2-20-2013

Make or Buy?: The Software Developer Shortage That Isn't

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Google

Google's EU HQ in Dublin features geeky potato heads, along with multiple restaurants and bars, game rooms, libraries, garden rooms and ostensibly, some computers.

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RESEARCH
02.20.2013

Tags: Bob Lokken, economic development, Education Reform, EMSI, IGEM, IT, Matt Rissell, STEM

See, for example the Idaho Global Entrepreneurial Mission.

I daho's supposed software developer shortage and the terrible ramifications for the state's economy if this condition persists has reached conventional wisdom status in recent years.

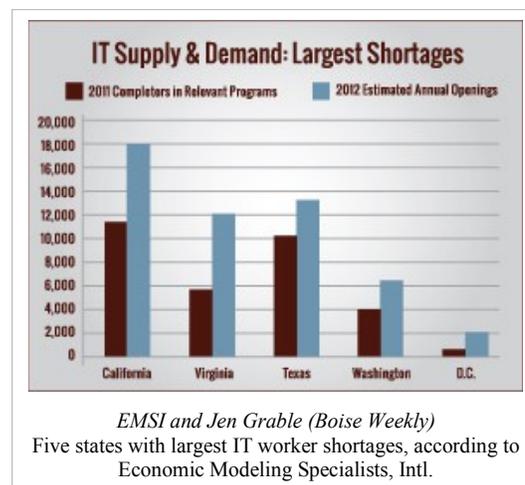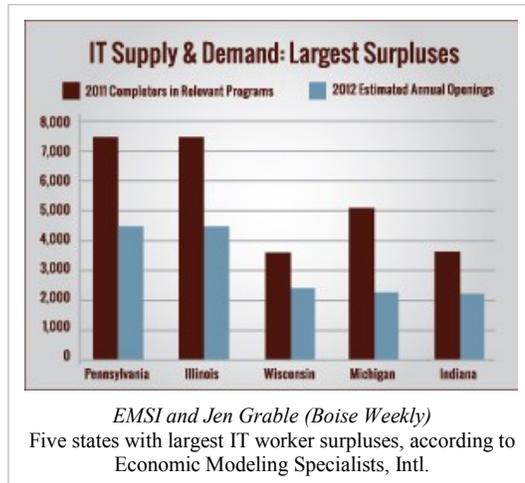**TBR Research** presents insights and excerpts from peer-reviewed scholarship.

"It's the one industry in Idaho that has 20 graduates per 1,000 job openings," warned T-Sheets CEO and Idaho Technology Council Chairman Matt Rissell, repeating the claim. At a recent luncheon hosted by the Boise Metro Chamber of Commerce, White Cloud Analytics CEO and ITC Hall of Fame inductee Bob Lokken estimated that more than 400 software developer jobs in the Boise Valley go unfilled at any given time. Tech industry leaders have so far been successful in achieving the goals of their public relations campaign: convincing the usually reticent executive and legislative branches of government to support targeted spending on software engineering programs in Idaho's universities.

But federal data and economic models cast doubt on the relative importance of the software industry in Idaho, the reality of a programmer shortage here and the efficacy of pointing scarce funding toward training more homegrown programmers specifically, or even technology workers in general. Better-funded regions have already tried to become the next Silicon Valley. What was their fate and why? Finally we need to ask very simply whether the private sector in Idaho has made the effort to "buy" the talent it needs.

IS THERE A SHORTAGE OF IT WORKERS?

Before looking specifically at the software development industry, let us survey the IT fields in general across the U.S., and in Idaho. Nationally the supply for IT workers just about matches the demand for IT workers. Economic Modeling Specialists Intl., a job market forecasting firm based in Moscow, Idaho, estimates that 146,930 people completed IT degrees in 2011, and that those graduates would

fill an estimated 146,247 positions across the country. If local technology firms find they have a labor shortage, then we know that the dispersion of tech workers is "spiky," to use urbanist Richard Florida's term. Indeed some regions produce more tech workers than they need; others face shortages. The charts below show the spiky nature of the places where tech workers settle.

EMSI and Jen Grable (Boise Weekly)
Five states with largest IT worker surpluses, according to
Economic Modeling Specialists, Intl.

EMSI and Jen Grable (Boise Weekly)
Five states with largest IT worker shortages, according to
Economic Modeling Specialists, Intl.

Pennsylvania, Illinois, Wisconsin, Michigan and Indiana cannot employ all the IT workers they graduate. California, Virginia, Texas, Washington and Washington, D.C. cannot "make" enough talent to fill available IT positions. It's no surprise then that the shortage in those places bid wages up. California, Virginia, Washington and D.C. are among the leading regions for annual mean wages for software developers.

EMSI estimates the annual openings for all IT related occupations in the state of Idaho at 592. Idaho universities annually graduate 524 students with degrees applicable to IT work, leaving a shortage of only 68 workers in all Information Technology fields. In fact half the states cannot fill all their annual tech openings with homegrown workers, and Idaho actually has the sixth smallest shortage in the nation.

DOES IDAHO HAVE A SIGNIFICANT SOFTWARE INDUSTRY?

Social workers operate from a platform they call the strengths perspective. They help clients build on their strengths. Idaho's economic developers could take a cue from that field when crafting their own plans. Economic development practice tends toward convergence. That is, if you go out and look at economic development strategic plans they all tend to look fairly similar. Everyone wants high tech, green tech, manufacturing, tourism and film. But it's obvious that not every location can have a comparative advantage in all these things—and some don't have advantages in any of these things. So how are economic development plans created?

Instead of starting from strengths or building where you have a comparative advantage, regions start with what they don't want—concentrated animal feeding operations (CAFOs), call centers, waste disposal, big box retail, growth in government, general contractors. What you end up with when you start eliminating sectors of the economy that you don't want are sexy industries like high technology. Often economic development plans aren't built around strengths or competitive advantages at all. And if Idaho and Boise Valley economic developers surveyed the strengths in those places, software development would most certainly not emerge as a critical part of the economy.

The Bureau of Labor Statistics' Occupational Employment Statistics (OES) division estimates there are 539,880 software applications developers at work in the United States today earning a median annual wage of $89,280. Washington, Colorado, Virginia, Massachusetts and New Hampshire feature the highest concentrations of software developers. In Washington State, software developers hold 12.48 jobs for every thousand jobs in the state. How does Idaho stack up? In Idaho, jobs in software development constitute 2.18 of every thousand jobs. When you get to the metro level the picture changes more drastically. In the Seattle metro, almost 22 jobs for every thousand are software jobs. In San Jose it's over 30 jobs per thousand. In the Boise-Nampa metro area, only three of every 1,000 jobs are jobs in software development. That hardly represents a job classification critical to the regional economy.

IS THIS FORWARD THINKING POLICY OR A RELIC OF A BYGONE ERA?

It might sound funny to argue that supporting more spending on STEM programs is a backward looking strategy, but in some ways it is. Massive investment in institutional science and technology spending was the mantra of the Cold War era. This is when the National Labs came to bear. It is also when Stanford University began to accumulate real power as an economic driver. The birth of Silicon Valley can be traced to corporate and governmental financing of labs at Stanford that ultimately developed significant military and consumer related technologies. We've had more than a half-century to replicate the Stanford/Silicon Valley model. It has proven elusive.

Historian Margaret Pugh O'Mara in her book Cities of Knowledge: Cold War Science and the Next Silicon Valley outlined what made Stanford an economic development force—and the efforts undertaken by Georgia Tech and the University of Pennsylvania to replicate the Stanford model. Philadelphia and Atlanta, for all their strengths, are not exactly tech hotbeds. O'Mara observes that Stanford's success was rooted in "a particular political and cultural moment in history and shaped by the relationship between the state and civil society in late 20th-century America." History matters in the context of public policy.

The point is that we don't really know what the next big thing is. Education reformers, politicians and business leaders have been wringing hands for a decade (or longer) about the status of education and the changes necessary to ensure continued American economic dominance. But no one is really sure of the exact prescription. What O'Mara shows, though, is that a half-century-old economic development road map probably isn't going to get you where you want to go.

THE "MAKE OR BUY" DECISION

Software industry executives, leaders in state and local governments, higher education institutions and trade groups like the ITC, chambers of commerce and the like face the question of whether we make the software developers we need or buy them. Many factors influence the make or buy decision, but the current policy landscape is one in which government leaders, higher education administrators and business leaders all find themselves in agreement: They all believe a publicly funded "make" strategy is the way to go. This has not always been the case.

More examples here and here.

As Wharton Professor Peter Cappelli noted, internal development or the "making" of employees needed to execute business operations, was standard practice from the 1950s through much of the 1970s. That all changed when the collapsing 1970s economy and the recession of the 1980s brought an end to lifetime employment. Unilever, PepsiCo and GE constituted the last "academy companies" featuring robust internal training and development programs. Poaching trained employees from competitors became the norm in the 1990s. That too ceased when the long run of full employment in the 1990s absorbed the supply of available talent. The emergence of the neo-liberal global economy since the mid-90s, coupled with the prolonged worldwide recession, contributed to the current labor market characterized by decentralization, networked forms of organization, knowledge workers and the service economy, flexible specialization and a breakdown of the welfare state consensus.

See Heying, Charles, and Marianne Ryder. "Genesis of the Concept." In *Brew to Bikes: Portland's Artisan Economy.* Portland, OR: Ooligan Press, 2010.

Companies once trained their own employees because succeeding in the marketplace is all about specialization. Institutions of higher education are set up to provide just the opposite: a broad-based market basket of generally applicable skills. To wit: few graduate Boise State University, or MIT for that matter, knowing the first thing about health care analytics or web-based timekeeping. For Idaho's software industry, making its own talent is still an option even if industry leaders fail to exercise it. As Cappelli concluded though, the private sector, unable to recoup sunk costs into training—especially when the employee leaves for a competitor—has made most firms unwilling to continue the practice of internal development.

Paul D. Gottlieb: "In fact, for discussion purposes, we may state a devil's advocate position on human capital migration that very few state officials would endorse. This is the idea that training your own labor force might actually put your state at a disadvantage in the fast-moving global economy."

Companies may also "buy" the workers they need. This is a straightforward proposition: Firms simply pay the wage required to get the workers they need. But evidence suggests that employers are being stubborn on wages. Employment levels for software engineers have risen in recent years but wages are flat or declining. Thus, as EMSI concluded, "If there is indeed the major undersupply . . . wages would not be stagnant but continuing to rise (and probably rising sharply)."

Firms choosing to locate in Idaho as opposed to locations with greater concentrations of available technology workers likely remain here because wages are low. Corporate site selectors almost always cite labor costs as their

primary factor in choosing a business location. But firms do retain the option of paying a wage premium in order to attract workers. Wage premiums, however, are only part of the economic equation.

Trade offs always exist in firm level location decisions but the current conversation about Idaho's software industry ignores this point. Firms locating in Idaho enjoy the benefit of low wages. However that comes with the following trade-offs: reduced access to talent, markets, capital, advanced business services and like firms (which generate numerous types of spillover benefits). This is presumably why Microsoft moved ProClarity from Idaho. In our mostly free-market system of economics these trade-offs all represent firm level decisions, i.e., strategies available to Idaho's technology entrepreneurs.

These same decisions face state (but mostly regional) labor markets as well. Is Idaho "making" enough graduates from its system of private trade schools, community colleges and universities? If not, what are Idaho's prospects for "buying" or attracting the talent its firms need?

First consider the "making" side of the equation. Two different EMSI studies address this subject. In February 2010 EMSI released the results of a labor force study commissioned by the Idaho Division of Professional-Technical Education and the Idaho State Board of Education. The study compared the state's projected employment needs with the number of graduates being produced by the state's institutions of higher education each year. EMSI's modeling projected a shortage in the field they call "computer programming, specific applications." They estimate 395 annual openings in this field each year and further estimate 24 graduates, a net shortage of 371 homegrown workers. Compared to other fields, however, this shortage pales in comparison. By a wide margin, Idaho's universities are failing to graduate enough students with undergraduate degrees in business administration.
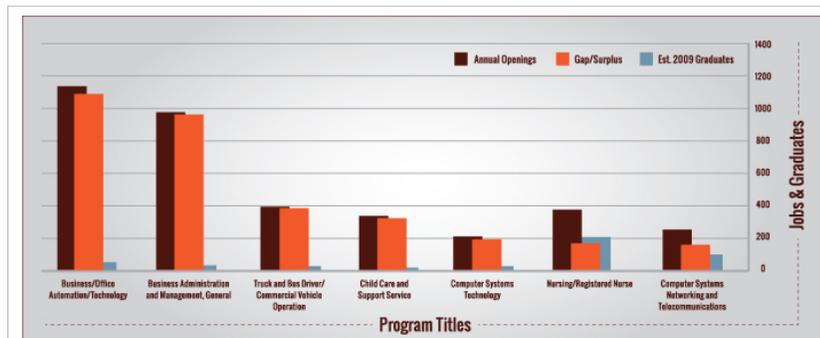
EMSI and Jen Grable (Boise Weekly)
The chart above shows education programs in Southwest Idaho with the largest job gaps. Business Administration, drivers and childcare outrank the computer specialties, according to Economic Modeling Specialists, Intl.

While the data for the state as a whole shows some gaps, the data for Southwest Idaho (the "10 county" region) shows that the shortage of software developers is very small relative to other occupations. In the region that contributes very nearly half the state's GDP, "computer programming, specific applications" aka software developers, doesn't make the top 10 list of most severe shortages. Again, of most concern for local economic developers should be in producing garden-variety graduates with four-year degrees in business administration (See chart above.)

CONCLUSION

The evidence reviewed here suggests that:

- Industry boosters overstate worker shortages.
- The software industry comprises a very minimal portion of state and regional employment.
- The chosen policy option is a relic of the Cold War.
- Other options such as "buying" software developers still exist but have not been exercised.

Idaho is situated between some of the most competitive technology regions in the United States. Budgets here—public and private—are extremely limited. That means every dollar invested in economic development efforts must be accounted for. Our efforts must be thoughtful, targeted, supported by data and realistic. While any investment in human capital and educational infrastructure seems a step in the right direction, that is too low a bar. Investments must be prioritized so that what is spent generates the greatest benefit, at the least cost, for the longest period of time. In light of the evidence, it is unlikely that investments in the software industry rise to that level.

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The views and opinions expressed here are those of the writer and do not necessarily reflect those of Boise State University or the College of Social Sciences and Public Affairs.