

BIENVILLE GLOBAL REVIEW

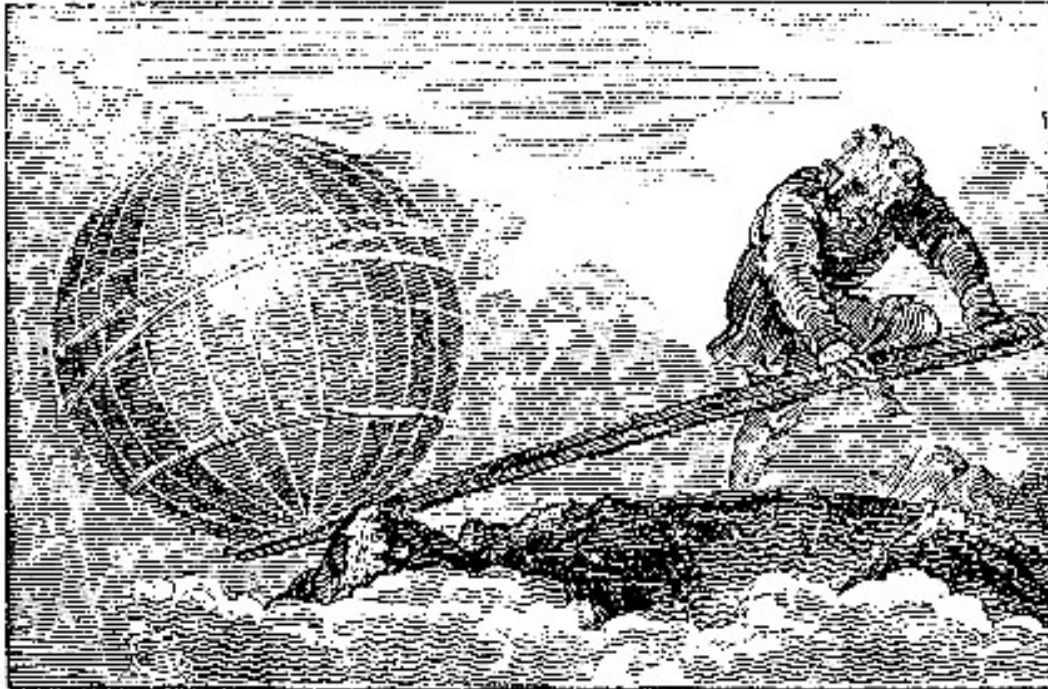
Disruptive Technologies Part 1: Declining Startup Costs Accelerate Disruption

July 2015



*“Give me a lever long enough and a fulcrum on which to place it,
and I shall move the world.”*

- Archimedes





DECLINING STARTUP COSTS ACCELERATE DISRUPTION

Summary

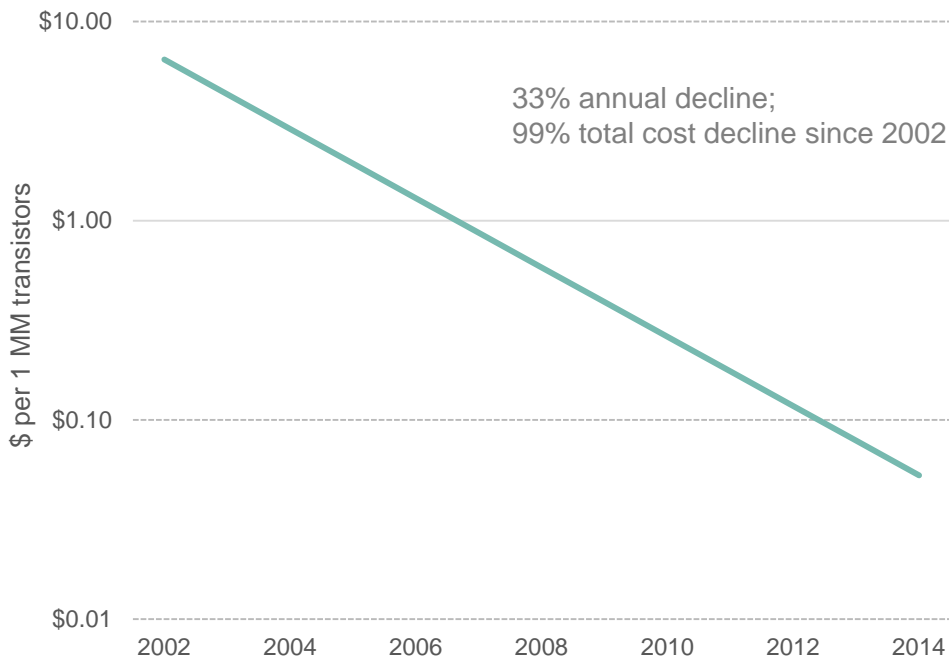
The pace of technological advancement is accelerating. As the upfront costs of creating a new business falls, the resources needed by entrepreneurs to build credible, real world applications is diminishing. Today, new tools are being developed with remarkable speed to solve previously unsolvable problems and leading to the proliferation of companies offering better services for less, threatening established corporations...

- **Three primary elements are driving the rapid reduction in the cost of entrepreneurial ‘tinkering.’** All are inexpensive and easy to use:
 1. Cloud-based infrastructure has replaced old world hardware systems, reducing fixed costs to near zero and variable costs to historical lows, while granting access to previously costly computational power for a small fee.
 2. Outsourced third-party services allow for complex companies to be built quickly. Many new software businesses have created tools for other software companies that “hide” complexity, massively reducing development time.
 3. Open source tools have evolved to become generally better than their proprietary counterparts and are freely accessible. Because the tools are “open” to the public, they build on each other in an exponential way.
- **Focus in Silicon Valley is shifting to traditional industries.** “Unsexy has become the new sexy.” Falling barriers to entry could result in an accelerated pace of disruption, particularly in industries where innovation has underwhelmed. Since 2009, the number of companies receiving funding has doubled, the majority of which are seed-stage.
- **The medium term macroeconomic implications are uncertain, but could be significant and therefore warrant ongoing monitoring.** The initial effects on employment, wages, productivity and inflation are likely to be met with monetary and fiscal policy responses.
- **The social consequences could also be substantial.** Advancements in Artificial Intelligence, such as Machine Learning and Natural Language Processing, threaten jobs once considered “safe” and could accelerate trends in income disparity.

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Competition in the **cloud space** has dramatically reduced the price of computing, making it cheaper for new companies to innovate. Today, cloud services are easier to use, have no fixed upfront costs, and can be scaled immensely. For cloud computing customers, fixed costs are near zero and variable costs are falling rapidly...

Cloud Enabling Lower Computing Costs



Decreasing costs relative to performance increases computational power for the same price

Major Cloud Services' Noteworthy Customers



Airbnb, Spotify, Siemens, Comcast



Hyatt, Kayak, Intuit, Yahoo!



Xerox, EasyJet, NBC News Digital, GE Healthcare



Google Cloud Platform

Snapchat, Best Buy, Coca-Cola, London Heathrow

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Cloud computing also drives down fixed costs by eliminating the need to purchase expensive hardware and the physical space required to store it. Data-heavy industries such as healthcare particularly benefit from this trend...

Case Study: Healthcare

- Cloud services allow healthcare providers to safely store massive amounts of patient data cheaply.
- Digital medical records lead to less paperwork and give doctors remote access to patient information.
- Large amounts of digital medical records can be analyzed in a more efficient manner using Machine Learning algorithms (pattern recognition), enhancing the quality of care and accuracy of diagnostics.
- Virtually all healthcare companies use the cloud in some way. Large companies that have already adopted it include Athenahealth, Carestream Health, and IBM.



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Many software companies offer **outsourced solutions** for *other* companies, enabling startups to contract out their non-core competencies for a variable fee, further reducing the barriers to entry in many industries...

Outsourced Third-Party Services

- **Intuit** provides an easy to use, secure platform for outsourced accounting solutions.
- **Stripe** manages online credit card payments, allowing startups to accept payments quickly and seamlessly over the Internet, thereby avoiding the need to build proprietary payment processing systems.
- **Frame** enables users to run desktop applications like Adobe Photoshop from a browser through the power of cloud-based computing, thus replacing the need for physical desktops or servers.
- **Sendgrid** allows entrepreneurs instantaneous access to large email infrastructure tools, such as automated email delivery and real-time analytics.

The screenshot shows the Intuit Developer APIs page. At the top, the Intuit logo is followed by 'Developer APIs Tools'. A dark blue banner below the header says 'Build your app using these APIs'. The main content area is divided into several sections:

- Learn with samples:** A green box with the text 'The fastest way to understand how apps work with our API.' and a link for 'Time Tracking'.
- Documentation:** A section titled 'Extensive information on our Accounting API.' with links for 'Time Tracking app', 'Documentation', and 'API Reference'.
- Tools and downloads:** A section titled 'Get the right tools and resources you need to build.' with links for 'API Explorer', 'Sandbox', and 'SDKs'.
- Apps built on Accounting:** A section on the right side showing logos for 'eBillity', 'Bill.com', and 'receipt bank'. Below the logos is a testimonial from Alexis Prenn, Co-founder & CEO of Receipt Bank, stating: 'Working with the QuickBooks Online API was an extremely smooth process. The clear and concise API documentation sped up the process significantly! We were able to make use of the developer's playground throughout the development process, trying out and experimenting with new features as we built the integration.'

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Third-party services replace non-core workflows for businesses of all types, allowing companies to dedicate their resources to further innovation and the development of their own unique, core competencies...

Case Study: Zenefits

- Many startups and smaller businesses lack the funds to hire human resource personnel.
- Zenefits offers a free, cloud-based software platform that replaces an HR department by automating various form fillings and makes it easy for companies to provide benefits like health insurance.
- Industries with changing regulatory frameworks have an increasing need for dynamic software-based solutions. The Affordable Care Act has driven many companies towards using the Zenefits platform.
- Many SaaS (Software as a Service) companies gain market share by providing certain solutions for free but charge for premium services. This business model is known as “freemium.”
- Zenefits operates on the freemium model, taking a commission only when clients select or change an insurance provider, just as an insurance broker would. In other words, they provide greater service for less and reduce a company’s need for HR employees.



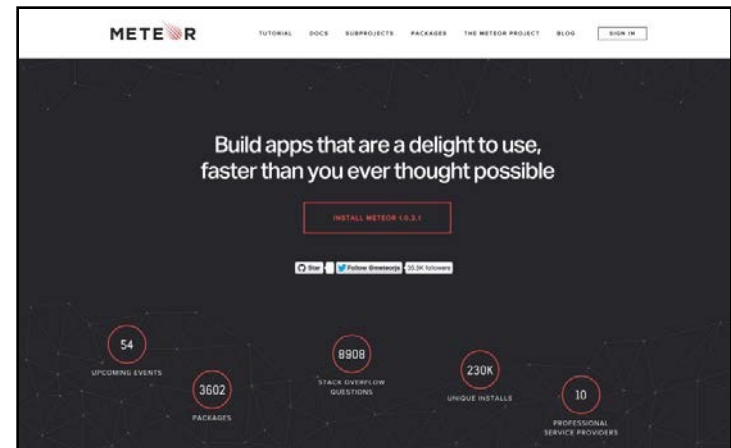
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Open source tools are free and maintained by large communities of companies and individuals, resulting in higher quality products thanks to the collaborative nature of their development. Open source tools build on each other in an exponential way and are rapidly removing the fixed costs of building complex engineering systems...

Open Source Tools

There are many types of open source projects that have led to a massive reduction in upfront, fixed cost:

- **Github** enables collaboration between developers on a single project. Users pay to keep their projects private, incentivizing the community to embrace an open source attitude.
- **Facebook Open Compute:** Facebook has open sourced the designs to their hardware data centers, resulting in 38% less energy usage and a 24% cost savings.
- **Meteor** is creating an open source platform for building both mobile and web applications (e.g., apps for Apple, Android, internet browsers). With Meteor, you can now build a simple app in 45 minutes.
- **Yelp** has open sourced their big data analytics engine called Mr. Jobs, enabling entrepreneurs to crunch enormous amount of data for no fee.

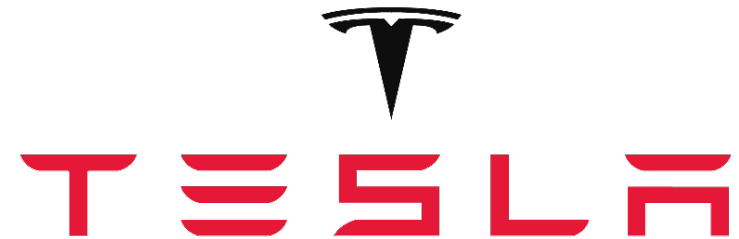


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The concept of **open source** is initially counterintuitive. For example, why would Coca-Cola release its formula to the public? But when it comes to accelerating the pace of innovation, having a community of the world's experts working with you drives the development process exponentially faster...

Case Study: Tesla Motors

- Elon Musk decided to open source all of Tesla's patents. Doing so embodied a new paradigm. Instead of Tesla competing against the traditional car industry alone, the entire open source community is now competing alongside them.
- This decision also has shareholders in mind. Because patents can fail to completely safeguard intellectual property, they often lead to expensive lawsuits, draining capital that could have been directed towards research and development.
- By open sourcing patents, Tesla is indirectly pulling the electric car industry into their ecosystem. Open source allows the community to build on top of Tesla's body of work, making Tesla a more formidable challenger against the traditional car industry.



"Tesla Motors was created to accelerate the advent of sustainable transport. If we clear a path to the creation of compelling electric vehicles, but then lay intellectual property landmines behind us to inhibit others, we are acting in a manner contrary to that goal"

- Elon Musk

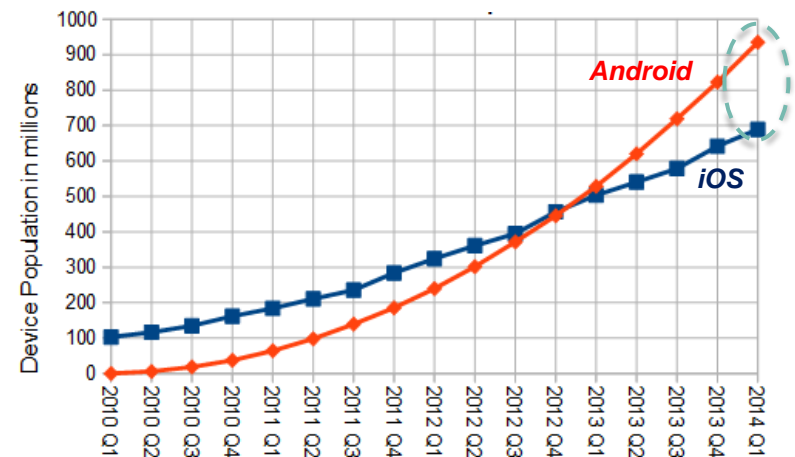
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Google purchased Android for \$50 million in 2005. **Open sourcing** their mobile operating software in 2007 allowed hardware manufacturers to apply free, state of the art operating software to any phone, resulting in the explosion of high-quality smartphones available to consumers...

Case Study: Google Android

- This move benefits Google in several ways. Instead of developing proprietary apps, licensees pay a small fee to run Google's Apps (e.g., mail, maps, etc.). Google earns additional revenue when individual consumers use apps such as Google Play, Google App Store, Search, etc.
- Open sourcing Android has increased competition in the global smartphone market by enabling small hardware manufacturers to compete against giants such as Apple.
- The widespread adoption of Android software has allowed Google to reach over 200 million more people than Apple in the mobile consumer market, despite failing to build a smartphone that can compete with the iPhone.

Android vs. iOS Users Globally

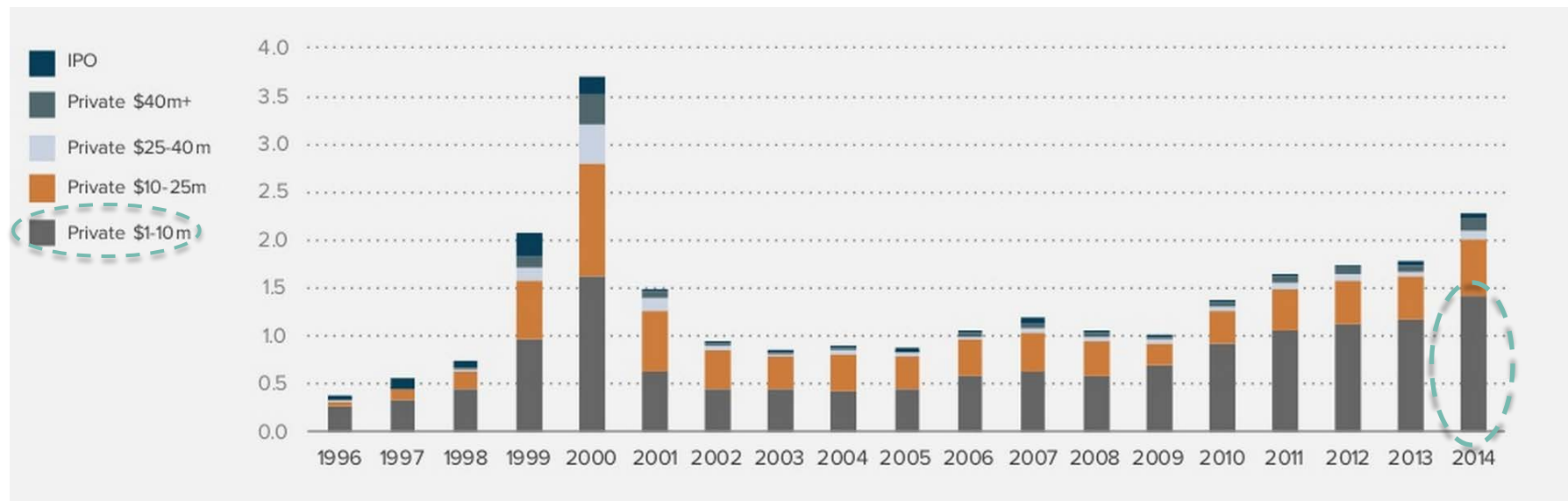


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The drop in barriers to entry caused by cheaper **cloud computing**, **open source tools** and **third-party services** has accelerated the proliferation of startup companies...

Company Fundraising by Round Cohort and Year (in thousands)

Since 2009, the number of companies raising money has doubled. The majority of these companies are in the seed-stage—that is, generally new companies with valuations between \$1-10mm.





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These three forces are accelerating the development of emerging technological fields, notably Machine Learning and Natural Language Processing. These technologies are now being leveraged by entrepreneurs to reshape traditional industries, particularly “unsexy” ones with complex workflow processes where innovation has underwhelmed...

To be continued...



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