized the app economy.

The iPhone has gone through significant changes and iterations, and apps played a vital role in that evolution. However, in the beginning, app developers resisted coming to the table, because they felt that Apple's initial model did not accommodate their ability to "launch fast and iterate" ^{xxxi} their apps.^{xxxii} Many feared that Apple's curation process was overly restrictive^{xxxiii} and would inadvertently affect a developer's ability to innovate new versions of their software.^{xxxiv}

In response, Apple addressed those concerns through the creation of its Developer Guidelines that worked to craft an arrangement accommodating both Apple's and app companies' business models—a practice Apple continues.^{xxxv} Similarly, the emergence of the platform had life-changing benefits for software developers, revolutionizing the software industry and creating the app economy. In 2016, there were 13 million people registered in Apple's developer community, after adding two million developers in 2015 alone.^{xxxvi} The development of a trusted network allows developers to directly engage with consumers and end users and provides an important foundation for market access, consumer discoverability, product legitimacy, and overall growth. Marc Fischer, owner of App Association member company Dogtown Media noted, "[platforms] are a conduit for developing, launching, and scaling our digital products. We would not have a business without them."

Successful platforms have changed the app ecosystem by providing app developers with ubiquitous access to a broader swath of consumers. Platforms provide a centralized framework for app developers to engage and secure visibility with the 3.4 billion app users ^{xxxvii} worldwide. With lower costs and barriers to entry, both fledgling and established app developers can succeed. For example, French educational app company L'Escapadou secured 1.3 million downloads and earned more than \$1.5 million from app sales between 2010 and 2014,^{xxxviii} a success attributed to the centralized nature of platforms. Founder Pierre Abel specialized the language, content, and pricing of each of his apps based on consumer and market needs and marketed them on different platforms to reach a variety of consumers around the world.^{xxxix}



V. The Evolution of iOS

The iPhone has gone through several iterations since its 2007 debut, with each evolution incrementally adding new features and functions to its design. What may not be apparent to the consumer is that the iPhone's evolution did not occur in a vacuum in Cupertino, but was powered by apps hosted on Apple's App Store platform. This section focuses on the evolution of Apple's iOS, the software that drives the device itself, and how iOS put app developers in the driver's seat.

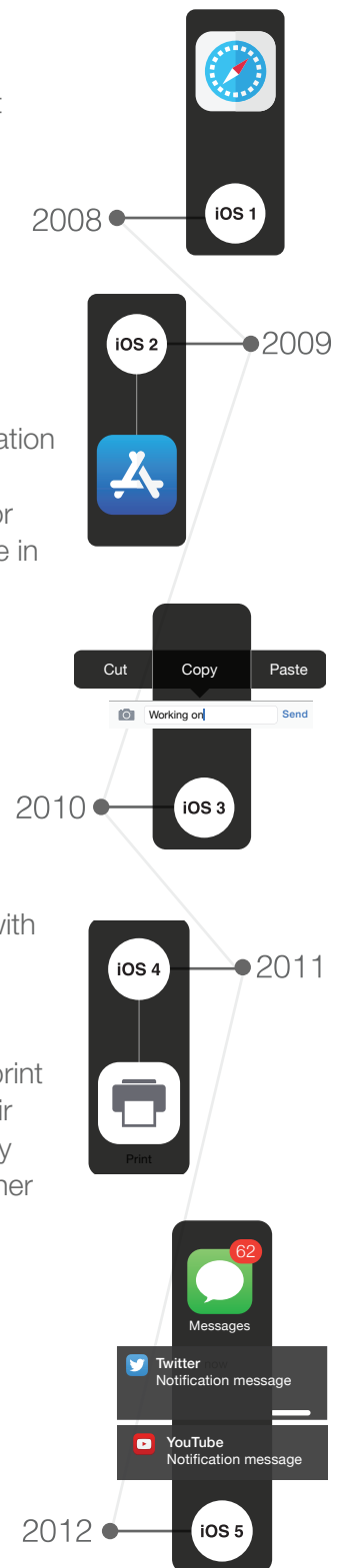
Safari Apps (iOS 1): When the iPhone was first released, Apple developed a toolkit for third-party developers to build web apps. While we no longer think of these as “apps,” this toolkit provided the foundation for many of the mobile websites that are still popular today.^{xi} Safari mobile was the first app where the web was fully visible, and iOS software features made it so users could easily pinch-to-zoom.^{xli}

App Store (iOS 2): Consumers and developers were clamoring for a way to take advantage of the power of the iPhone beyond simple web apps. In order to provide that access and recognizing the need for protection against piracy and malware, in 2008 Apple created a consumer-facing store with officially reviewed apps: the App Store.^{xlii} The App Store's integration into iOS 2, with all third-party apps it presented on one platform, not only made purchasing apps more secure, but it also made the app industry more economically viable, especially for small/new companies.^{xliii} iOS 2 and its integrated App Store represent a fundamental change in how software would be developed and marketed forever. The day of boxed software as the dominant delivery mechanism was gone. By 2017, Apple had paid app developers more than \$70 billion since iOS 2 was integrated with App Store in 2008.^{xliv}

Copy and Paste (iOS 3): Although now ubiquitous with every smartphone, copy and paste was not part of the original iOS. Apple not only adopted that function into its own apps but made the feature available to all app makers, allowing users to copy and paste text, graphics, sound, and other media. Additionally, iOS 3 adopted the iPhone's “tap to focus”^{xlv} for camera apps, which app companies like Instagram use to provide consumers with the option to focus their photos.^{xlvi}

AirPrint (iOS 4): In the early days of iOS, several utility apps allowed you to open them and print a data snippet or document.^{xlvii} With AirPrint, Apple made it easy for users to connect to their printer and app makers were now able to give consumers the functionality of printing directly from the app without having to guide users on how to set up their printer.^{xlviii} In response, other app developers began to work with myriad companies to incorporate this feature for other platforms (e.g., Google Maps or Instapaper), which opened up new market opportunities for these developers.^{xlix}

Notification Center (iOS 5): Different apps came with ways to notify the user that important things were happening. iOS 5's Notification Center provided users with a common, easy-to-manage way to determine when and how they wanted to be notifiedⁱ and facilitated the transition to a new system that anticipated and accommodated interconnected applications (e.g., apps that pair with a Facebook or Gmail account) with multiple notifications.ⁱⁱ



MapKit (iOS 6): Prior to iOS 6, Apple had been using Google's map technology.^{lii} When Apple started building its own map app, it allowed app makers to embed Apple maps into their own software but also add annotations and custom user interactions.^{liii} This capability, in turn, provided consumers with more accurate GPS-enabled apps while assisting Apple with its own Apple Maps software, because iOS 6 also provided offline caching for apps that opened up these new opportunities.^{liv}

AirDrop and Sharing (iOS 7): Apple created a simple framework that allowed users to share information in apps with other users and other apps, making their information more useful and easier to manage.^{lv} Google later incorporated a file sharing framework akin to Apple's AirDrop with Files Go, introduced in 2017, which also allowed users to drop files over Bluetooth.^{lvi}

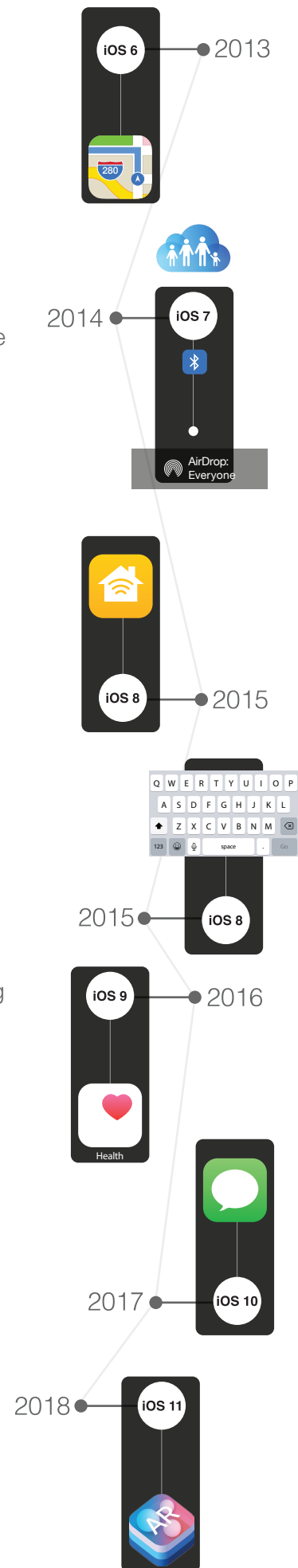
HomeKit (iOS 8): Developers started to develop apps for internet of things (IoT) devices, such as thermostats, light bulbs, etc.^{lvii} Before iOS 8, home automation devices and apps had difficulties communicating because of home automation devices' inability to fully integrate into a system.^{lviii} HomeKit remedied that problem by providing a standard way for device makers and app developers to talk to each other and build innovative solutions.^{lix}

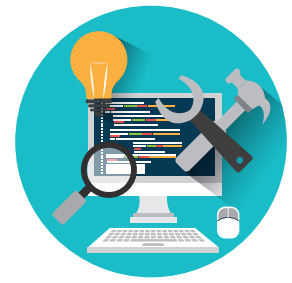
Third-party keyboards (iOS 8): Several app makers had offered specialized keyboards.^{lx} Apple found a secure way to make this feature available to all apps while protecting data that users type on these keyboards^{lxi} by localizing all keyboard data within that particular app using a specialized keyboard.

HealthKit (iOS 9): Through HealthKit, Apple now offers users a centralized, secure way to store and exchange health data. Given the advent of telehealth and remote patient monitoring, health and wellness apps are now able to transform the iPhone into a lifesaving device.

iMessage Apps (iOS 10): Apps like WhatsApp and Snapchat pioneered extending text messaging with stickers, art apps, etc.^{lxii} Now, the iMessage Apps function is standard on all iPhones.

ARKit (iOS 11): Well before Pokémon Go became all the rage, Apple had been working internally on augmented reality.^{lxiii} After the release of Pokémon Go, Apple introduced ARKit^{lxiv} at its Worldwide Developers Conference (WWDC), and now numerous games and larger apps (e.g., IKEA Place, Fitness AR, etc. use AR in innovative ways that benefit users.^{lxv}





VI. The Evolution of the Apple Review Guidelines for Developers

Along with evolutions to iOS, Apple also adapted to market demand and performed significant developer engagement to ensure its App Store had a hyper-competitive app ecosystem. This section illuminates how Apple developed a neutral framework for app developers through its Review Guidelines to fuel this procompetitive arrangement occurring between it and third-party app developers. Apple's management of the App Store via its guidelines has accomplished three main things from our perspective: 1) it maintains consumers' confidence in our members' products, 2) it streamlines ease of use for consumers, encouraging them to download more of our members' apps, and 3) it provides app developers with a neutral marketplace in which to compete.

Apple's Approval Process Before its Review Guidelines

From 2008 to 2009, Apple had an internal review process to assess what apps it would host on its App Store. Given the sheer volume of interest from app developers wanting to be on the App Store, Apple recognized that it needed to put procedures in place that responded to developers' needs. Without the guidelines, inappropriate and even unethical hacking put upstanding developers at a disadvantage in providing services to customers. Apple knew it had to give app developers a balanced infrastructure that also protected users and improved overall user experience. These concerns are the foundation on which Apple's Review Guidelines sit, and Apple's attempted amelioration of these concerns has promoted the app ecosystem's exponential growth.

How Apple's Review Guidelines Allow Small Business App Developers to Compete with Tech Giants and Instill Consumer Trust in our Members' Products

On September 9, 2010, Apple published its first official App Store Review Guidelines for developers. These guidelines provided small business app developers with a balanced framework that allows them to compete on par with the tech giants. For example, Apple rejected apps that took advantage of Apple's undocumented APIs^{lxvi} to ensure app companies, both big and small, were operating on a level playing field. Through the guideline language, Apple made clear that its focus is on maintaining the integrity of the device. This stability served to instill consumer trust in the product and directly benefited the developer community by ensuring that independent software running on the device would not create catastrophic failures. By Apple building this bridge to the consumer, it established trust in the independent developer's product too.

Guidelines that Combat Against Piracy

Apple added language to its guidelines at the behest of many app developers who complained to Apple about developers pirating apps. Specifically, Apple responded by discouraging "copycat" apps on its platform.^{lxvii} When a developer finds a "copycat" of their app, Apple provides them with a venue to resolve that issue. For example, App Association member Dan Russell-Pinson, developer of geography app Stack the States, credits his ability to confront and take down an infringing app to the availability of dispute resolution mechanisms on platforms. Of his infringement saga, he wrote:

"After recovering from the shock of discovering a copycat of my app, I spent a lot of time researching my options. I determined that Apple's Content Dispute process was my best course of action to address the copycat company and have the app removed. Apple provides a platform to submit a claim to the App Store Legal Team if you find yourself in a situation where an app or an ad violates your intellectual property rights... It is vital that you make your complaint, and your requests, clear. If you want the offending party to change the name of their app, request that specifically. If you want Apple to remove the offending app from the App Store, then explicitly ask for that at the end of every email correspondence to them." ^{lxviii}

This provision allows Apple to address the issue of pirated apps hosted on its platform, which directly helps our members by allowing Apple to remove clone apps expeditiously.

Guideline Changes to Privacy Protections to Better Protect Consumers' Personal Data

Before 2012, developers had access to a unique, permanent device-specific identifier (UDID) which could be used to identify a user's device. Because this identifier was unique and unchangeable, certain developers and advertisers were starting to use this identifier to aggregate information about users from multiple app makers, raising privacy concerns.

To increase user privacy, Apple discontinued access to the permanent UDID in iOS 6, replacing it with two new identifiers: one mostly remained the same but was specific for each app maker; the other for advertisers, which could easily be reset at any time by the customer to prevent long-term tracking. This innovative approach allowed app makers to make their cloud software operate correctly for a particular device, while significantly enhancing user privacy.

Guideline Changes to Apple's Revenue Sharing Model

Apple allows for a variety of revenue-sharing models within its guidelines. This has always provided app developers with the autonomy to set a price and pricing structure that is suited to their business. It also ensures that consumers are getting what they pay for. Roughly 90 percent of apps made available on the App Store are listed as free by the developer. These "free" apps may be supported by ad revenue, or they are part of clicks and mortar or provide some other service that is compensated outside of Apple's internal support structure. For those developers who choose to make their app available for direct pay, choices include upfront or in-app purchase or by subscription. Apple takes a portion of revenue for those developers who take advantage of Apple's direct pay model. Specifically, for upfront or in-app purchases Apple takes a 30 percent fee. Starting in 2016, for apps that use the subscription model Apple takes 30 percent in the first year and 15 percent for each year thereafter, yielding an 85 percent profit for the app developer.^{ix} Apple's subscription fee—either for apps' upfront subscriptions or in-app purchases—reduces overall costs to our members, including credit card collection record maintenance, third-party validation and other trust mechanisms, access to a global market, and a trusted framework for consumers.

VII. What Does All of This Mean?

The extraordinary rise of the app economy happened in tandem with the development of the iPhone's iOS and App Store. The presence of established, centralized platforms helped to drive the app ecosystem's dynamic growth and unrivaled success. The App Store has served as a vital foundation and database for the growing uses of apps across industries and enterprises. The App Store does three things for app developers:

1. Reduces overhead costs across the board
2. Provides instantaneous consumer trust mechanisms
3. Gives cost-effective access to a global market

Today every successful platform for mobile, desktop, gaming, and even mainframe computing must provide those features, or they fail in the marketplace.

Apps serve as the driving force in both the popularity and development of iOS, the App Store, and in turn, the iPhone offers lower barriers to entry for software developers into markets worldwide. The two entities' successes are symbiotic, and we look forward to continued success to into the next decade.

End Notes

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Nonpublic or undocumented usually exist to provide an API for internal use only or for a function where the incorrect use could lead to crashes or behavior that does not meet user expectations.

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