Roadmap

- Research Problem
- Theoretical Development
- Methodology & Results
- Contributions & Implications
Platform Ecosystems

A system of interoperating software apps built around an extensible technological foundation

- **Systems** competition ← apps fuel innovation
  - iOS + Android apps = $200 billion market {iOS 2 million apps}
  - Appeal: Substrate + market access
- **Within** platform competition ≠ among (econ, strategy)
  - App performance heterogeneity invisible
- Few big winners, most flounder (50% never breakeven)
  - Same platform resources (APIs, app stores, tools, platform services)
- Why do some apps fare better than rivals?
- Exploit platform advances better? [?]
“Better” is Relative

Competitive lead = \textit{Relative} to cohort of rival apps
Research Question

App Architecture

- APIs, app stores, tools, platform services

...but mixed findings

Same modularity regime, yet great disparity in fortunes

"a thousand flowers, but few bloom"

Why?

Competitive Lead

Relative to rival cohort

interplay

How?

Two ideas

1. What’s inside matters

2…because ↑ “platform synergy” of an app
Modular Systems Theory

Design principle for complex systems

Intentionally
↑ independence

Interacting subsystems

App

Platform

App

App

Any complex system

∴ zeal for APIs (iOS 15k), platform standards, plug & play architectures

But wait! Simon (1962) said independence among and interdependence within

Twin pillars

overlooked

 Ferdinand }
Missing Half the Theoretical Root
Simon Says…

“…independence among systems, and interdependence within them.”

Platform

External architecture

100% prior work

App boundary demarcates

In plain sight for 50 years

Internal architecture

Untouched

↓ Ripple effects

Platform-specific treaty

App

App architecture

External: App loosely coupled to platform via standardized interfaces

Internal: Strong internal connections ~ monolithic
Two Central Ideas

Idea #1

because

Platform Synergy
fine-tuned to platform

Competitive Lead

Idea #2

Internal Monolithicity

App Modularity

External Modularity

In-app innovation refocus

↓ imitation

↑ exploitation of platform APIs

↑ tweakability

UoA = App
Platform Synergy of an App

Degree to which an app derives functionality from being fine-tuned to *that* platform

\[ \sim \text{app} \text{ architecturally leverages} \text{ platform capabilities} \]

Premise: *Synthesizing internal with external* resources into market offering
Methodology

- Blackberry app developers
  - 50% market share, 90+ countries, 500 telcos
    ...Until iOS-Android duopoly wrecked havoc
  - Single platform: Mitigates cross-platform confounds
- UoA = app (1 per firm)
  - Random sample 3,800 app developer firms (sampled ~10,000 apps)
- Measures
  - New: Internal monolithicity; platform synergy; (EFA; \( \alpha \geq 0.7 \))
  - App performance: 10-pt end-user ratings (N=154 per app)
    ...Relative to cohort of rivals computed from absolute ratings
    ...(Robustness for DV: 4 different measures; 4 time periods)
52 Countries, N= 629 (16.8% response rate)
## Controls for Rival Explanations

1. **App characteristics**
   - App complexity (kb)
   - App age
   - **Price** (free dummy; actual price as robustness check)
   - Ad supported
   - Lifetime review count
   - **Multi-homing** (ios, android, and windows platforms)
   - Extraecosystem services (outside BBOS used)
   - **Tenure** (on blackberry platform in months)
   - Platform experience (# of other BB apps by developer)
   - Freemium strategy (% of developer’s apps that were free)
   - Developer country (dummies)

2. **Developer characteristics**
   - Process modularity
   - App category (dummy)

3. **App market characteristics**
   - **Technological uncertainty** (in primary app category)
   - $\Delta price_{t1 \rightarrow t3}$
   - $\Delta rating_{t1 \rightarrow t3}$

4. **Evolutionary dynamics**
Analysis & Results

- **Endogenous** choices → Internal and external modularity
  - OVB, unobserved heterogeneity
  - Must account for this, or else…
- **Garen** 2-step econometric procedure → no evidence of endogeneity
  - OLS okay (robust to heteroskedasticity, WLS, different time periods; 2/3SLS)

→ 2 hierarchical OLS models

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![Diagram showing relationships between internal monolithicity, synergistic specificity, competitive lead, and external modularization.](image_url)
Modular Monoliths Prevail

Higher when externally modular AND internally monolithic

> Sum of parts

Synergistic Specificity vs. External Modularization
Multihoming diminishes synergy's payoff
Theoretical Contributions

1. **How:** Internal *monolithicity* amplifies external modularity
   
   Way to manage tension

2. **Why:** ∴ ↑ platform synergy ~ architecturally leverages pfm
1. What’s **inside matters**, competitively
   – Co-architectecting at and inside an IT artifact’s boundary

2. **Modular monoliths** prevail in evolutionary competition
   – Internal monolithicity ↑ benefits from external modularity
The IS advantage: *Intra*platform competition

1. Platform synergy’s *dark side*? “Multihoming” costs, lock-in
2. Can network *externalities substitute* for platform synergy?
3. Power asymmetry's *interplay* with architecture
Tweet Version

An app that beats its rivals is modular outside *but monolithic inside*