Aalto University
School of Science

Mobile Business Ecosystems

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A Brief Biography

- Graduated from Helsinki University of Technology in 2005, focus in telecommunications and software, business studies
- Worked in the wireless industry between 2004–2012, including 5 years in market analysis, strategic advisory & management roles; worked in German/ international automotive industry (connected car & telematics services) in 2013–2014
- Pre-doctoral Licentiate Thesis on *Success Factors of Mobile Business Ecosystems** completed in 2014. Currently continuing toward a full doctorate at Aalto University School of Science.
- Research interests include *business ecosystems*, *multi-sided markets*, and *product/industry platforms,* particularly in the context of smartphone business and the Internet of Things, as well as *path dependence* as it explains the strategic choices of firms

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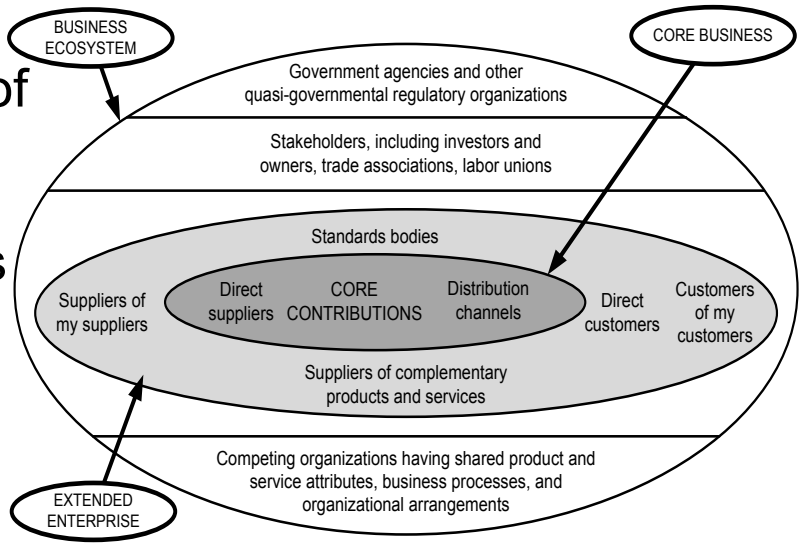
Contents

Background

- Origins of smartphones in the mid-1990s
- Nokia (+ other Symbian OS licensees), Palm, RIM (BlackBerry), and Microsoft (WM licensing) were the early leaders in 2001–2007
- The year 2007 was the turning point – the “smartphone revolution” of Apple (iPhone/ iOS) and Google (Android) disrupted the market
- Just a little over three years later (Q2 2011), Nokia had lost its #1 position in the smartphone market to Apple, before Samsung took the lead later in 2011
- Illustrates a rare phenomenon in recent business history
  - a leading incumbent in an industry sector suffers an almost complete collapse of its market share and profit in just a couple of years
  - Two companies that had practically no stake in the smartphone market a few years earlier have taken the lead
- Such a drastic change in the market structure surely warrants a study on the factors that contributed to it
- Understanding the business ecosystems of the players is the key

Key Theoretical Concepts (1/3)

- **Business Ecosystem**: An economic community supported by a foundation of interacting organizations, producing goods and services of value to customers, being themselves members of the ecosystem in addition to suppliers, lead producers, competitors, and other stakeholders.
- Firms within a business ecosystem coevolve capabilities around innovations, working both **cooperatively and competitively** to support new products, satisfy customers, and incorporate the next round of innovations (J.F. Moore, 1993, 1996)



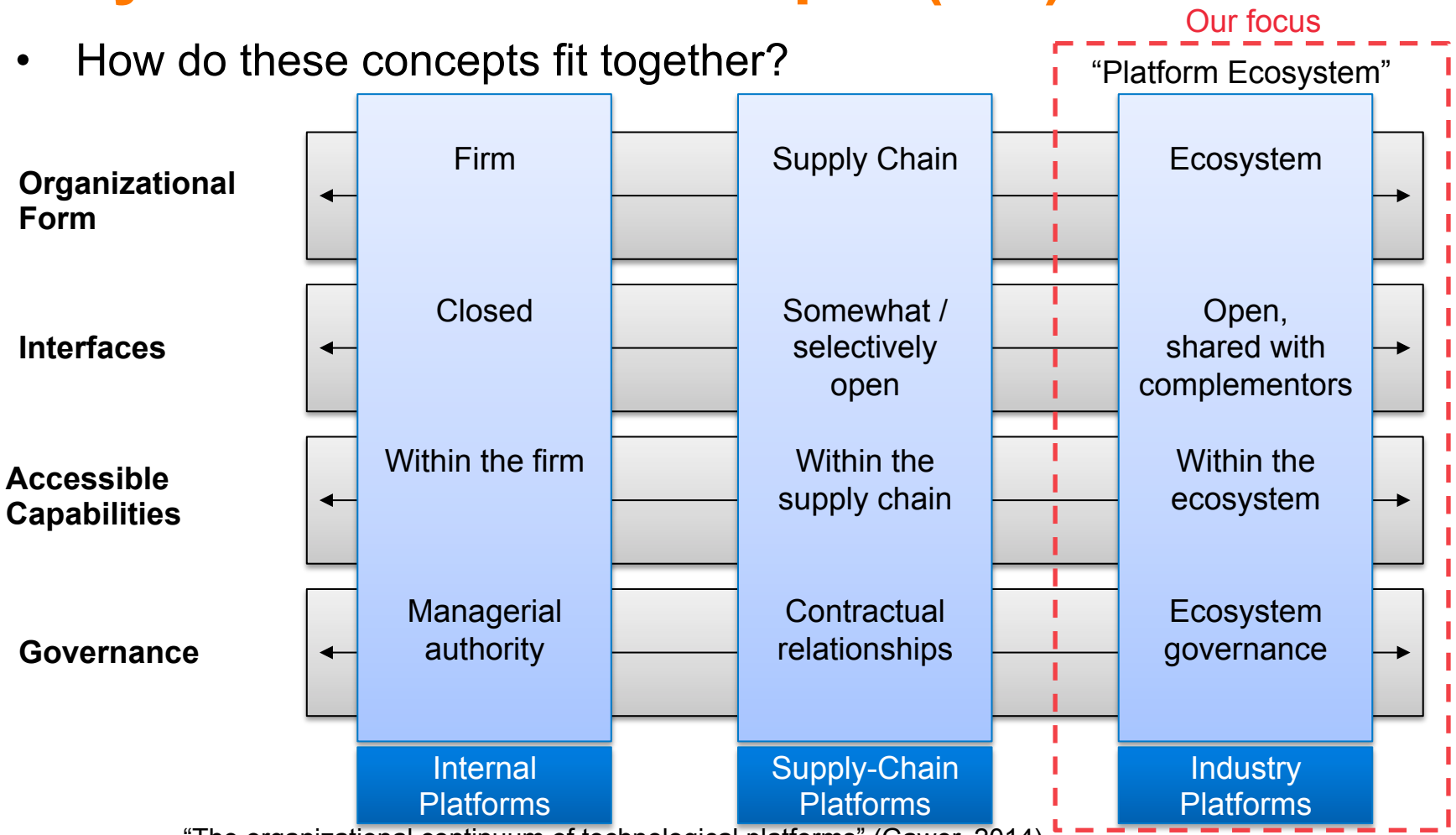
Roles of ecosystem actors:
keystone, physical dominator, value dominator, niche player (Iansiti and Levien, 2004)

Key Theoretical Concepts (2/3)

- **Platform**: (Many definitions …)
  - *collections of common elements*, particularly technological ones, implemented across a range of products (McGrath, 1995)
  - *a set of subsystems and interfaces forming a common structure* from which a stream of products can be developed (Meyer and Lehnerd, 1997)
  - *the assets shared by a set of products*, including components, processes, knowledge, people, or relationships (Robertson and Ulrich, 1998)
  - all share the commonality of *systematic re-use of components across different products within a product family*, which allows *economies of scope* in production to occur (Gawer, 2014)
- **Two-Sided Market**: An *economic platform* that serves two distinct groups of users on opposite sides of the market, each side gaining benefit from the other through positive **cross-side network effects**. The pricing structure affects transaction volumes. Research literature is focused largely on pricing and competitive dynamics. Generalizable as multi-sided markets (or platforms).

Key Theoretical Concepts (3/3)

- How do these concepts fit together?



"The organizational continuum of technological platforms" (Gawer, 2014)

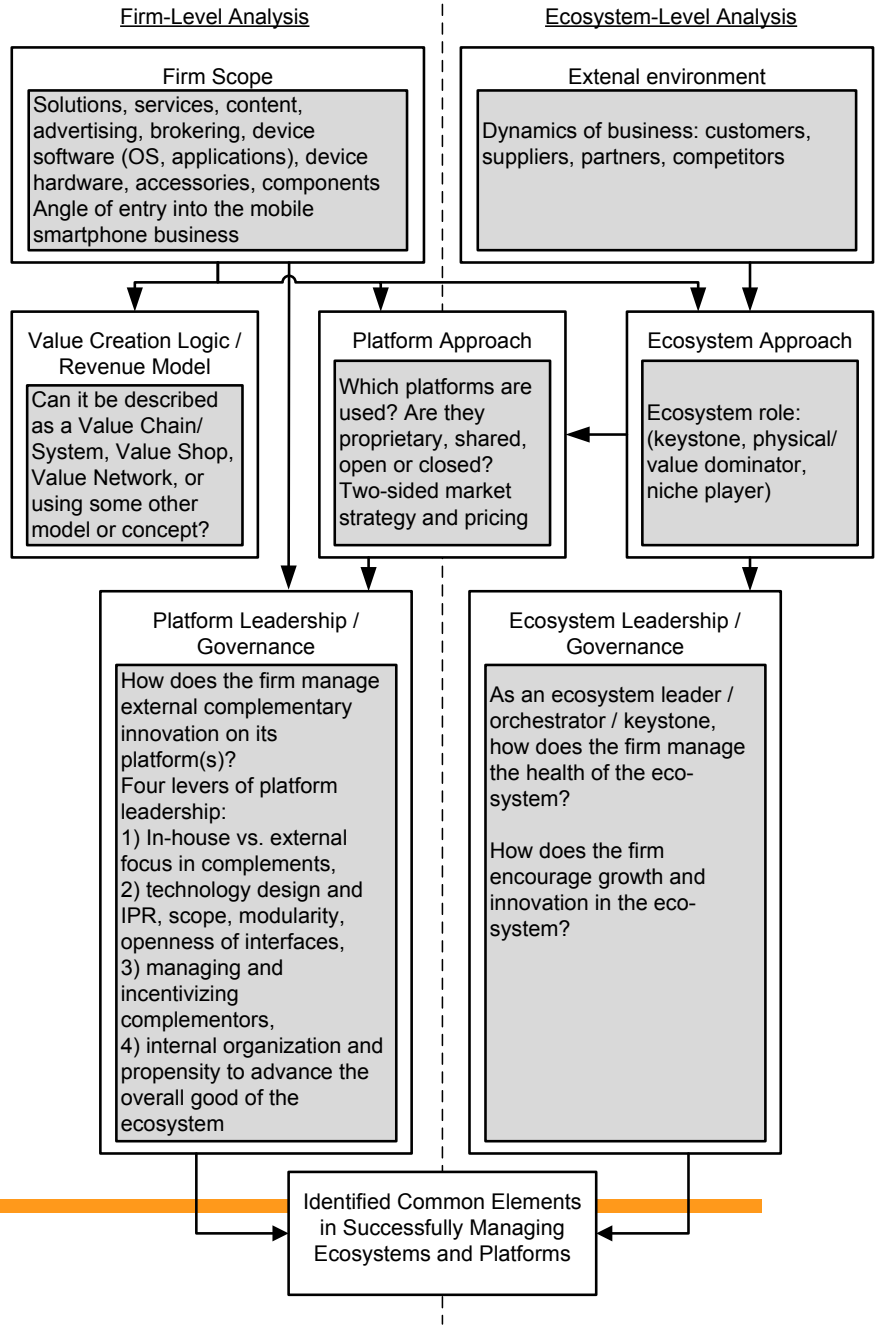
Analysis Framework

Firm-Level Analysis

- Firm Scope and Angle of Entry
- Value Creation Logic (Rev. Model)
- Platform Approach and Governance

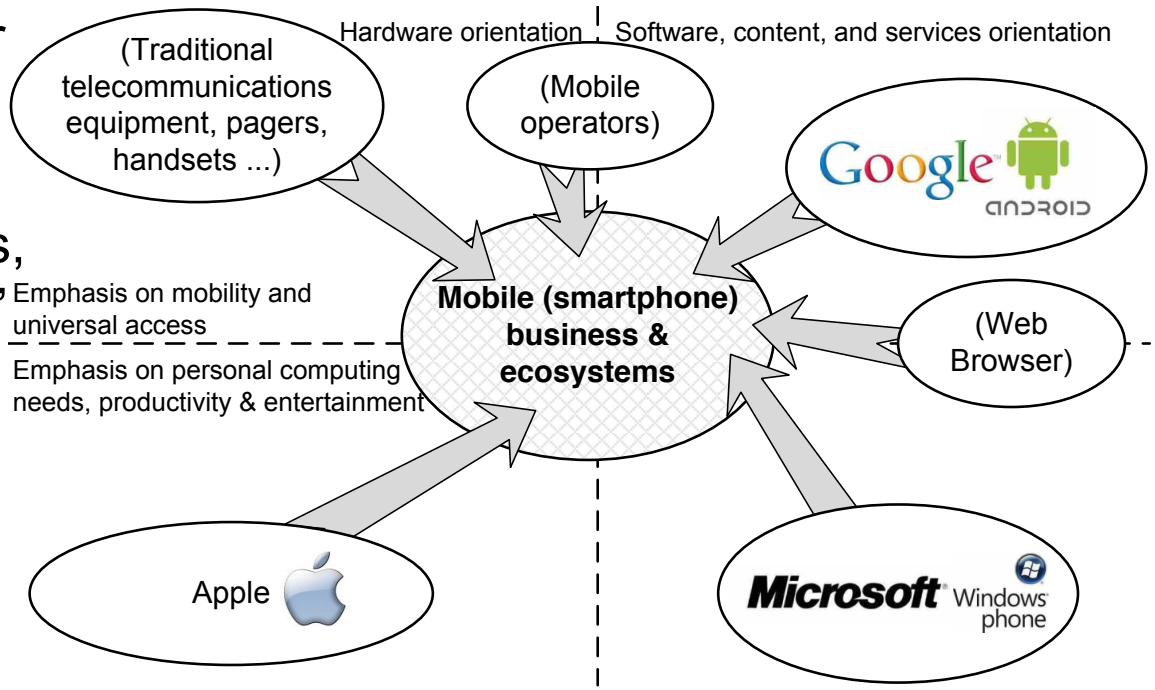
Ecosystem-Level Analysis

- Ecosystem Approach and Governance
- Software Ecosystem and Application Marketplace



Multiple Case Study: Three Leading Companies and Their Ecosystems

- **Apple** is the 'computer hardware and consumer electronics' company
- **Google** depicts the 'Internet (cloud) services, content, and advertising' player
- **Microsoft** is the 'computer software: operating systems and applications' firm



- Each is a hub and orchestrator of a business ecosystem as well as a platform provider in the smartphone business

Google and the Android Ecosystem: Firm Scope and Value Creation

- **Search advertising** based on the *AdWords*, *AdSense*, and *AdMob* programs forms the foundation of Google's advertising business model
  - Also display advertising services through DoubleClick technology
- Continuous subscription-based and freemium monetization models for some services: e.g., *Google Apps for Business*, *Google Drive*
- Most of its services continue to be free to consumers as long as they endure the advertising
- New business areas: cars (*Android Auto* and autonomous driving), home automation & IoT, robotics, augmented reality (*Google Glass*)

Google's primary revenue model can be described as **sales of search and display advertisements** on the web and on mobile devices, which is complemented by **sales of subscriptions** for SaaS apps and other cloud-based services

Google and the Android Ecosystem: Value Creation Logic with Android

- Google **does not monetize Android directly**
  - It gains extra “eye balls” for its advertisements
  - It gains valuable information about its user base’s preferences, online activity, and usage patterns that are used for profile building and targeted advertising
- Google does not seek vertical integration or physical domination in the smartphone business; divested the Motorola handset business
- Devices are not so important per se, **service usage** is, which is driving advertising revenue

Google wants to promote the proliferation of Android as much as possible, and being too exclusive or restrictive in its policies for app publishing and sales would be counterproductive. **Google services on Android drive advertising revenue**.

Google and the Android Ecosystem: Platform Approach and Governance (1/2)

- Android (company) was acquired by Google in 2005; Open Handset Alliance founded to drive its adoption and ecosystem in 2007
- Android Open Source Platform (AOSP) is an open source project
  - Code under the Apache Software License (ASL) 2.0 and, to a lesser extent, GNU Public License (GPL) v2 where the code is related to the Linux kernel and standard libraries
  - ASL2.0 is a permissive license – does not have a strong 'copyleft' clause, thus allowing complements & derivative work to be kept private
- Latest version is always developed in a private branch with a lead OEM, and also the "Google Mobile Services" (GMS) are *closed source* and not part of AOSP – criticism for "closed source creep"

Although AOSP is open source, Google exhibits proprietary control over key components that most would probably consider critical to the platform.

Google and the Android Ecosystem: Platform Approach and Governance (2/2)

- Software development for Android has been possible to the general public ever since the platform was announced and a preview SDK was made available in November 2007
- Comprehensive developer site at *http://developer.android.com*
- Unlike with Apple's iOS platform, the Android development tools are completely free of charge and developers can write and test applications without having to join a developer program
- In order to publish Android applications on Google Play, a one-time registration fee of $25 is charged; revenue sharing scheme 70/30
- Being open with regard to end users, developers, platform providers, and (partially) platform sponsors enables a high degree of open innovation, although platform *fragmentation* is also a problem

Google and the Android Ecosystem: Ecosystem Approach and Governance

- Google's self-stated goal is to ensure a successful ecosystem around Android, but without forcing anyone to participate
  - The focus of Google and OHA members is on releasing "great devices" into a competitive marketplace, and then incorporating the innovations and enhancements made into the core platform as the next version
- Google is a **keystone** – it is a platform provider on many levels and enables value creation for its entire ecosystem
  - Websites earn revenue by hosting Google's advertisements, and advertisers benefit from Google's broad consumer reach and effective targeted ads that have a high conversion rate
  - Android OEMs benefit from having a state-of-the-art mobile OS platform that is essentially royalty free and currently enjoys much higher consumer adoption rates than any competing platform

Google and the Android Ecosystem: Software Ecosystem and Marketplace

- Per the definition of Bosch (2009), Android is an *OS-centric ecosystem*, possessing the following three success factors:
  1) minimal effort required by developers
  2) generic, evolving functionality and set of features provided by the OS
  3) (a sufficiently large) number of customers that use the OS and that are accessible to developers
- Google Play is the largest store (>1.4 billion app titles in the catalog) but it is *nonexclusive* – several other application stores exist for Android, independent from Google
  - Amazon, Barnes & Noble, China Mobile, Samsung, GetJar, etc.

Android has a **non-exclusive process of application development**, verification, and publishing. The platform has the **most nonrestrictive policy for complementors**, not limited by protective clauses against competition or substitution.

Case 1: Google and the Android Ecosystem (1/3)

Identified success factors

Q1

- **G1**. Platform-agnostic business model, independent of devices and hardware
- **G2**. No burden of legacy, enabling a clear focus on cloud services, software, and content
- **G3**. More freedom for complementors to innovate on top of Google technologies
- **G4**. Google and its services are loved by consumers, also high brand equity

Q2

- **G5**. OEMs benefit from having a state-of-the-art mobile OS platform, essentially royalty free and enjoying higher adoption rates than any competing platform
- **G6** (M5). Accessory makers appreciate that they can work with standard interfaces (and are not bound to the whims of any single OEM)

Case 1: Google and the Android Ecosystem (2/3)

Identified success factors

Q2

- **G7**. Developers value the openness and nonrestrictive philosophy in application distribution
- **G8**. Mobile operators benefit from the transition to smartphones, fueled in many markets by the availability of affordable Android handsets, driving up demand for mobile data plans
- **G9**. Healthy ecosystem based on metrics of productivity, robustness, and niche creation
- **G10** (A6). Generic, evolving functionality and set of features provided by the OS
- **G11** (A7). The number of customers that use the OS and that are accessible to developers

Q3

- **G12**. Being open with regard to end users, developers, platform providers, and platform sponsors enables a high degree of open innovation, but may lead to severe fragmentation

Case 1: Google and the Android Ecosystem (3/3)

Identified success factors

Q3

- **G13**. Non-exclusive process of application development, verification, and publishing
- **G14** (A11, M9). The software components of the platform that meaningfully differentiate it from the competition or otherwise create significant added value based on proprietary IP are kept closed source
- **G15** (A12, M10). The platform exposes enough APIs so that OEMs, accessory makers, and developers are able to create products and apps with meaningful differentiation
- **G16**. The platform has the most nonrestrictive policy for complementors, not limited by protective clauses against competition or substitution

Apple and the iOS Ecosystem: Firm Scope and Value Creation

- Apple has a vertically integrated business model with a clear focus on device HW sales, supported by services and content
  - Very high gross margins due to the premium pricing of products across categories, contributing to the company's financial results
  - >90% of revenue comes from the sales of devices and related services, not including content, although Apple provides cloud services (iCloud) and an extensive content offering (App Store, iTunes, iBooks Store) to consumers, and operates a mobile ad platform (iAd), Apple Pay, …
- 'Halo effect' projects the positive perception of certain Apple products on other Apple products as well, driving up sales of these products (e.g., iPod → Mac & iPhone, iPhone & iPad →Mac)

Apple's revenue model is based on sales of premium-priced products differentiated through superior UX and a first-class complementary service and content offering. Strong brand equity enables the premium and halo effects across the product portfolio.

Apple and the iOS Ecosystem: Value Creation Logic with iOS

- Apple keeps the roles of device HW vendor, OS provider, and application store provider strictly proprietary – these are its key control points for value creation and capture
- Apple's ecosystem partners may offer device accessories (by obtaining a license for Apple's proprietary interfaces), content, applications, and services
  - However, any complements such as apps may not substitute or compete directly with Apple's own offerings on a significant scale
  - Apple maintains discretion over which complements are accepted, e.g., Firefox for iOS has not been allowed so far, but Opera Mini is there

iOS, the App Store, iTunes, and Apple branded devices are key control points for value creation and capture – thus they are kept closed (proprietary) and exclusive to Apple. Complementors may produce accessories and SW applications for iOS under Apple's terms and conditions and at Apple's final discretion.

Apple and the iOS Ecosystem: Platform Approach and Governance (1/2)

- Apple relies fully on proprietary, in-house developed operating systems and platforms for its products
- iOS is the OS for the iPhone, iPad, iPod touch, and iWatch products
  - iOS is based on a mix of closed source software components developed by Apple as well as open source components
  - The differentiating or value-adding components such as the UI and application framework are closed source to protect Apple's intellectual property and to hinder substitute innovation
- Due to its stringent control and proprietary approach, Apple has not had problems with free riders. No other platform provider or device manufacturer has access to the iOS and OS X platforms.

iOS is an Apple proprietary platform, based on a mix of closed source software and some open source components. It is a key differentiator for Apple and not licensable to other HW vendors.

Apple and the iOS Ecosystem: Platform Approach and Governance (2/2)

- Development of third-party applications for iOS has been possibly since March 2008 when the first SDK was made available
- For iOS applications, the only legitimate distribution channel is the Apple App Store
  - "jailbroken" devices can also run apps downloaded from unofficial sources ("*sideloading*"), not approved by Apple
- In order to publish applications on the App Store, the developer is required to enroll in the corresponding developer program for an annual fee of $99 (individual/company) or $299 (enterprise)
  - Testing apps on an actual iOS device is not possible without first registering as an iOS developer
- Apple pioneered the 70/30 revenue sharing scheme between the developer and Apple – no revenue share for the mobile operator

Apple and the iOS Ecosystem: Ecosystem Approach and Governance

- The iOS ecosystem revolves around Apple and its iOS products
  - Complementors can provide apps and services, content, accessories
- Apple acts as the undisputed leader and keystone of its ecosystem – it provides the platforms and business models that enable sustainable value creation for a large number of players of varying sizes, occupying different roles in the ecosystem
  - Most complementary innovation occurs in SW applications
  - However, Apple exhibits characteristics of a value dominator on the hardware side of its ecosystem, capturing the great majority of value created in that domain
  - also accessory manufacturers must pay substantial license fees for using the proprietary 'Lightning' connector; at the same time, this is useful in ensuring that all accessory manufacturers comply with Apple's compatibility, quality, and design requirements and guidelines

Apple and the iOS Ecosystem: Software Ecosystem and Marketplace

- The iOS ecosystem is an OS-centric ecosystem, possessing the three success factors identified by Bosch (2009)
- The competition for end-users' attention on the App Store is fierce, and a large and ever growing catalog (>1.4 billion titles!) makes app discovery increasingly a problem, putting pressure on developers
  - application developers to invest more in, e.g., social media and viral marketing to ensure the continued discovery of their applications
  - Implication: iOS app ecosystem is suffering from significant crowding-out effects that lead to diminishing returns for developers as well as a reduced level of innovation on the platform (as per Boudreau (2008))
  - Still, the Apple App Store is collectively the most profitable mobile application marketplace, as Apple said it had paid out a cumulative total of $20bn to app developers since the launch of the App Store in 2008

The iOS ecosystem is strictly controlled by Apple and more closed than Android.

Case 2: Apple and the iOS Ecosystem (1/2)

Identified success factors

Q1

- **A1**. Vertically integrated business model with clear focus on device hardware sales, supported by services and content
- **A2**. Differentiation through superior UX and a first-class complementary service and content offering
- **A3**. Strong brand equity enabling premium pricing and halo effects across the product portfolio

Q2

- **A4**. Healthiest ecosystem based on metrics of productivity, robustness, and niche creation
- **A5** (M6). Minimal effort required by developers
- **A6** (G10). Generic, evolving functionality and set of features provided by the OS
- **A7** (G11). The number of customers that use the OS and that are accessible to developers

Case 2: Apple and the iOS Ecosystem (2/2)

Identified success factors

Q2

- **A8**. Most likely ecosystem to benefit from multi-homing developers

Q3

- **A9** (M8). Keeping the platform provider and sponsor roles closed (under proprietary control) helps keep fragmentation in check, but may limit market share growth
- **A10**. High degree of vertical integration through exclusive ownership of all core elements in the value network, full control of the publishing process, and a strong influence on external complementors and providers
- **A11** (G14, M9). The software components of the platform that meaning-fully differentiate it from the competition or otherwise create significant added value based on proprietary IP are kept closed source
- **A12** (G15, M10). The platform exposes enough APIs so that OEMs, accessory makers, and developers are able to create products and apps with meaningful differentiation

Overview of the Case Study Results

Identified common success factors (CSF) for ecosystems and platforms

- **CSF1**. (Partially Confirmed:) Accessory makers appreciate that they can work with standard interfaces (and are not bound to the whims of any single OEM)
- **CSF2**. (Partially Confirmed:) Healthy ecosystem based on metrics of productivity, robustness and niche creation
- **CSF3**. (Partially Confirmed:) Minimal effort required by developers
- **CSF4**. (Partially Confirmed:) Generic, evolving functionality and set of features provided by the OS
- **CSF5**. (Partially Confirmed:) The number of customers that use the OS and that are accessible to developers
- **CSF6**. (Partially Confirmed:) Keeping the platform provider and sponsor roles closed (under proprietary control) helps keep fragmentation in check, but may limit market share growth
- **CSF7**. (Confirmed:) The software components of the platform that meaningfully differentiate it from the competition or otherwise create significant added value based on proprietary IP are kept closed source
- **CSF8**. (Confirmed:) The platform exposes enough APIs so that OEMs, accessory makers, and developers are able to create products and apps with meaningful differentiation

Checklist for Android & iOS Application Developers – Things to Consider

- **Audience**
  - What kind of people? Which ages? Private users or professionals? Which platforms?
  - Which regions / languages?
  - Is the audience broad enough?
- **Revenue model**
  - Free or paid application, or a combination (freemium)?
  - If your app is a game, the most popular model is ‘free with in-app purchases’, ‘free with advertisements’, or ‘free with in-app purchases and ads’
  - usually only big titles can succeed with a paid model
  - If network effects play any role for your app, go for a free model to encourage user base growth, worry about monetization later
- **Distribution and marketing**
  - Where to publish? Obvious for iOS, more choice for Android
  - How to ensure the visibility and efficient discovery of the app? Social media & viral marketing
- **Life cycle planning**
  - Roadmap / plan for updates

Openness in Various Dimensions: Android, iOS, Windows Phone

Dimension of Openness	Apple (iOS)	Google (Android)	Microsoft (Windows Ph.)
Demand-Side Users (End Users)	Open	Open	Open
Supply-Side Users (Developers)	Open	Open	Open
Platform Providers (Marketplaces)	Closed (Apple only)	Open (Google, Amazon, Samsung, others)	Closed (Microsoft only)
Platform Sponsors (OS Development)	Closed (Apple only)	Semi-Open (Google, OHA, OAA, others through AOSP)	Closed (Microsoft only)

Concluding Remarks

- Google's Android and Apple's iOS are the leading mobile business ecosystems with 81% and 15% global market share of smartphones sold in 2014, respectively
- Apple exercises more stringent control over its ecosystem and has strict guidelines in place for complements as well as only one official channel for publishing and distributing iOS apps
- Apple has distributed over $20bn in cumulative revenue to developers per its revenue sharing scheme since the launch of the App Store in 2008; Google doesn't publish figures for Google Play
- Android has a more open approach with no exclusivity in distribution, and the core platform (i.e., AOSP) is open source. However, fragmentation is causing extra effort for developers willing to maintain broad compatibility
- As a developer, remember that business analysis and planning is just as important as software development itself: *audience – revenue model – distribution and marketing – life cycle planning*

Thank You!

Any questions? Thoughts?

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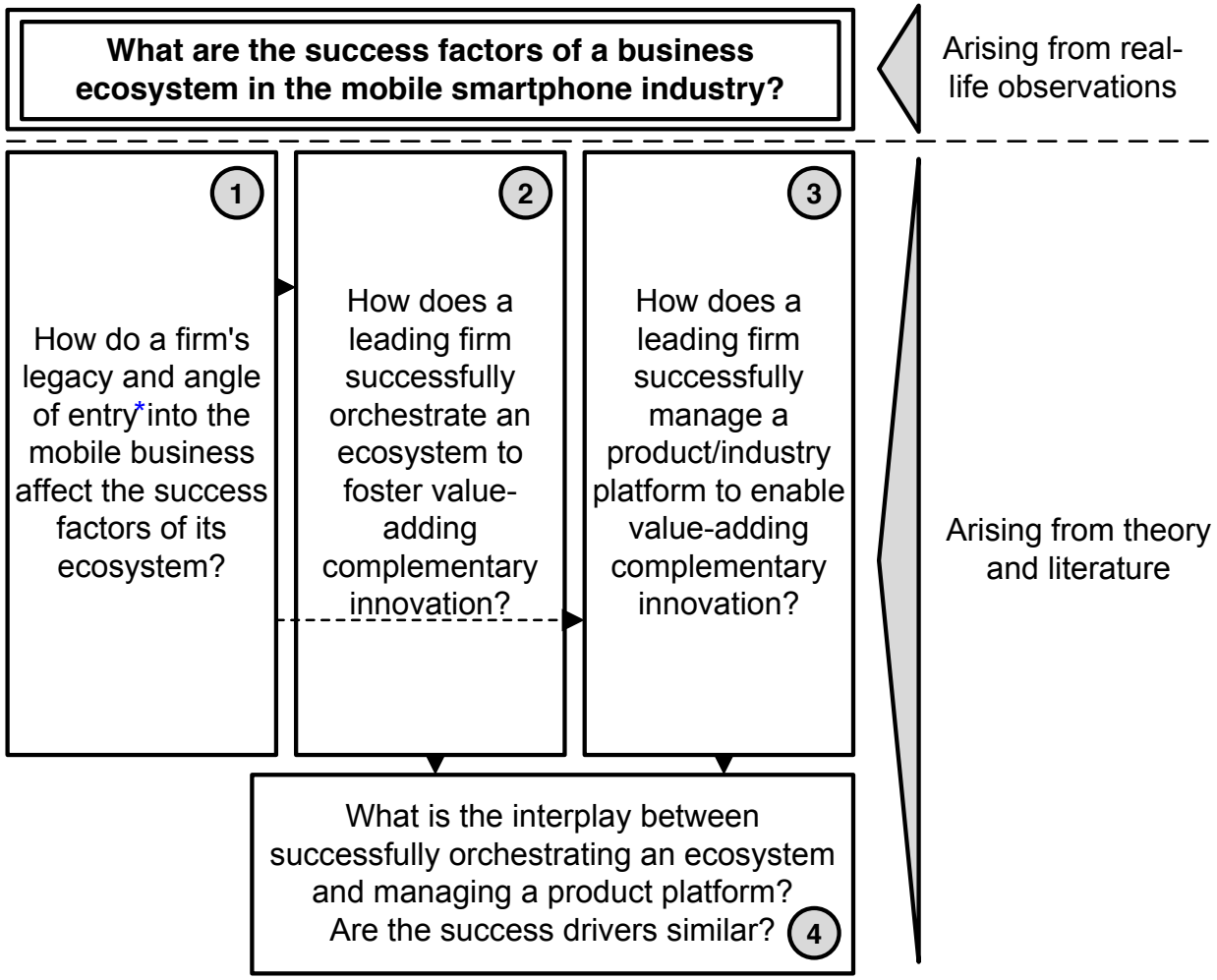
BACKUP MATERIAL

Research Questions



A!

*) **Angle of Entry**: The historical legacy and **path-dependent** evolution of a firm's previous business activities, capabilities, and assets, having an impact on the decisions the firm has made in its ecosystem and platform strategies

Contribution of the Study

Practical Contribution

- Eight CSFs in total (CSF1–CSF8) were evaluated by me as either 'confirmed' (CSF7 and CSF8), when all three ecosystems or platforms clearly exhibited them, or as 'partially confirmed' (CSF1–CSF6), when two ecosystems or platforms exhibited them
- Partially confirmed success factors are no less relevant and impactful than the confirmed ones, but their generalizability may be subject to certain preconditions relating to the business model of the ecosystem leader or the structure of the ecosystem under analysis

Theoretical Contribution

- The concept of 'angle of entry' (building on the theory of path dependence) having an impact on the choices and decisions the firm has made in its ecosystem and platform strategies is my original contribution
- The holistic analysis framework bringing together many existing theoretical concepts and frameworks proved out to be effective in getting answers to the research questions of this study and could easily be applied to other studies of similar scope, yielding even more insights

Suggestions for Further Research

- Getting further confirmation for the partially confirmed success factors would be a natural continuation of this study
  - likely involving at least additional case studies
  - perhaps even more detailed measurement and analysis of the relevant metrics
- The analysis framework developed as part of this study should be valid also for the extended research
- Develop the concept of 'angle of entry' further, possibly validating its applicability in other industry contexts
  - For purposes of confirming the success factors discovered in this study and identifying some additional ones, it would be interesting to study not only firms whose primary business is smartphones but also firms from adjacent but partially overlapping industries
  - Explore the other generic angles of entry not covered in this study, i.e., traditional telecommunications equipment manufacturers, mobile operators, and web browser makers (and their HTML5 initiatives)

Case 3: Microsoft and the Windows Phone Ecosystem (1/2)

Identified success factors

Q1
- **M1**. Business model largely focused on B2B licensing of Office, the world's most popular productivity software suite, as well as other business apps and services
- **M2**. Windows Phone includes Office while other platforms have limited functionality
- **M3**. Microsoft can afford to waive the license fee for Windows Phone

Q2
- **M4**. Strong IP portfolio to defend own OS, also enabling value extraction from rivaling ecosystems
- **M5** (G6). Accessory makers appreciate that they can work with standard interfaces (and are not bound to the whims of any single OEM)
- **M6** (A5). Minimal effort required by developers
- **M7**. Harmful crowding-out effects less likely to occur in application
- marketplace

Case 3: Microsoft and the Windows Phone Ecosystem (2/2)

Identified success factors

Q3

- **M8** (A9). Keeping the platform provider and sponsor roles closed (under proprietary control) helps keep fragmentation in check, but may limit market share growth
- **M9** (A11, G14). The software components of the platform that meaning-fully differentiate it from the competition or otherwise create significant added value based on proprietary IP are kept closed source
- **M10** (A12, G15). The platform exposes enough APIs so that OEMs, accessory makers, and developers are able to create products and apps with meaningful differentiation

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