



The Geography of the App Economy

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September 20, 2012

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Foreword

Alex Moazed, the founder of Applico, is a 24-year-old CEO. When he started college, his industry didn't exist. Applico hired its first employee in May 2010. At the end of 2011, the company had a staff of 75, and by the end of this year, Moazed could hire his 150th employee.

That's a great example of how fast the app economy works. Since the iPhone debuted in 2007, the app economy has created 519,000 jobs across the U.S. App developers and related personnel work at large tech companies and small development shops. They work for health care systems, non-profits, and government agencies. They start their own businesses, which have the chance to become hugely successful. And, as this research explains, they live and work in every state in the U.S.

This study tells us a little more about where these developers live, work, and innovate. The research maps the burgeoning industry, identifying where the app jobs are located and their effects on local economies. The results are surprising. While traditionally tech-heavy states such as California and Washington top the list as app economy leaders, states such as Texas, Oregon, Colorado, and Virginia are not far behind.

The research suggests that the app economy is borderless and virtually unencumbered by traditional burdens. In previous eras, the goods the U.S. built and shipped globally came with costs for manufacturing plants, warehouses, and shipping. Today, a developer with a computer and a reliable Internet connection can build the next app that will top app-charts globally. App developers, like manufacturers before them, are the men and women who are building the 21st century economy.

CTIA-The Wireless Association® and the Application Developers Alliance, an industry association for software developers, have partnered with South Mountain Economics to deliver a comprehensive analysis of the app economy. CTIA and the Alliance represent a cross section of the mobile app industry – carriers, suppliers, and the developers that give smart mobile devices the power and reach we increasingly can't live without. As this report proves, the app ecosystem is strong, growing quickly, and an increasingly important part of our nation's economy.

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Introduction

Good economic news is hard to come by these days. Nevertheless, parts of the economy have plenty of energy. Perhaps the most vibrant sector? Wireless telecommunications.

Just take a look around you at the astonishing wave of innovations: Smartphones with built-in global positioning receivers, near-ubiquitous broadband wireless connections, social media, and an incredible number of mobile applications. As Federal Communications Commission Chairman Julius Genachowski said, “the U.S. is killing it on mobile innovation.”² All these are coming together to propel the next great boom—the App Economy.

The App Economy is simultaneously global, local, and intensely personal—indeed, it looks like nothing we have seen before. Mobile apps give businesses—including American businesses—the ability to interact with customers and potential customers anywhere in the world, using the smartphone in their hand. At the same time, employees can be armed with apps that allow them to become more productive at work. And ordinary consumers can use mobile apps to find local businesses and connect with nearby friends.

Both businesses and individual users recognize the potential of the App Economy, and are taking advantage of it. According to the Pew Research Center, 45% of American adults owned a smartphone as of August 2012, up from 35% in May 2011.³ The Apple App store contained more than 700,000 active apps as of August 2012, up about 40% since the

¹ We thank June Shelp and The Conference Board for use of The Conference Board Help Wanted OnLine® (HWOL) database. The Conference Board bears no responsibility for the analysis and

² <http://techcrunch.com/2012/09/14/fcc-genachowski-us-killing-it>.

³ <http://pewinternet.org/Reports/2012/Smartphone-Update-Sept-2012/Findings.aspx> (45% of American adults have smartphones, including 66% of those 18-29, 59% of those 30-49; 34% of those 50-64, and 11% of those 65+).

end of 2011.⁴ The number of apps for Android has risen at roughly the same pace over the comparable period.⁵

Not surprisingly, the number of App Economy jobs is soaring. These jobs include app developers, of course—the people who design and create the apps that we all use. But remember that the work does not stop once a company has built a successful app—they have to extend the app to new operating systems, add new capabilities, and respond to customer questions, all of which require paid employees. Someone has to make sure that the apps are secure against hackers and cyber-attack.

But the App Economy generates plenty of non-tech jobs as well. Companies that do app development have to hire sales people, marketers, human resource specialists, accountants, and all the myriad of workers that inevitably make up the modern workforce. Finally, each app developer supports a certain number of local jobs, such as the pizza guys across the street who are making a good living delivering food to late-night software engineers. (The full definition of an App Economy job is found later in this study).

Moreover, as this study will show, App Economy jobs can be found at both small and large enterprises, both tech and non-tech. Indeed, it's astonishing how fast many companies have embraced the App Economy, hiring the workers needed to develop mobile applications at a rapid rate. We are seeing the creation of new specialties and new ways to interact with customers and employees.

Moreover, this rapid growth has generated a large number of new government policy and regulatory questions. Partly in response, a new professional industry association, the Application Developers Alliance, has started up, representing an increasing number of application developers.

National Analysis

How many App Economy jobs are there in the U.S. economy? In our earlier February 2012 report we used an innovative methodology to quantify the demand for App Economy skills by analyzing The Conference Board Help Wanted OnLine® (HWOL) database, a well-organized national database of help-wanted ads.⁶ As The Conference Board notes, the

⁴ <http://148apps.biz/app-store-metrics/?mpage=appcount>.

⁵ <http://www.appbrain.com/stats/number-of-android-apps>.

⁶ Michael Mandel, "Where the Jobs Are: The App Economy," Technet, February 2012.

database “collects data on a daily basis from around 1,000 online job board sources.”⁷

Utilizing that database allowed us to estimate that there were 466,000 App Economy jobs as of the fourth quarter of 2011. This report received extraordinarily wide coverage, and was highlighted by then Chairman Julius Genachowski of the Federal Communications Commission.⁸

In this study, we have updated the earlier national analysis. Our current estimate shows 519,000 App Economy jobs nationally as of April 2012. The methodology can be found in the appendix to this report.

These two numbers are not perfectly comparable because we were unable to adjust for seasonal variation. In addition, we tweaked our methodology between the first report and the second report. However, there is little doubt that App Economy employment rapidly expanded across this period.⁹

<http://innovationandgrowth.files.wordpress.com/2012/06/technet-app-economy-study.pdf>.

⁷ http://www.conference-board.org/pdf_free/press/TechnicalPDF_4500_1338293747.pdf.

⁸ <http://www.fcc.gov/document/announcement-news-apps-challenge>.

<http://www.lautenberg.senate.gov/assets/NJ-APPS-ECONOMY.pdf>.

⁹ Preliminary analysis of July 2012 data suggests that App Economy employment has continued to rise.

Beyond National: The Geography of the App Economy

In this study, we also go beyond the national numbers and examine the geography of the App Economy. The key questions: Where are the new jobs located? What kind of economic benefits is the App Economy bringing to different states around the country?

At a time when state and local governments want to rejuvenate their faltering economies, the App Economy offers real potential. No one is saying that app-related employment is big enough yet to provide widespread growth. But remember that innovation-driven job growth can happen very rapidly.

Indeed, history tells us that every major innovation wave reshapes the economic landscape by creating new centers of growth. The personal computer revolution, for example, brought the rise of a new axis of economic power from Apple and Intel in Silicon Valley to Microsoft in Seattle. Meanwhile, the previous centers of information technology might—IBM in New York and Route 128 in Massachusetts—found the ground softening under their feet.

In this study we estimate the number of App Economy jobs per state as of April 2012. We use online help-wanted ads as a guide to the location of App Economy jobs, under the reasonable assumption that states with more want-ads calling for App Economy skills—such as familiarity with Android, iPhone, or Blackberry app development—will tend to have more App Economy jobs.

The methodology is described in detail in the appendix. Importantly, we note that we closely validated a sample of want ads to verify where the jobs were located.

The analysis generates three types of results. First, we estimate the number of App Economy jobs per state. Table 1 shows the top 15 states, ranked by the number of App Economy jobs as of April 2012 (the full list is found later in the study).¹⁰ The largest numbers of App Economy jobs are found in California, home to App Economy stalwarts such as Apple, Google, and Facebook. The second leading state is Washington, where Microsoft and Amazon make their headquarters.

¹⁰ Preliminary analysis of the July 2012 data shows a very similar ranking. This is discussed further in the methodology appendix.

Table 1

App Economy Employment:
Top States, April 2012

	App Economy jobs* (thousands)
1 California	151.9
2 Washington	49.8
3 New York	39.8
4 Texas	25.0
5 Georgia	24.0
6 Massachusetts	21.4
7 Illinois	19.9
8 New Jersey	19.5
9 Virginia	15.0
10 Florida	14.6
11 Pennsylvania	12.9
12 Oregon	10.8
13 Ohio	10.3
14 North Carolina	9.3
15 Minnesota	9.1

Data: The Conference Board, Bureau of Labor Statistics

Calculations: South Mountain Economics LLC

* Based on methodology described in appendix

Table 2

App Intensity:
Top States, April 2012

	App Intensity (U.S. average =1)
1 Washington	4.47
2 California	2.71
3 Massachusetts	1.71
4 Oregon	1.70
5 Georgia	1.56
6 New Jersey	1.29
7 New York	1.16
8 Virginia	1.04
9 Delaware	0.93
10 Colorado	0.90
11 Illinois	0.90
12 Connecticut	0.88
13 Minnesota	0.87
14 Utah	0.86
15 Maryland	0.84

Data: The Conference Board, Bureau of Labor Statistics

Calculations: South Mountain Economics LLC

*App intensity is the ratio of App Economy to total jobs in a state, indexed to the national average. A higher App intensity means that App Economy jobs make up a larger share of jobs in a state.

Second, to adjust for the size differences between states, we calculate the “App Intensity” of each state. That’s the percentage of App Economy jobs in a state as a percentage of total jobs, indexed to the national average. The higher the App Intensity, the bigger the share of App Economy jobs in that state. In other words, App Intensity measures the importance of App Economy jobs to a state.

Table 2 shows the top 15 states by App Intensity. The top 2 states are Washington and California. Third is Massachusetts, which has a long history as a high tech state, followed by Oregon, Georgia, New Jersey, and New York.

Third, we measure the economic impact of the App Economy, based on the wages generated by App Economy jobs. We closely analyze a sample of want-ads to see what kind of App Economy jobs companies were advertising for—software engineers, user interface developers, or support personnel—and then estimate the average pay for App Economy jobs in that state, using mainly Bureau of Labor Statistics data. Once again, the full methodology can be found in the appendix.

Table 3 shows the top 15 states, in terms of App Economy impact on the state economy, measured as of April 2012. California is the highest by far, with an estimated annual economic impact of \$8.2 billion in App Economy wages, followed by Washington with an estimated \$2.7 billion in App Economy wages. These figures are intentionally estimated conservatively.

Table 3

APP ECONOMIC IMPACT:
TOP STATES, APRIL 2012

	App Economy Economic Impact millions of dollars, annual rate
1 California	\$8,241
2 Washington	\$2,671
3 New York	\$2,313
4 Texas	\$1,183
5 Massachusetts	\$1,143
6 New Jersey	\$1,087
7 Georgia	\$1,062
8 Illinois	\$847
9 Virginia	\$788
10 Pennsylvania	\$632
11 Florida	\$587
12 Oregon	\$526
13 Minnesota	\$475
14 Maryland	\$436
15 Colorado	\$429

Data: The Conference Board, Bureau of Labor Statistics

Calculations: South Mountain Economics LLC

*Methodology described in
appendix. Includes spillover
jobs.

App Economy workers and App Economy employers

Before diving into the analysis, let's start by defining what we mean by an App Economy worker. For this study, a worker is in the App Economy if he or she is in:

- An IT-related job that uses App Economy skills—the ability to develop, maintain, or support mobile applications. We will call this a “core” app economy job.
- A non-IT job (such as human resources or marketing) which supports app developers in the same company. We will call this an “indirect” app economy job.
- A job in the local economy that is supported by app developers. We will call this a “spillover” job.

How do we tell which jobs require App Economy skills? The key is to look at help wanted ads, where companies actually describe the skills and knowledge they are looking for. For example, if a want ad requires that the job candidate have experience developing apps for iOS—the iPhone/iPad operating system—then we can reasonably conclude that the job is part of the App Economy. Similarly, if a want ad calls for experience using the Blackberry API (application programming interface) to develop apps for Blackberry devices, we can be reasonably sure that job is part of the App Economy.

In practice, we compiled a list of key words and phrases that would generally be associated with App Economy-related skills, including iOS, “Blackberry API” “Windows Phone”, and Android. A full list of key words and phrases is found in the methodology appendix, plus additional validation screens that we used to make sure that the advertisements were actually associated with App Economy jobs.

Based on this analysis, the App Economy turns out to be remarkably diverse. The conventional picture of an app developer is a single person working in a basement, or perhaps a small firm with two or three programmers.

However, we found in our study that a surprisingly broad range of enterprises are searching for workers who have the ability to develop, maintain, or support mobile applications. Tiny app developers and mobile broadband providers; tech companies and non-tech companies; multinationals, nonprofits, and the government—it's just amazing the types of enterprises that are hiring app developers these days.

Based on our analysis of want ads, there are ten types of companies who hire App Economy workers:

1. Large, medium, and small app developers, who may be creating apps for themselves or for clients. These companies are the leading edge of the App Economy. At one end of the spectrum we have Zynga, the San Francisco-based game developer with roughly 2800 employees at the end of 2011. Zynga, which went public in December 2011, reported revenues of more than \$650 million in the first six months of 2012, up 25% over a year earlier. At the other end of the spectrum are small firms such as Associated Systems Professionals of Charleston (WV), whose website promises potential clients that “[o]ur Mobile Development team will work with you to bring your design to life.” As of spring 2012, Associated Systems Professionals had 7 employees and 4 partners, all of whom are native to West Virginia.
2. Media and software companies that engage in app development for consumer use under their own name. These days, mobile applications are essential for media and software companies. For example, the sports giant ESPN, based in Bristol, CT, has a growing collection of mobile products. As a result, ESPN was advertising in spring 2012 for positions such as “Senior iOS Mobile Software Engineer,” “Director Mobile Sales and Strategy,” and “Mobile Art Director Digital Media.”¹¹ The demand for app developers is also being fueled by the movement of major publishing companies into the mobile space. For example, in September 2012, The New York Times was advertising for an iOS developer position. Similarly, Dow Jones, the publisher of The Wall Street Journal, was looking for a mobile application developer.
3. Finance and retail companies that use apps to reach customers. Apps are a natural fit for retail and finance companies. In early 2012, for example, @WalmartLabs, an arm of Walmart, announced the acquisition of Small Society, an app developer based in Portland, OR.¹² Walmart has been rolling out increasingly sophisticated mobile apps that have the capability to make in-store shopping easier, including identifying the aisle location of products.¹³ In spring 2012, Zappos, the Las Vegas-based online shoe

¹¹ The want ads highlighted in this paper appeared either on job boards or on the company’s website between April 2012 and September 2012. When a date is not identified, the want ad appeared in April or May 2012. These ads are being used for illustrative purposes only.

¹² <http://blogs.reuters.com/mediafile/2012/01/05/wal-mart-buys-mobile-app-developer-small-society/>.

¹³ <http://walmartlabs.blogspot.com/2012/05/mobilizing-our-store-customers.html>.

retailer (now owned by Amazon), was hiring “mobile QA (quality assurance) engineers.”

On the finance side, virtually every major financial institution has to maintain an active mobile presence, creating the need for App Economy skills. Just to give a couple of examples: In August 2012, Capital One posted an open Virginia-based position for “Senior Manager, Mobile Product Management” to lead a team to develop new mobile products. American Express was advertising in spring 2012 for a “mobile security specialist” to join its Phoenix, AZ, office. According to the ad, good job candidates would be “recognized experts at discovering subtle mobile security issues that appear under unexpected threat scenarios.”

4. Other large non-tech companies that are developing apps for internal and customer use. In every industry, businesses are realizing that apps, and mobile in general, are becoming essential tools for productivity, marketing and customer service. For example, in April 2012, Pfizer—the giant NJ-based pharmaceutical company—ran an ad for “Senior Mobile Application Developer” to “mobile-enable their enterprise and transform their customer facing web presence.” Pfizer has tested the use of smartphones in clinical trials.¹⁴ Similarly, Bendix/King, a Honeywell unit which makes aviation navigation and communication gear, was posting job openings for iOS- and Android-savvy software engineers for its Albuquerque, NM operation.
5. Smaller non-tech firms who need a small number of app developers. Many companies are realizing that apps are essential to their core businesses, so they need to develop in-house expertise. For example, Precision Planting of Tremont, IL, just outside of Peoria, is a leading provider of precision agriculture equipment and software, including an iPad app that displays “instantaneous maps of planter performance.” Not surprisingly, in spring 2012 the company (which was acquired by Monsanto in June 2012) was advertising for an iOS developer to help with its latest product.
6. Nonprofits and government agencies, including the military, which hire app developers directly or indirectly. Faith Comes By Hearing, a religious organization in Albuquerque, NM, produces audio ‘Bible apps’ in hundreds of languages. To help with this endeavor, the

¹⁴ “A Clinical Drug Trial Via Phone, Computer,” Wall Street Journal, June 7, 2011, <http://online.wsj.com/article/SB10001424052702304432304576369840721708396.html>.

organization ran an ad in spring 2012 for a programmer to use his or her talents “for an eternal purpose.” On another page altogether, CACI International—a large IT consulting firm with specialties in defense, intelligence and homeland security—advertised in spring 2012 for a software engineer with security clearance, to help develop mobile apps at the Aberdeen Proving Grounds in Maryland, with a particular emphasis on cryptography and security vulnerability analysis.

7. Support companies to help manage all the new technology. The growth of mobile has created opportunities for fascinating new types of companies that hire mobile developers. For example, Baltimore MD-based Millennial Media, which went public in early 2012, provides a platform by which ads can be delivered to apps, which means it has to hire software engineers with App Economy skills. Millennial Media more than doubled in size from 119 employees at the end of 2010 to 295 employees at the end of the second quarter of 2012.
8. Large companies—including Amazon, Apple, Google, Microsoft, and RIM—that develop and maintain mobile app ecosystems/platforms. Of course, these companies are among the largest employers of App Economy workers, since they are simultaneously engaged with maintaining their ecosystems/platforms and with developing their own apps. It should be noted that even those companies based on the West Coast have App Economy employees across the country.
9. Large tech companies who develop essential infrastructure and complementary technologies for the app economy. The mobile infrastructure includes large wireless broadband providers, handset makers, and chip companies. As a scan through the want ads showed, all of these companies have a great need for tech personnel who are app-savvy. For example, Sprint, based in Overland Park, KS (outside of Kansas City) has been advertising for mobile application developers. Similarly, Verizon has been advertising for positions requiring experience developing mobile apps.
10. Accounting and IT consulting firms, who provide app development as part of a larger suite of services. This separate but very important category of App Economy employers includes large operations such Deloitte and the consulting arms of companies such as IBM, who hire consultants that are fluent in mobile applications, as well

as app developers. For example, as of September 2012 Deloitte Digital's office in Denver, Colorado was advertising for mobile software engineers and mobile interaction designers.

In future work we intend to quantify the number of App Economy jobs in each category. That's not an easy task, because many want ads are placed through employment agencies and job boards without identifying the ultimate client. However, it is clear that each of these categories includes a significant chunk of employment.

Table 4: Types of App Economy Employers

1. Large, medium, and small app developers, who may be creating apps for themselves or for clients.
2. Media and software companies that engage in app development for consumer use under their own name.
3. Finance and retail companies that use apps to reach customers.
4. Other large non-tech companies that are developing apps for internal and customer use.
5. Smaller non-tech firms who need a small number of app developers.
6. Nonprofits and government agencies, including the military, which require app developers to perform their functions.
7. Support companies to help manage all the new technology.
8. Large companies such as Amazon, Apple, Google, Microsoft, and RIM, who develop and maintain mobile app ecosystems/platforms.
9. Large tech companies who develop essential infrastructure and complementary technologies for the app economy.
10. Accounting and IT consulting firms, who provide app development as part of a larger suite of services.

Data: South Mountain Economics LLC

The Role of the App Economy in Economic Development

In this time of sluggish economic growth, the jobs and income generated by the App Economy are a welcome addition to almost any state or locality. But there's more—it may turn out that the App Economy offers unique opportunities for economic development, especially for an area that can harness local universities, an educated workforce, and desirable amenities such as quality of life and ease of recreation.

We've already mentioned that the App Economy is global, local, and personal simultaneously. What does this mean for economic development? The first point is that any app is exportable, in the sense that it can be downloaded from an app store by anybody around the world. That means any App Economy firm can potentially become an engine of growth for a state or a city by writing a mobile application that is nationally or even globally successful.

The second point is that apps can improve the efficiency and attractiveness of the local economy. All across the country we're seeing apps written specifically to make it easier for residents to connect with local businesses, cultural institutions, and government agencies. For example, municipalities such as San Jose, CA, and San Antonio, TX, have adopted apps developed by App-Order.com of Las Vegas, NV, which allow citizens to take pictures of a problem, such as graffiti or litter, and immediately send a picture and location to the appropriate department.¹⁵

The third point is that the App Economy offers up new opportunities for economic development. Without much investment in physical capital, App Economy firms can be globally competitive almost immediately. The key is to have a local college or university, a workforce with the right skills and education, and local amenities that can attract young entrepreneurs and creative types. Indeed, the App Economy workforce seems to epitomize the "Creative Class" described by Richard Florida—mobile, educated, creative, and drawn to exciting and diverse urban areas.¹⁶

¹⁵ "Keeping SAN JOSE CLEAN is now just a click away," press release, San Jose City Government, January 12, 2012. http://www.sanjoseca.gov/prns/antigrffiti/docs/Graffiti%20APP_News%20Release.pdf.

See also <http://www.sanantonio.gov/ces/graffiti.aspx>.

¹⁶ Richard Florida, *The Rise Of The Creative Class: And How It's Transforming Work, Leisure, Community And Everyday Life*, 2002.

Table 5	
THE APP ECONOMY AND EDUCATION	
Ranked by App Intensity	Average College Attainment*
Top 10 States	32.3%
#11-20	29.9%
#21-30	26.3%
#31-40	24.8%
Bottom 10 States	23.5%
* Share of adult population with bachelor's degree or more, 2010. Data: Census Bureau, The Conference Board, South Mountain Economics LLC	

In the era of the App Economy, one crucial ingredient for economic development is having an educated and talented workforce. Our data allows us to compare state App Intensity with level of college attainment. Perhaps not surprisingly, we find that states with a higher App Intensity tend to have better educated workforces.

Table 5 shows that in the top ten states, ranked by App Intensity, more than 32% of adults 25 and over have a college degree, on average, as of 2010. By comparison, in the bottom ten states, ranked by App Intensity, less than 24% of adults have a college degree. The state with the lowest App Intensity, West Virginia, also has the lowest level of college attainment. The only two states that fall out of line are California and Washington, which have many more App Economy jobs than their education levels would warrant. That's the benefit of being home to the central firms of the App ecosystem.

This raises the question of whether education can be an effective tool for attracting App Economy jobs. Colleges across the country have started offering courses and programs in how to create mobile apps. For example, Mid-State Technical College in Wisconsin is planning to offer a 10-credit advanced technical certificate for developing mobile

applications.¹⁷ Meanwhile Full Sail University, a for-profit university based outside of Orlando, FL, is offering a 32-month online bachelor's degree in mobile development with tuition and fees totaling about \$60,000.¹⁸

Case Study: Louisiana Economic Development

Louisiana is currently #48 on the App Intensity measure. But judging by recent events, the state should soon be moving up the rankings. In recent years Louisiana has made a major effort to attract app developers and other info tech jobs, and that effort seems to be bearing fruit. By offering a variety of incentives—especially help in training and staffing—Louisiana was able to convince Gameloft, a multinational game developer headquartered in France, to open up a 'studio', or game development office, in New Orleans. As of May 25, 2012, Gameloft was advertising for 18 different positions in the New Orleans area. These included a Social Game Designer, "responsible for the design of top social games on platforms like the iPhone, Facebook and other social networks." Meanwhile, Louisiana was also able to attract an Electronics Art 'quality assurance center' to Baton Rouge which now employs 400 workers, with plans to grow to 600 when the center moves to its permanent facility in fall of 2012.

According to Stephen Moret, Secretary of Louisiana Economic Development, the state would like to add 10,000 jobs in this sector in the next 7-10 years. The single biggest challenge, says Moret, is building up talent. So the state and key local educational institutions are working out new practice-oriented degree programs that would focus on tracks such as global tech, enterprise software, and entertainment. The hope: That with enough talent, Louisiana can build on its other assets, such as its creative culture, lower cost of living and positive business climate.

¹⁷ "Mobile Apps certificate another advance in technology learning," Mid-State Technical College, June 2, 2012, <http://www.mstc.edu/about/2012/20120605.htm>.

¹⁸ <http://online.fullsail.edu/degrees/mobile-development-bachelors/outcomes-and-statistics> (downloaded September 11, 2012).

Job Growth and the App Economy

How much can the App Economy contribute to overall job growth? History offers two potential lessons. On the one hand, the personal computer revolution and the Internet-driven New Economy of the 1990s created millions of IT-related jobs. From the introduction of the first Apple computer in 1976 to 2000, the number of jobs in the computer hardware, software and data processing industries rose from 800,000 to more than 3 million. Areas such as Silicon Valley, Austin and Seattle became tech havens, and tech drove a new economic geography for the country.

On the other hand, tech employment growth was negligible or even negative during the 2000-2007 business cycle. Most tech hardware production was permanently shifted overseas. Meanwhile, employment in both the software and "internet publishing" industries fell sharply for years after the 2000-2001 tech bust. Indeed, a big part of the shortfall in jobs in the 2000s came from the poor performance of tech.

We believe that the App Economy should be seen as a much-delayed continuation of the personal computer revolution and the New Economy, from personal computers to internet to mobile. Looking back, we will see the sluggishness of tech employment in the 2000s as an aberration.

The App Leaders: States #1-15

	App Intensity	App Economy jobs	App Economy economic impact
	(U.S. average = 1)	(thousands)	(millions of dollars, annual rate)
1 Washington	4.47	49.8	\$2,671
2 California	2.71	151.9	\$8,241
3 Massachusetts	1.71	21.4	\$1,143
4 Oregon	1.70	10.8	\$526
5 Georgia	1.56	24.0	\$1,062
6 New Jersey	1.29	19.5	\$1,087
7 New York	1.16	39.8	\$2,313
8 Virginia	1.04	15.0	\$788
9 Delaware	0.93	1.5	\$76
10 Colorado	0.90	8.1	\$429
11 Illinois	0.90	19.9	\$847
12 Connecticut	0.88	5.6	\$294
13 Minnesota	0.87	9.1	\$475
14 Utah	0.86	4.1	\$192
15 Maryland	0.84	8.4	\$436
All figures estimated as of April 2012. Includes spillover jobs.			
Data: The Conference Board, Bureau of Labor Statistics			
Calculations: South Mountain Economics LLC			

We start with the top 15 states, as measured by App Intensity. This list is led by Washington (#1 on the list) and California (#2), homes to Microsoft, Amazon, Google, Apple, and Facebook. With the exception of Research in Motion (based in Ontario, Canada), these are the companies creating the platforms or ecosystems for apps. It's not surprising that Washington and California score so high on app intensity.

But the App Economy goes well beyond these platform-creating companies. For example, a prototypical App Economy company is Square, a San Francisco-based start-up. Square offers an app that helps the smallest of businesses take credit cards from customers, using only the app, a smartphone, and a small card reader. For Square, hiring workers to design, build, maintain, and support its iOS and Android apps is an essential part of doing business, just like steel and tires are essential to making cars.

Virtually all of the major tech companies have been hiring mobile app developers and related personnel. For example, eBay has been searching for an Android Architect for its operation in Portland, OR, a state ranked #4 on the App Intensity list. EMC, the giant maker of data storage devices, wants a visual designer for apps for its Santa Clara, CA, office. Or, as the help-wanted ad put it: "A creative design sensei, channeling your brilliance into graphic assets for visual components of mobile applications."

On the other side of the country the App Economy in New York, #7 on the list, has been driven by media, finance, retail, and advertising. A recent report noted that "riding a wave of start-ups, New York has emerged a national leader in fields that leverage the Internet and mobile technologies."¹⁹

Applico, a successful app development firm based in New York City and founding board member of the Application Developers Alliance, hired its first employee in May 2010. In September 2012 Alex Moazed, founder and CEO of Applico, projected that the company would go from 75 workers at the end of 2011 to perhaps 150 workers by the end of 2012.

Massachusetts (#3 on the App Intensity list) has also enthusiastically joined the App Economy, propelled by the state's outstanding institutions of higher education and long history of tech prowess. For example, Greg Raiz, who graduated from Tufts University, founded RaizLabs, an app developer based in Brookline, MA. RaizLabs has designed and built more than 50 mobile apps over the past five years, including apps for Bloomingdale's, Benjamin Moore Paints and the Massachusetts Institute of Technology. As of September 2012, Raiz employs over 20 workers, with a couple of offers outstanding.

Every state has its particular App Economy story. Virginia (#8 on the App Intensity list) and Maryland (#15) are both benefiting from hefty spending for military and government-related app development. In New Jersey (#6), it's communications plus finance, since large Wall Street firms maintain huge back offices across the river in Jersey City. Firms such as Goldman Sachs and Morgan Stanley deliver research to their clients via iPad apps.

In some cases we see small app developers who have achieved enormous success. In Lakewood, CO (#10), Healthagen, founded by two

¹⁹ "New Tech City," Center for an Urban Future, http://www.nycfuture.org/images_pdfs/pdfs/NewTechCity.pdf.

emergency room physicians, launched iTriage, an app that helps people figure out what could be wrong with them, based on their medical symptoms. The popularity of this app led to the company's expansion and subsequent acquisition by Aetna in fall of 2011. As you might expect, as of September 2012 the company was advertising for a variety of software engineers and interface designers with App Economy skills.

Case study: Airwatch, Atlanta, Georgia

One reason why Georgia shows up as #5 on the App Intensity list is the presence of companies such as Airwatch, founded in 2006 by Alan Dabbiere. Airwatch is one of the leading creators of software that enables companies to manage both smartphones provided to employees and personal smartphones used for work. Airwatch's software configures the smartphones, provides content and app management, and enforces security. "We provide the software for 2500 customers," said Dabbiere in June 2012. "We're signing up 400 new customers a month, and our target market is anybody with a phone."

Given the nature of the business, it's not surprising that Airwatch hires a lot of app-savvy software engineers. Airwatch has gone from 150 people 18 months ago to more than 650 people as of June 2012, said Dabbiere, with more than 250 of those employees involved in product development. He expected to get to 1000 by the end of the year, which would make Airwatch one of the fastest growing employers in Atlanta.

Because many of Airwatch's clients are large multinationals, Airwatch "had to be global almost immediately," says Dabbiere. "The world today is dragging you into it."

App Clusters: States #16-30

	App Intensity	App Economy jobs	App Economy economic impact
	(U.S. average = 1)	(thousands)	(millions of dollars, annual rate)
16 Arizona	0.70	6.8	\$308
17 North Carolina	0.60	9.3	\$415
18 Texas	0.59	25.0	\$1,183
19 Pennsylvania	0.58	12.9	\$632
20 Rhode Island	0.57	1.0	\$45
21 Michigan	0.54	8.4	\$364
22 Ohio	0.51	10.3	\$424
23 Wisconsin	0.51	5.3	\$222
24 Florida	0.50	14.6	\$587
25 New Hampshire	0.48	1.2	\$49
26 Kansas	0.47	2.5	\$112
27 Nevada	0.43	1.9	\$90
28 Idaho	0.38	0.9	\$32
29 Missouri	0.36	3.8	\$169
30 Vermont	0.32	0.4	\$16
All figures estimated as of April 2012.			
Data: The Conference Board, Bureau of Labor Statistics			
Calculations: South Mountain Economics LLC			

We can find App Economy clusters all across the country—areas where there's a healthy pool of app-savvy workers and companies who will hire them. One such cluster can be found in the metro region of St. Louis, MO (#29 on the App Intensity list), home to such companies as Integrity, a digital marketing agency that builds mobile apps and sometimes uses the phrase “Proudly designed in St. Louis.” Graphite Lab is a video game and website developer that was advertising for a mobile development programmer earlier in 2012. St. Louis-based Coolfire Solutions is an app developer that does the normal sort of commercial work, but also focuses, as the website says, on “creating solutions for the military and intelligence communities. Boom.” As of September 2012, Coolfire was advertising for mobile application engineers as the company works to expand its international sales.

Often App Economy clusters form around universities. One such cluster can be found in Austin, TX (#18 in App Intensity). One of the major app

developers in the country, Mutual Mobile, was founded in 2009 by several University of Texas students and now has clients such as Google and Cisco. A March, 2012 article by the Austin American-Statesman reported that the company had 160 employees in Austin, plus more in its Indian office.²⁰ Austin-based Chaotic Moon Studios, founded in 2010, has built apps for Pizza Hut and FlightAware, among other high-profile clients.²¹

We can see the beginnings of an app cluster in Madison, WI (#23), home of the University of Wisconsin. One local star is PerBlue, a startup company making multiplayer mobile games such as Parallel Kingdom and Parallel Mafia. The company was started by two University of Wisconsin students, and continues to maintain strong ties with the School of Engineering & the School of Business. PerBlue employed 43 employees in Madison as of June 2012 and hopes to expand to 65 workers over the next year.

And there may even be a cluster emerging in the area around Detroit, MI, a state which perhaps surprisingly places at #21 on our list. The Detroit metro area is home to app developers such as Detroit Labs, which was founded in 2011 and already had 23 employees as of June 2012; and jacApps, which is best-known for the apps that it designs for radio stations, both in the U.S. and around the world. Perhaps coincidentally Livio Radio, also based just outside of Detroit, designs apps and related hardware specifically intended to stream internet radio to cars. Livio's slogan? "More Music, Less Work." Meanwhile Detroit-based Quicken Loans, the top online mortgage lender in the country, is advertising for developers to help create new mobile applications for iOS, Android, and other platforms.

An interesting cluster is found in the Dallas, TX, metro region. Bottle Rocket Apps, creator of high-profile apps for National Public Radio and SPIN magazine, was advertising for several Android and iOS developer positions as of September 2012. The area also has several app development companies that have a strong presence in both the U.S. and overseas. For example, Copper Mobile, with clients such as Cisco, Coca-Cola and Verizon, has offices in Dallas, London, and Noida, India. Mobile developer [x]cube LABS has its headquarters and design operations in Dallas, but it does research in New York City and engineering in Hyderabad, India.

²⁰ <http://www.statesman.com/business/technology/austin-works-to-become-hub-for-mobile-internet-2231740.html>.

²¹ <http://www.statesman.com/business/technology/austins-quirky-chaotic-moon-making-splash-in-mobile-2442321.html>.

This combination of offshore and onshore app development seems to be increasingly common, especially as domestic app developers have difficulty finding sufficient talent to meet the demand. Part of the implication is that ramping up education and talent development has the potential to generate more App Economy jobs in the United States.

Case Study: Appek Apps, Scranton, Pennsylvania

Scranton, PA is home to Steamtown National Historic Site, a collection of steam locomotives harkening back to the era of coal and steel. It's also home to Appek, a mobile application developer started by two college graduates. Originally, says founder Adam Ceresko, they built an iPhone app so that Penn State students could get information about bus schedules. After graduating, they started the business in Scranton because it was their hometown, and because of the cheap cost of living.

But the location paid off in other ways as well. The company was able to get local angel investor funding. In addition, Appek was able to take advantage of economic incentives such as Keystone Innovation Zones and Keystone Opportunity, which give the company tax breaks and access to such programs as subsidized interns.

As a result the company was able to expand. As of June 2012, employment stood at 11, mostly in tech occupations. It's true, notes Ceresko, that there are less networking opportunities in Scranton than in larger markets. Yet technology partly makes up for that.

App Diversity: States #31-50

		App Intensity	App Economy jobs	App Economy economic impact
		(U.S. average = 1)	(thousands)	(millions of dollars, annual rate)
31	Maine	0.29	0.7	\$25
32	Indiana	0.29	3.2	\$129
33	Nebraska	0.26	1.0	\$38
34	Oklahoma	0.26	1.6	\$54
35	Kentucky	0.25	1.8	\$66
36	Iowa	0.24	1.4	\$49
37	South Carolina	0.20	1.5	\$57
38	South Dakota	0.19	0.3	\$12
39	North Dakota	0.19	0.3	\$11
40	Tennessee	0.19	2.0	\$80
41	Alabama	0.19	1.4	\$54
42	Hawaii	0.19	0.4	\$19
43	New Mexico	0.14	0.5	\$18
44	Montana	0.14	0.2	\$8
45	Alaska	0.12	0.1	\$6
46	Arkansas	0.11	0.5	\$22
47	Mississippi	0.10	0.4	\$17
48	Louisiana	0.10	0.8	\$29
49	Wyoming	0.06	0.1	\$2
50	West Virginia	0.03	0.1	\$3
All figures estimated as of April 2012.				
Data: The Conference Board, Bureau of Labor Statistics				
Calculations: South Mountain Economics LLC				

Even states with a low App Intensity can have remarkably diverse App Economy hiring activity and potential for future growth. For example, earlier in this report we mentioned Louisiana's successful attempt to attract a major app developer, Gameloft, to the state. But that's really just the tip of the iceberg for App-related job growth, even in states with a relatively small App Economy presence.

For example, take South Dakota, #38 in our ranking of states by App Intensity. In spring 2012, the Sioux Falls, SD, office of Jack Henry & Associates—a large Missouri-based provider of technology services to financial institutions—was advertising for software engineers with expertise

in mobile application development. In Fargo, ND—#39 on our list—the app developer Myriad Devices developed the Winter Survival Kit, an app that gives you guidance when your car stalls out in frigid weather. Myriad, founded in 2010, had a total of 15 employees in North Dakota as of June 2012.

In Westbrook, ME, IDEXX Laboratories, which supplies veterinarians around the world with diagnostic and IT-based products, was advertising in spring 2012 for a visual interface expert to design websites, small screen mobile applications, and handheld tablets. West Virginia is home to Mobile Main Street, a nonprofit project developed by the West Virginia University School of Journalism to create an open source, community-based mobile publishing system. It is designed specifically for rural areas, able to easily take in news and information from a wide variety of sources such as local small businesses, historical attractions, community voices, and local publishers, and distribute it through an application via smartphone.

Finally, the App Economy has not bypassed Alaska, #45 on the App Intensity list. Anchorage-based Catapult Consulting has created apps for Bacardi and for the Alaska Channel, as well as a high-profile iPhone war game. Catapult draws equally on talent in Alaska and around the country, but the two co-founders both went to University of Alaska and stayed in the state because of the quality of life.

Case Study: Apax Software, Lexington, KY

When Brian Raney graduated from the University of Kentucky in 2006 with a computer science degree, his choices were to take a software developer job or start his own company. He made an appointment to speak with Lee Todd, then president of the university, who had founded two tech companies of his own. "He told me 'Brian, if you truly want to be an entrepreneur then just do it. You'll always be able to get a job in a year or two if it doesn't work out,'" says Braney. "I walked out of his office and decided to start my own software company."

The moment turned out to be propitious. Raney started Apax Software in Lexington, KY (#35 on the App Intensity list) just as the iPhone was coming on the market, putting him out ahead in the mobile app market. Since then, his company has produced apps such as a survey app for University of Kentucky researchers that replaces paper forms, an app that allows you to order Papa John's pizza right from your smartphone, and TakeltArtSide, an app that allows people in the Lexington area to locate art near them.

As of June 2012, his company had six full-time and six part-time employees, and he anticipated hiring one or two more app developers with the right experience. From Raney's perspective, the advantage of locating in Lexington was the low cost of living, which meant he could offer lower rates than competitors in larger markets such as New York and Atlanta. "There are more software companies starting in the area than you might think," says Raney.

To encourage more tech startups in the state, Raney points to the need for less regulation. "Starting a company is enough work without worrying about which forms to fill out or which taxes you might be forgetting to pay." That having been said, he notes that "Lexington does a good job creating an entrepreneur-friendly ecosystem." The downside of Lexington is that it's tougher to find companies to partner with, and finding talent is hard. But, says Raney, "this is a problem everywhere."

Raney expects huge growth in the mobile industry. "Companies are asking for mobile app versions first before website."

Appendix: Methodology

In our earlier paper, we developed a methodology for tracking App Economy jobs based on online want ads. The basic idea was that we were looking for want ads, which call for 'app economy' skills, such as familiarity with Android programming. In that initial study, we developed a list of key words and phrases to identify App Economy ads, and then used that information to develop a national estimate of App Economy jobs as of the fourth quarter of 2011.

In this study we use an improved version of the same methodology to estimate App Economy jobs by state. The first step is to identify App Economy want ads for the month of April 2012.²² These want ads had to be addressed towards mathematical and computer occupations, and to include one or more of the following key words or phrases:

Android; "Blackberry API"; "Facebook API"; iOS; iPad; iPhone; "mobile app"; "mobile apps"; "mobile applications"; "web app"; "web apps"; "Windows Mobile"; and "Windows Phone."

To improve the quality of the results, we also omitted ads that included either 'Cisco' or 'routers, ' since Cisco's operating system for routers and switches is also called by the initials IOS (with a capital 'I'). In addition, we made an adjustment because one important job board was using boilerplate that contained some of our key words. Finally, we tested alternative key word lists and found little qualitative change in the nature of our results.

This procedure yielded a figure for each state for help-wanted ads listed in April 2012 for computer and mathematical occupations requiring App Economy skills. In total, this was approximately 25,000 ads.

²² In the initial study we used a 3-month window, but the 1-month window seems to generate fewer problematic results for small states because it included fewer stale ads.

Table 6 Methodology Summary

1. Identify App Economy help-wanted ads by state for April 2012

Using The Conference Board Help-Wanted Online database, for each state we identify help-wanted ads for computer and mathematical occupations containing one of the following key words or phrases: Android, "Blackberry API", "Facebook API", iOS, iPad, iPhone, "mobile app", "mobile apps", "mobile applications", "web app", "web apps," "Windows Mobile," "Windows Phone". *

2. Estimate validation rate by state

We estimate a "validation rate" for each state by closely examining a sample of want ads for that state to confirm that they refer to a local App Economy job. Ads are scored for quality—the specificity of the job to that state.

3. Estimate want-ad to employment ratio for core App Economy jobs

We estimate the ratio between the number of want ads and the number of corresponding tech jobs, using April 2012 data from The Conference Board and the Bureau of Labor Statistics on want-ads and employment for web developers, computer software engineers, and computer programmers.

4. Estimate ratio of core App Economy jobs to non-IT (indirect) App Economy jobs

We estimate the ratio between the number of core App Economy jobs and indirect App Economy jobs, using anecdotal data and The Conference Board data on want ads for a sample of pure app economy companies.

5. Estimate job creation multiplier

We estimate the total number of jobs created given the spillover effects of app economy jobs, based on our judgmental and conservative assessment of research on job multipliers.

*In addition, as described in the text, we omit ads that contain certain key words such as router and Cisco.

The second step, new to this study, was to validate the want ads for location and content. That is, we sampled roughly 500 ads across states, or 2% of the total number of ads. We closely examined these ads to ensure that they were truly picking up valid jobs for those states. In cases where the location or content of the job seemed ambiguous, we gave it a partial score.

We found that roughly 83% of the ads were valid by location and content nationally, after adjusting for quality.²³ For individual states, the estimated validation ratio ranged from 39% to 100%.

At this point in the process we constructed an adjusted validation ratio for each state by averaging the original state validation ratio with the national ratio. This was done to avoid unfairly penalizing a state because of weak hiring in one month. In addition, for a small number of states we manually recalculated the adjusted validation ratio to better reflect the whole sample.²⁴ For each state, we multiplied the adjusted state validation ratio by the raw number of App Economy want ads to get an adjusted number of want ads.²⁵

The next step was to estimate the number of jobs based on the number of want ads. In the earlier study, we matched want ad data on all computer and mathematical occupations from The Conference Board with comparable occupational data from the Bureau of Labor Statistics. In that study, with a three-month window for ads, each ad corresponded to roughly 3.5 core App Economy jobs.

For this study we refined the procedure by focusing on the main App Economy occupations. We compared the April 2012 total of ads for web developers, computer software engineers, and computer programmers with the April 2012 total of jobs in these occupations reported by the Current Population Survey. This yielded a ratio of one want ad for every 7.2 jobs.

We used this 7.2 multiplier to go from the number of App Economy want ads to the number of App Economy core jobs. Please note that changing this ratio would not change the ranking of states.

Next we estimated the number of non-tech jobs at app developers. Looking at several App Economy firms suggested that on average, the number of non-tech jobs at app developers was roughly equal to the number of tech jobs. So we used a multiplier of 2 to go from the number of core App Economy jobs to core plus indirect jobs.

²³ We should note that as a check, we examined roughly 1600 ads for the 3-month window ending March 31, 2012, and got roughly the same results.

²⁴ This step could perhaps be avoided by expanding the sample. But there still would be no guarantee that one month's results would match the next month's. We felt more comfortable using the average of the state and national validation ratios.

²⁵ Please note that the aggregate figures include the District of Columbia, which is not ranked in the state lists.

And finally, we use a spillover coefficient to estimate the number of jobs created in the rest of the state economy by the core and indirect App Economy jobs. In the previous study we used a very conservative multiplier of 0.5. For this study, we raised the multiplier slightly to a still conservative 0.7, based on critiques of the previous study.

This procedure for calculating App Economy jobs seems to be fairly robust, but there are several reasons to be cautious. First, App Economy work can often be done remotely, by people living in a state different from the employer. We tried to weed out these situations, or assigned them lower quality rankings in the validation process, but they still might have sneaked through.

Second, our procedure relied on published want ads. As a result, we are omitting the one or two person shop that either doesn't hire, or hires by word of mouth.

Third, it's possible that taking one month of want ads (April 2012) gives unrepresentative results. That's a special concern for states with a relatively low number of App Economy jobs, such as West Virginia and Alaska.

To address this issue, we ran two alternative analyses. Using a three-month window for want ads rather than a one-month window gave us roughly the same results. In addition, when we compared the rankings from April 2012 data to the rankings from a preliminary analysis of July 2012 data, we found relatively small differences. For example, the list of the top 15 states, ranked by App Intensity, was almost identical in the April 2012 and preliminary July 2012 data, with only one state dropping out of the top group. Overall, the median absolute difference in App Intensity ranking between the April 2012 data and the preliminary July 2012 data was only 2, while the mean difference in App Intensity ranking was only 3.

Economic impact

We want to calculate the economic impact of App Economy jobs, as reflected by wages paid. How did we go from the want ads to pay? Some want ads contain salaries or salary ranges. When they did, we used the stated salary or the midpoint of the salary range.

However, the vast majority of want ads did not have explicit salaries. We took a sample of 500 App Economy want ads, and classified the ads by

occupation and by level. These occupations and pay levels were mapped into state-level data from the Bureau of Labor Statistics Occupational Employment Survey for May 2011.

This procedure allowed us to estimate the average salary level for core App Economy jobs in each state. We assumed that workers in indirect App Economy jobs receive the same salary as workers in core App Economy jobs. We also assume that workers in spillover App Economy jobs received the median annual salary for that state. For each category, we multiplied the salary by the number of App Economy jobs, and then added these figures for all three categories to get total wages paid. Finally, based on our judgmental assessment of the content of the want ads we examined, we reduced this figure by one-third to account for the fact that some App Economy jobs include a mixture of App Economy and non-App-Economy tasks.

Several important caveats are essential here. First, this process of calculating App Economy pay is by necessity indirect and imprecise, since we don't observe the pay of App Economy workers directly. Second, we have no information about the nature of spillover jobs, and assigning them the state's median pay may err on the side of being too high or too low in some cases. Third, we could have chosen to use the full wage of App Economy workers to estimate economic impact. Finally, we are not including benefits such as healthcare in our estimate of economic impact. Using the full wage and adding benefits in could substantially increase our estimates. However we feel comfortable with the figures in this report as a conservative calculation.

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