progressive
policy
institute

ppi

Jobs in the Australian App Economy

BY DR. MICHAEL MANDEL   JULY 2014

INTRODUCTION

Is Australia ready for the digital economy? This is obviously a subject of great debate, intertwined with decisions about investments in the National Broadband Network and public concerns about data privacy.

It is clear that some parts of the Australian digital economy, notably mobile communications, are quite vibrant. Two recent reports from the Australian Communications and Media Authority show the strength of this sector.[1]

- The number of Australians using the Internet via their mobile phone rose 33% from June 2012 to June 2013.

- The number of Australians with a smartphone rose by 29% from May 2012 to May 2013.

- Mobile broadband boosted Australia's economic activity in 2013 by an estimated $34 billion (AUD).

In this study, we focus on one particular aspect of the mobile boom: The number of Australian jobs created in Australia's 'App Economy'. Australia has a large number of app developers—these are the people who design and create the apps distributed by small and large companies, nonprofits, and government agencies. 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.

But building a successful app is not a one-shot deal. Think of an app like a car—once built, it still needs to be repaired (in the case of bugs or security risks), updated, and maintained. And just as the automobile industry supports a large number of workers, from engineers to factory production workers to sales to service stations, so too does the App Economy support a significant number of workers.

About the author
Dr. Michael Mandel is the chief economic strategist at the Progressive Policy Institute and a senior fellow at Wharton's Mack Center for Technological Innovation.

An Australian company that does app development has 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. (The full definition of an App Economy job is found later in this study).

In this report we estimate that the Australian App Economy employed roughly 140,000 workers as of June 2014. The top state was New South Wales, with 77,000 App Economy jobs, but every state had some App Economy employment. Moreover, we note that Australia stacks up well against the United States and the United Kingdom when it comes to App Economy employment per capita.

THE ROLE OF THE APP ECONOMY IN ECONOMIC DEVELOPMENT

Before getting into the details of the Australian App Economy, we ask a broader question: How much can the App Economy contribute to overall job growth? Looking backwards, there are two lessons from recent history. On the one hand, the personal computer revolution and the rise of the Internet created millions of IT-related jobs globally. In Australia, the number of people working as IT professionals nearly doubled from the early 1990s to the early 2000s. The size of the "computer systems design" industry—which includes custom computer programming and software services— went from less than 25,000 workers in 1990 to over 130,000 at the end of 2000.[2] The employment gain in this industry alone accounted for roughly 10% of the job increase in the entire Australian economy over this 10-year period.

On the other hand, tech employment growth was negligible from around the end of 2000 to roughly 2007. The number of IT professionals in Australia stayed at roughly the same level, and employment in the "computer systems design" industry shrank somewhat.

The first iPhone shipped in the United States in the middle of 2007, and the first smartphone powered by Android came out in 2008. This signaled the beginning of a new era of mobile broadband, and mobile applications, in Australia, the United States, and the United Kingdom. The result: An explosion of jobs.

Figure 1 examines employment growth in two key tech-related sectors over the past six years, starting with the 12 months ending May 2008 to the 12 months ending May 2014. This represents the entire smartphone era to date. As noted above, the "computer system design" industry includes computer programming and custom software development, which means it is the logical classification for most app development firms. The "tech/info" sector, as defined in earlier studies, is a broader classification which includes the computer system design industry; content creators such as publishers, television, and movie production companies; internet companies; and telecom companies (including mobile).[3] As we will see, the reason for showing the tech/info sector is that Internet firms and content creators are important sources of mobile apps as well.

Figure 1 shows Australia outperforming both the United States and the United Kingdom in these two key tech-related sectors since 2008. For example, employment in the Australian computer systems design industry has risen by more than 38% since 2008, compared to a 22% gain in the United States and only a 10% gain in the United Kingdom.

True, part of this outperformance may be due to Australia finally catching up to other countries. However, it's worth noting that the computer systems design industry amounts to 1.6% of overall employment in the Australian economy, compared to 1.2% of the U.S. workforce. Moreover, the 38% employment growth in the Australian computer systems design industry since 2008 has far outstripped the overall employment gain of 8% in the rest of the Australian economy, perhaps driven in part by the growth of app developers.

These figures all suggest that the digital sector may be a potential strength of the Australian economy. Consider the broader tech/info sector, which includes both tech-related firms and content producers such as publishers, record companies,

and filmmakers. Despite the changes required by the digitization of content, employment has risen by 5% in the Australian tech/info sector since 2008. This surpasses the job growth in the tech/info sector in both the United States and the United Kingdom.
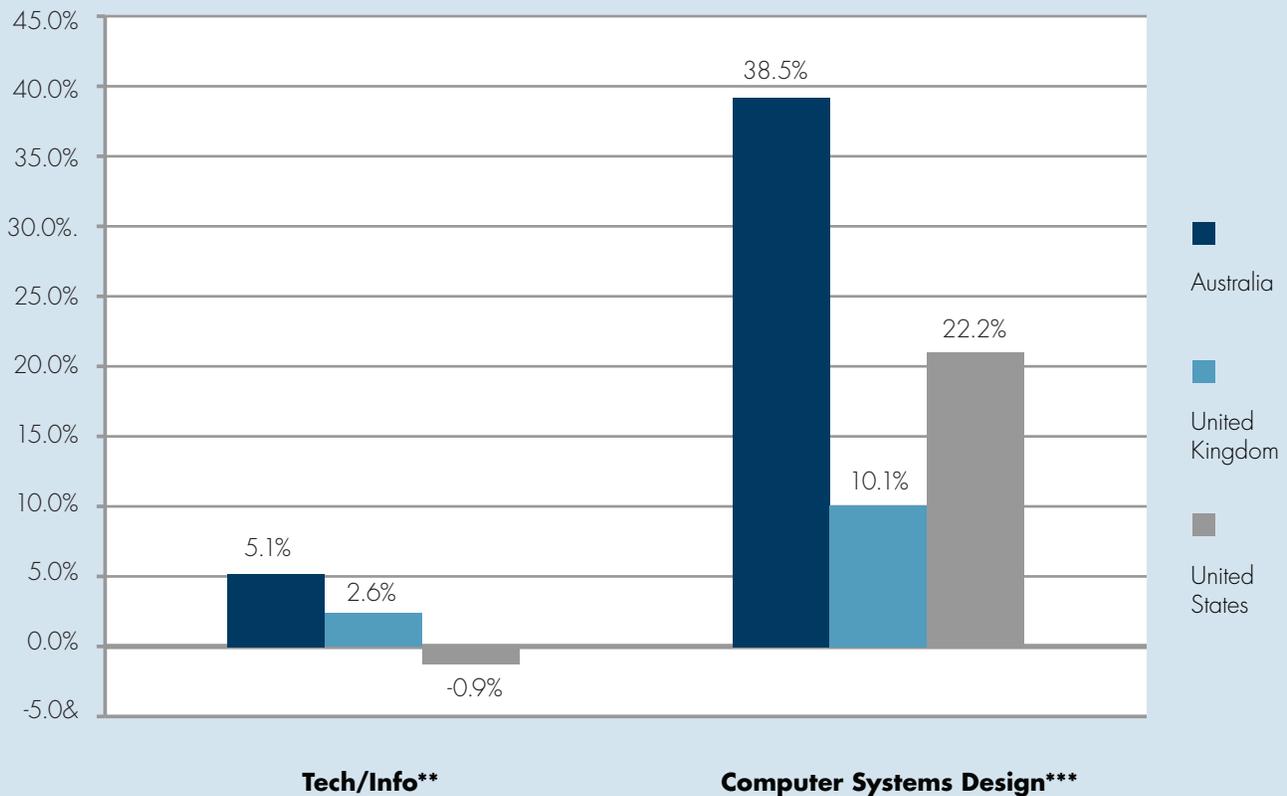
APP ECONOMY WORKERS AND APP ECONOMY EMPLOYERS

Against this broad backdrop of growth, let's take a look at the Australian App Economy. First,

let's start by defining what we mean by an App Economy worker. For the purposes of 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, marketing, or management) that supports app

FIGURE 1: AUSTRALIA'S TECH EMPLOYMENT OUTPERFORMS UNITED STATES AND UNITED KINGDOM (EMPLOYMENT GROWTH, MAY 2008-MAY 2014*)

Average of 12 months preceding date. March 2008 to March 2014 for the United Kingdom.
**Tech/info as defined in "London: The Rise of A Digital City" (June 2014).*
For Australia, tech/info is the "Information Media and Telecommunications"
sector, plus the "computer systems design and related services" industry.
For the United Kingdom, tech/info is the "Information and Communications" sector.
For the United States, tech/info is the Information sector plus the "computer systems design and related services" industry.
****For the United Kingdom, this category is the "computer programming, consultancy and related services" industry.*
Data: Australian Bureau of Statistics, UK Office for National Statistics, US Bureau of Labor Statistics.

FIGURE 2: 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 non-tech companies that are developing apps for internal and customer use.
5. Nonprofits and government agencies, including the military, which require app developers to perform their functions.
6. Offices of large companies such as Apple, Google, and Microsoft who develop and maintain mobile app ecosystems/platforms.
7. Accounting and IT consulting firms, who provide app development and mobile application consulting as part of a larger suite of services.

Data: Progressive Policy Institute.

developers in the same enterprise. 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—also called 'position vacant' ads—where enterprises actually describe the skills and knowledge they are looking for. For example, if a help-wanted ad or position vacant ad requires that the job is located in Sydney, and 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 Australian 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 keywords and phrases is found in the methodology appendix.

Based on this analysis, the Australian App Economy turns out to be remarkably diverse. A

surprisingly broad range of Australian enterprises are searching for workers who have the ability to develop, maintain, or support mobile applications. Based on our analysis of want ads, there are seven types of Australian enterprises 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. For example, as of July 2014, Melbourne-based app developer Buzinga was advertising for app game developers for iOS and Android, as well as app marketing experts. Melbourne-based company, b2cloud, which recently worked with Telstra to create two of the world's first Google Glass apps designed for the visually and hearing impaired communities, was looking for an experienced business development manager and experienced iOS developer. And in some cases foreign app developers have opened up offices in Australia. Thoughtworks, a Chicago-based software company, was looking for software developers in its Brisbane, Perth, Melbourne, and Sydney offices. Thoughtworks is making "mobile applications including native Android and iOS for telco, retailers, banking clients as well as less traditional science and indigenous communities."

2. **Media and software companies that engage in app development for consumer use under their own name.** For example, as of June 2014, the Australian Broadcasting Corporation was advertising for "Mobile Applications Developer—iOS" to help support its popular mobile apps, including the Foodi app for iPad. As of July 2014, Fairfax Media, which publishes the Sydney Morning Herald and The Age, was looking for iOS developers. And once again, an American game company, Electronic Arts, was advertising for 18 job titles at its Firemonkeys Studio in Melbourne, an operation that updates mobile games such as Need for Speed.

3. **Finance and retail companies that use apps to reach customers.** Apps are a natural fit for retail and finance companies. On the finance

Thousands of App Economy Jobs, June 2014*	
New South Wales	77.0
Victoria	39.2
Queensland	10.0
Western Australia	5.0
ACT	1.3
South Australia	1.0
Tasmania	0.3
Northern Territory	**
Australia	**139.6***

*App Economy jobs are tech jobs requiring App Economy skills, plus indirect and spillover jobs.
**Too small to be measured by our methodology.
***Includes a small number of jobs not assigned to a particular location.
Data: Australian Bureau of Statistics, au.indeed.com, Australian Computer Society, Progressive Policy Institute.

App Intensity, June 2014	
New South Wales	1.78
Victoria	1.13
Queensland	0.35
Western Australia	0.30
ACT	0.52
South Australia	0.11
Tasmania	0.10
Northern Territory	*

*Too small to be measured by our methodology
App intensity measure app economy jobs as share of total employment, indexed to national average (Australia = 1).
Data: Australian Bureau of Statistics, Progressive Policy Institute.

side, virtually every major financial institution has to maintain an active mobile presence, creating the need for App Economy skills. For example, as of June 2014, Heritage Bank was looking to hire an app developer for a permanent full-time position in Toowoomba, Queensland. Woolworths, Australia's biggest retail group, was searching for a senior iOS developer

4. **Other small and large non-tech companies that are developing and using apps for internal and customer purposes.** In every industry, businesses are realizing that apps, and mobile communications in general, are becoming essential tools for productivity, marketing and customer service. As of July 2014, Melbourne-based Sportsbet, for example, was looking for an operations manager to help manage its tablet app that runs on iOS and Android.

5. **Nonprofits and government agencies, including the military, which hire app developers directly or indirectly.** The Australia national government has a long list of apps that can

be accessed directly at http://australia.gov.au/services/apps-services. These include SoilMapp, an app that allows farmers and others to access information about the likely soil types on their property. As of June 2014, a help-wanted ad was active for up to five senior software developers "to work on a critical online web project for a large Federal Government agency in Brisbane." The ad specified that "experience in developing native applications for iOS, Androids and Windows platform will be highly regarded.

6. **Large companies—including Apple, Google, and Microsoft—that develop and maintain mobile app ecosystems/platforms.** Of course, these companies are primarily headquartered in the United States, for the most part, but they do contribute significantly to jobs in Australia. As of July 2014, Apple and Google together were listing more than 60 job openings, technical and non-technical, in Australia (not including positions in Apple retail stores). These positions ranged from software engineers to financial accountants.

7. **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 as Accenture and PriceWaterhouseCoopers, who hire consultants who are fluent in mobile applications.

APP ECONOMY JOBS

How many App Economy jobs are there in the Australian economy? In this study we use a similar methodology to that used by the author in previous work for South Mountain Economics and the Progressive Policy Institute. This methodology, described in the appendix, uses data on online want ads to quantify the number of jobs requiring App Economy skills. That methodology has been used to study App Economy and big data jobs in the United States, as well as big data and fintech jobs in the United Kingdom.

Figure 3 shows the total number of App Economy jobs in Australia and the individual states and mainland territories. These include core App Economy jobs, which are developers and other IT workers with App Economy skills; indirect App Economy jobs at app developers; and a conservative estimate of spillover jobs to the local economies.

Second, to adjust for the size differences between states, we calculate the "App Intensity" of each state in Figure 4.[4] 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.

HOW THE AUSTRALIAN APP ECONOMY COMPARES GLOBALLY

Earlier in this study, we did a comparison of app-related growth in Australia with the United States and the United Kingdom. Here we do another global comparison, this time looking at core App Economy jobs as a share of all ICT (tech) jobs.[5]

We see that Australia compares favorably with both the United States and the United Kingdom, having a slightly higher proportion of core App Economy jobs as a share of all ICT jobs. Perhaps

FIGURE 5: HOW AUSTRALIA STACKS UP GLOBALLY

	Estimated core app economy jobs as share of all ICT jobs, June 2014*
Australia	9.4%
United States	8.4%
United Kingdom	7.6%
SF-Silicon Valley	17.6%
Melbourne	10.9%
Sydney	10.7%
New York City	10.5%
Chicago	9.5%
London	9.3%

Core App Economy jobs are tech jobs requiring app economy skills. Data: Australian Bureau of Statistics, Progressive Policy Institute Au.Indeed.com, indeed.com.

more interesting, Sydney and Melbourne are roughly on par with New York City and London. The San Francisco-Silicon Valley region, of course, is far ahead.

CONCLUSION

What lessons should government policy makers take from the analysis? The major take-away is that Australia has a good start on the digital economy, especially when viewed from the perspective of mobile apps. As this sector continues to expand globally, this opens up new opportunities for Australia to become an exporter of apps and app-related services, especially given the current international importance of English-language markets.

Remember that any app is exportable, in the sense that it can be downloaded from an app store by anybody around the world, no matter how far the distance. That means the Australian App Economy can become a basis for continued growth. The second point is that apps can improve the efficiency and attractiveness of the Australian economy, as noted in the recent ACMA report.

More broadly, app development offers an accelerated route to the development of the digital economy. The App Economy is a logical

complement to Australia's natural resources industries, especially for a country that can harness strong universities and desirable amenities such as quality of life and ease of recreation.

Beyond that, it's important for policymakers to strike the right balance between essential and excessive regulation, especially in areas such as data privacy.[6] This debate is at a fever pitch in both the United States and Europe, especially after the recent NSA revelations. The preferred outcome for any region depends on that region's cultural values and history, of course. However, a general principle is that the tighter the regulations, the more obstacles in the path of the growth of the rapidly innovating App Economy.

It's also important to note that the App Economy is closely related to the Internet of Everything, which may be the next stage of the Information Revolution.[7] Where the Internet transforms 'digital' industries such as entertainment and financial services, the Internet of Everything does the same for physical industries such as mining, healthcare, and public services, using distributed sensors and wireless connections. Policymakers need to be aware that a country such as Australia, with a large natural resource sector, may derive great productivity gains from the Internet of Everything.

Assuming good policy, the App Economy is becoming an important part of Australia's future. That's a good thing for jobs and growth.

APPENDIX: METHODOLOGY

This paper uses a methodology originally developed by South Mountain Economics in a series of papers on the U.S. App Economy.[8] Those papers developed a methodology for tracking App Economy jobs based on online want ads (also known as 'position vacant' ads). The basic idea was to identify online help-wanted ads call for 'App Economy' skills, such as familiarity with iOS or Android programming.

In this study we use an improved version of the same methodology to estimate App Economy jobs in Australia, both nationally and by state and territory. The first step is to identify App Economy want ads (the sample was taken mid June 2014). We used summary results generated by au.indeed.com, a site that aggregates online want ads for Australia.[9] These want ads had to include one or more of the following key words or phrases:

Android; "Blackberry API"; "Facebook API"; iOS; "mobile app"; "mobile application"; "mobile apps"; "web app"; "Windows Phone API"

In addition, we restricted ourselves to help-wanted ads include one or more of the following words, in order to make sure we were picking up ICT (tech) jobs:

App; developer; development; engineer; programmer; software; support; technician

Finally, we made an adjustment because one important job board was using a boilerplate that contained some of our key words. Note that we did not use 'iPhone' or 'iPad' as part of our key word list because they have become too common as part of the job description for non-tech occupations.

This procedure yielded a figure for Australia overall, and for each state, for help-wanted ads for occupations requiring App Economy skills.

The next step was to benchmark the relationship between overall Australian employment in ICT occupations and overall Australian ICT want ads (this procedure was described in detail in Mandel (2012) and Mandel and Scherer (2014)). The

employment in ICT occupations was derived from the *Australian ICT Statistical Compendium 2013*, published by the Australian Computer Society Inc. We use the combined figures for February 2013 employment in ICT management and operations, ICT technical and professional, and ICT trades. We then updated to May 2014, using the change in ICT professionals as measured by the Australian Bureau of Statistics. That gave us a figure for overall Australian ICT employment

METHODOLOGY SUMMARY

1. **Identify App Economy help-wanted ads by state for June 2014**
   Using summary statistics generated by searches on au.indeed.com for each state or territory, we identify ICT want ads containing app-related key words or phrases such as iOS, Android, or mobile app.

2. **Estimate want-ad to employment ratio for overall ICT occupations**
   We estimate the ratio between the overall number of ICT want-ads and the number of corresponding ICT jobs, using data from the Australian Bureau of Statistics, the Australian Computer Society, and Au.indeed.com.

3. **Estimate App Economy core jobs by state**
   Using the estimates generated in steps 1 and 2, we estimated the number of App Economy core jobs by state and territory.

4. **Estimate total App Economy employment**
   Using a conservative and judgmental assessment of indirect and spillover effects, we estimated the total number of App Economy jobs by state and territory.

of roughly 500,000, amounting to roughly 4.3% of total Australian employment. By comparison, tech occupations in the United States, including managers, amount to roughly 4% of overall employment).

We then identified the overall number of ICT want ads in Australia, using public summary statistics from au.indeed.com. We used 23 key words and phrases, including "software developer," "help desk," and "business analyst."[10]

This gave us a ratio of overall ICT want ads to overall ICT occupational employment. We then applied that ratio to the number of App Economy want ads in order to estimate employment in App Economy core jobs—that is, app developers and the like.

Next we estimated the number of indirect App Economy jobs. In earlier studies we have looked at several App Economy firms in the United States, which suggested that conservatively, 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. Finally, we use a conservative spillover coefficient of 0.5 to estimate the number of jobs created in the rest of the economy by the core and indirect App Economy jobs—that is, for every job at an enterprise employing an app developer, half of a job is created in the rest of the economy.

This methodology for calculating App Economy jobs seems to be fairly robust, but there are a couple of reasons to be cautious. First, the methodology relies on published want ads. As a result, these figures omit the one- or two-person shop that either doesn't hire, or hires by word of mouth. Second, the ratio of want ads to employment derived from overall ICT occupations may not apply to App Economy jobs.

ENDNOTES

1. The Centre for International Economics (prepared for ACMA), "The economic impacts of mobile broadband on the Australian economy, from 2006 to 2013," January 2014; "ACMA Communications report, 2012–13," November 2013.

2. There was a statistical coding change in early 2000 that may be slightly distorting this change.

3. For a discussion of the construction of the tech/info sector, see Michael Mandel, "Building A Digital City: The Growth and Impact of New York City's Tech/Information Sector," September 2013; and Michael Mandel and Jonathan Liebenau, "London: Digital City on the Rise," June 2014.

4. In general, when we refer to states, we include the Australian Capital Territory. The number of App Economy jobs in the Northern Territory was too small to measure by our methodology, at least for our data sample.

5. This analysis is done by looking at respective want ad summary counts, and assuming that the ratio between want ads and employment is the same for core App Economy jobs and all ICT jobs.

6. A good summary of the Australian regulations applicable to cloud computing can be found in the May 2014 report, "Cloud Computing Regulatory Stock Take," from the Australian Department of Communications.

7. Michael Mandel, "Can the Internet of Everything bring back the High-Growth Economy?," Progressive Policy Institute Policy Memo, September 2013.

8. Michael Mandel, "Where the Jobs Are: The App Economy," South Mountain Economics, February 2012; Michael Mandel and Judith Scherer, "The Geography of the App Economy," South Mountain Economics, October 2012. In addition, the methodology was further developed in an upcoming NESTA working paper on the UK economy: Michael Mandel and Judith Scherer, "Using Want-Ad Data for Mapping of Jobs and Economic Activity Related to Innovative Technologies," (forthcoming, 2014).

9. We thank au.indeed.com and Indeed.com for use of their public summary statistics. No ads were copied. Any errors or omissions are our own.

10. Full list available on request.

About the Progressive Policy Institute

The Progressive Policy Institute (PPI) is an independent research institution that seeks to define and promote a new progressive politics in the 21st century. Through research, policy analysis and dialogue, PPI challenges the status quo and advocates for radical policy solutions.