THE ECONOMIC GRAPH

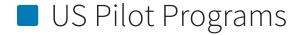2017 End-of-Year Global Report

Linked in™

■ Executive Summary

There are more than three billion people in the global workforce, and LinkedIn's vision is to create economic opportunity for each and every one of them. The development of the world's first Economic Graph is key to making that vision a reality. The Economic Graph is a digital representation of the global economy, and a source of information for individuals, governments and private sector organizations that make decisions about jobs, education and training.

Today the Economic Graph is comprised of over 530 million members on LinkedIn around the world, 18 million companies, 29,000 institutions of higher education, more than 11 million open jobs and 50,000 skills. The Economic Graph is our true north—something that all LinkedIn employees are building together. Within that broader effort, a small cross-functional team focused on public policy and research works on helping LinkedIn become a primary source of insights and ideas that guide leaders' decisions on workforce development across the globe. The team does this by bringing to life research and pilot projects that help leaders understand and address the future of the global workforce.

This document is a high-level overview of selected work. First, we examine each of the major pilots that our team has undertaken to better understand the workforce at the local level—from our work with educational institutions, local governments and workforce investment boards in Colorado and Arizona, to our pilot in Utah, which seeks to understand the extent to which unemployed individuals receiving benefits can be impacted by LinkedIn Job Seeker assistance. Second, we outline partnerships with national and international organizations -- such as the National League of Cities, the World Bank, and the World Economic Forum -- over the past year. Third, we review the Economic Graph's engagement with governments throughout Europe, the Middle East, North Africa, Asia, and Australia.

US Pilot Programs

LinkedIn Workforce Reports

In February 2017, we launched the LinkedIn Workforce Report, a monthly report on employment trends in the U.S. workforce. It's divided into two sections: a National section that provides insights into hiring, skills gaps, and migration trends across the country, and a City section that provides insights into localized employment trends in 20 of the largest U.S. metro areas: Atlanta, Austin, Boston, Chicago, Cleveland-Akron, Dallas-Ft. Worth, Denver, Detroit, Houston, Los Angeles, Miami-Ft. Lauderdale, Minneapolis-St. Paul, Nashville, New York City, Philadelphia, Phoenix, San Francisco Bay Area, Seattle, St. Louis, and Washington, D.C. The goal of the LinkedIn Workforce Report is to provide federal, state, and local policymakers, as well as job-seekers themselves, with real-time information to help understand and navigate the dynamics of the labor market. In November 2017, we expanded the LinkedIn Workforce Report internationally, to the United Kingdom. The U.K. report shares hiring and migration insights on a monthly basis.

Colorado and Arizona | Skillful Partnerships

Over the past few years, one of our main focuses has been on narrowing the middle skills gap in Colorado and Arizona through policy and product initiatives in partnership with the Markle Foundation's Skillful initiative.

Our pilot programs provide a unique combination of online tools with offline events and training. On the ground, we work closely with the governmental and community organizations that directly support middle-skilled workers.

When we surveyed recruiters and hiring managers in Colorado and Arizona, 44% said that it's hard to find people with the right technical skills. And when we surveyed workers, 54% of workers with a high school diploma and some or no college education said they didn't know what jobs were available or whether or not they needed additional training to acquire the skills required for those jobs.

So last year, the team launched Training Finder, a tool to help job-seekers in Colorado and Arizona who have a high school diploma and some or no college education find training to land middle-skill jobs in fields such as IT, advanced manufacturing, and healthcare.

LinkedIn is also serving as the apprenticeship marketplace for CareerWise Colorado, a new nonprofit that works with public high schools in the state to provide students with on-the-job training opportunities. We are hosting CareerWise apprenticeships as job postings on LinkedIn, creating a more transparent path for potential applicants. We hope to do the same for all apprenticeships throughout the state.

This spring, we partnered with Skillful to pilot a placement program designed to help students inform employers of their skills and credentials, and to enable employers to find qualified candidates. Our team helped 80 students from Colorado community colleges create LinkedIn profiles, which we then shared with employers to determine the role of LinkedIn in sending clearer signals about the capabilities of potential hires.

Skillful also supported our efforts to train and support career coaches embedded at Goodwill and other workforce centers across both Colorado and Phoenix. Through Skillful, we have learned that career coaches often feel unprepared to support job-seekers with skills and positions in the rapidly changing digital economy. In partnership with the LinkedIn for Good team, we worked to upgrade coaches' LinkedIn accounts and helped identify volunteers in tech and other middle-skill industries who could engage directly with job-seekers.

Arizona | LinkedIn Gigs Pilot

In 2016, we hosted events with gig workers from Lyft, Instacart, and DoorDash to learn about the value of gig work for low-skill workers and better understand how LinkedIn can support individuals in the gig economy. We learned that many workers found the gig economy to be a valuable and flexible source of income.

In order to make the gig economy accessible to more people, we built a Gig Common Application that allowed low and middle-skill workers to apply to multiple app-based gig companies using just one form. Successful applicants received a free 6-month LinkedIn subscription to help them upskill and search for full-time roles while engaging in gig work.

We partnered with workforce centers across Arizona to showcase LinkedIn Gigs to job-seekers, and launched this as a limited 10-week pilot in Phoenix in April 2017.

Utah | InPloyment Project

Last year, the team launched our first-ever pilot to study the impact of LinkedIn on unemployment. In close partnership with the state of Utah's Department of Workforce Services (DWS), LinkedIn provided Job Seeker and LinkedIn Learning subscriptions for 300-500 unemployed workers, plus training for staff employment counselors who provide counseling to those workers. We found that pilot program participants were less likely to exhaust their unemployment benefits when compared to a control group. In addition, 75% of participants indicated that the partnership made them more likely to recommend services provided by the Utah DWS. We will continue to use findings from the pilot to learn how we can effectively engage the nearly 17 million Americans who receive Unemployment Insurance, and to help state and federal decision-makers shape policy for the $45 billion Unemployment Insurance program.

Cleveland | Health IT Project

In June, we partnered with the City of Cleveland, BioEnterprise, Cleveland State University, and Cuyahoga County to launch an analytics project designed to support Cleveland's health IT sector. LinkedIn provided city stakeholders with information about the disconnect between the skills needed by local employers and the available skills in the Cleveland community, with the aim of identifying opportunities for talent development in fast-growing fields like software engineering and data science.

 When we launched the partnership in June, Cleveland Mayor Frank Jackson discussed the importance of building pathways to opportunity for a broad cross-section of job-seekers in the city, including formerly incarcerated individuals. We will continue to work with our partners in Cleveland to expand and diversify the pipeline of health IT talent in the city.

Los Angeles | Tech Talent Pipeline

In 2017, we joined Los Angeles Mayor Eric Garcetti in highlighting the launch of the LA Tech Talent Pipeline, leveraging LinkedIn data to support efforts designed to help grow the city's tech economy. The LA Tech Talent Pipeline supports HIRE LA's Youth, a flagship program to provide job opportunities for Angelenos between the ages of 14 and 24, and youth and young adults in our local community colleges.

Through our partnership, LinkedIn data was incorporated into a comprehensive report detailing the status of the city's tech talent pipeline, which was shared with the city's Workforce Development Board and Economic and Workforce Development Department, local community colleges, and other local educational institutions to help create new pathways for LA residents to access training in high-growth tech fields.

National League of Cities | Building Equitable Pathways to Postsecondary and Workforce Success

LinkedIn joined forces with the Kresge Foundation and the National League of Cities (NLC) to support the Building Equitable Pathways to Postsecondary and Workforce Success project -- a two-year initiative in which six cities (Charleston, SC; Nashville, TN; Jacksonville, FL; Houston, TX; Corpus Christi, TX; and Austin, TX) develop strategies to promote greater access to workforce-relevant credentials and meaningful employment opportunities. The Mayors of each participating city have committed to working with the NLC to build and scale programs that will remove pervasive equity barriers to access and success in education and the workforce.

During the months of July and August, we embarked on a roadtrip to conduct in-person briefings with the Mayors of each city, sharing insights from the Economic Graph on regional labor market trends -- including hiring patterns, migration, and the skills in greatest demand from regional employers. Our data will support participating cities' efforts to identify local skill gaps and develop programs that connect job-seekers with training and employment opportunities.

LinkedIn representatives also participated as speakers and panelists at the NLC's City Summit in Charlotte in November, as well as at the December Mayor's Institute in Washington, DC.

In 2018, we will join the Mayors of these six cities at the NLC Mayor's Institute in Austin to share updates on each city's efforts to support postsecondary and workforce success. We are also collaborating in the development of a report designed to highlight best practices from the six participants and help other cities explore sustainable and equitable economic development solutions.

Additional City Projects

New York City

We used Economic Graph data to provide New York City, as part of its Tech Talent Pipeline initiative, with insights on the current state of the city's tech industry. The city used the insights to determine "how to deploy $10 million in funding to help NYC schools, government, nonprofits and companies better prepare New Yorkers for in-demand tech jobs and fuel the continuing growth of NYC tech businesses." This led to the launch of 10 new and expanded programs focused on in-demand fields identified by LinkedIn including mobile development, web development, software engineering and cloud administration.

Chicago

In Chicago, the team analyzed the city's software engineering talent, the migration patterns of talent, and the companies that are improving the local tech scene. This research directly informed outreach strategies for the city's ThinkChicago event, a workshop for aspiring graduates from top universities across the country.

New Orleans

In New Orleans, we analyzed the top industry demand and the skills on entry-level job postings to determine whether there are strong differences between job applicants and confirmed hires.

We determined that medical industries are the most prevalent across the entire metro area. Within the city, recreational industries are largest; in Greater New Orleans, manufacturing industries are largest. These employers make up about one-third of the local economy.

Seattle & Vancouver

We partnered with the Boston Consulting Group to analyze the connections between Seattle and Vancouver and the economic growth of the broader region between the two cities. LinkedIn's research suggests that while Seattle and Vancouver individually have rich human capital, there is a low level of connectedness between the two cities, which could be an impediment to regional growth.

Toronto

We also partnered with Civic Action and the City of Toronto to examine ways in which the Economic Graph can assist with mitigating youth unemployment across the City of Toronto. We determined that the Toronto region has a strong, highly-skilled workforce when it comes to technology -- and that not only are tech-related skills in high-demand, but a significant portion of tech-skilled LinkedIn members are in "early career roles," which generally require less than five years of experience. LinkedIn also identified skills that were most likely to be found among Toronto-area members who were recently hired into early career roles. Toronto is now using the data to help youth learn tech-related skills and bolster its tech sector.

Ottawa

The City of Ottawa hosted the Education and Economy Summit at City Hall and showcased LinkedIn insights before 250 participants from local school boards, post-secondary institutions, government and private sector partners, NGOs and students with the goal of increasing collaboration and creating employment opportunities for students, and ultimately, more start-ups and jobs in the city.

Multilaterals and International Organizations

World Economic Forum | Global Human Capital Report 2017

In 2017, LinkedIn collaborated with the World Economic Forum (WEF) in the development of a series of reports focused on human capital and the future of work, both globally and in specific geographic regions (including the Middle East and Africa).

In September, the WEF published its 2017 Human Capital Report, one of the leading commentaries on the current status, gaps, and potential in human capital across the world. The 2017 report includes an index ranking 130 countries on how well they are developing their human capital.

LinkedIn's insights and findings were a central part of the 2017 Human Capital Report. Economic Graph data highlighted the following, among other insights:

- **The breadth of degree specialization among different age groups.** Overall, our data found increasing diversification and specialization of degrees, reflecting increasing demand for more specific skill sets across the economy.

- **The extent to which different industries hire individuals with certain degrees.** Industries like consumer, media, and entertainment, as well as the public sector and nonprofits, hire from a wider pool of degrees than energy, financial services, healthcare, and telecommunications.

- **The distribution of "cross-functional" skills across ages and degrees.** We found that "cross-functional" skills (the most commonly mentioned skills across our global membership) are not evenly distributed across degrees. For instance, individuals who studied engineering or IT are more likely to have skills in project management than in customer service or leadership.

In addition to analysis of Economic Graph insights, the report also acknowledges the "unique and illuminating data on the global human capital landscape" that LinkedIn can provide -- as well as the concrete, immediate benefits such insights can deliver to governments, policymakers and other leaders.

World Economic Forum | The Global Gender Gap Report 2017

We also collaborated with the World Economic Forum in the development of its Global Gender Gap Report, which examines whether countries distribute resources and opportunities equitably between women and men.

As detailed in a [blog post](#) by Sue Duke, Senior Director of Public Policy, Economic Graph insights into global gender representation included:

- **Women represent fewer than 50% of leaders in every industry analyzed.** In some fields, such as energy and mining or manufacturing, the representation of women is even lower, with women holding fewer than 20% of leadership positions.

- **The rate of progress for women has been slow.** Over the past decade, the proportion of female leaders has increased by an average of just over 2% across the 12 industries studied.

- **When women are better represented in leadership roles, more women are hired across the board.** Economic Graph data suggest that a critical step in the closing the gender gap will be accelerating the representation of women in leadership roles.

World Economic Forum | Africa Report

In May of 2017, the WEF published an [executive briefing](#) focused on the future of jobs and skills in Sub-Saharan Africa. Thanks to a research partnership with LinkedIn, the briefing includes detailed information on the emerging jobs and in-demand skills across the continent. Economic Graph findings in the briefing include:

- Trending professions on the continent include the creative industries, food technologists, 3D designers, data centre workers and care, education and health workers.

- More than one-third of professionals in Africa with postsecondary credentials hold degrees in business, administration, and law.

The World Bank | Competitive Cities Project

In 2017, LinkedIn kicked off a partnership with the World Bank aimed at uncovering labor market insights in developing economies worldwide. The first pilot project, which took place in South Africa, leveraged Economic Graph data to better understand indicators of entrepreneurial activity, analyze the skills in demand across industries, and examine migration patterns of talent in and out of the country.

Among the highlights from the pilot, which was featured in the World Bank's Economic Update for South Africa:

- South Africa is losing more professionals than it is gaining, due in large part to emigration to the United States, the UK, and Australia.

- However, LinkedIn data also indicate that South Africa is a fertile environment for entrepreneurship. Cape Town, Pretoria, and Johannesburg have a "large base of entrepreneurs that outstrips that of similar cities in larger countries."

World Economic Forum | MENA Report

LinkedIn also supported the WEF's development of an executive briefing focused on the Middle East and North Africa (MENA). The Economic Graph team provided WEF researchers with data on the state of education, skills, and jobs in the region; highlights included:

- The most common types of high-skilled employment in the region include commercial bankers, corporate finance specialists and accountants, schoolteachers and academics, and engineers.

- The MENA region demonstrates a distinct tendency towards a select number of job specializations, resulting in a somewhat less diversified talent pool compared to other regions as measured by the WEF.

◼ Europe, the Middle East, and Africa

Belgium | Digital Belgium Skills Fund

In May 2017, we launched the Brussels Economic Graph report as part of Deputy Prime Minister Alexander De Croo's "Digital Belgium Skills Fund," a three-year initiative to help Belgians develop digital skills. The report found that Brussels is a "magnet for talent," gaining 18 new LinkedIn members for each one that moves away.

Last year, the Brussels-based Centre for European Policy Studies (CEPS) published a study based on LinkedIn data highlighting mobility and skills of IT workers in the EU. We continued our work with CEPS this June, launching a new study analyzing the movements of IT professionals between the EU and the UK. According to the study's authors, Britain's reliance on the EU for IT recruitment – one in ten new hires comes from the EU – suggests that even if the UK does not plan to restrict immigration for high-skilled workers, curbing overall immigration could have unintended negative consequences for the British tech workforce.

> *"Too often, when we talk about skills, education, and training… not often enough is the conversation based on facts. The Economic Graph is a great fact-base which shows… that there is great demand for jobs related to technology."*
>
> - Deputy Prime Minister De Croo

France | Conseil d'Orientation pour l'Emploi

We collaborated with the French Conseil d'Orientation pour l'Emploi, a permanent council set up by the Prime Minister that focuses on labor market and employment issues, on a report on Automation, Digitization and Employment in France which was published in September 2017. The report addressed the skills that will be increasingly in demand in the Fourth Industrial Revolution and how France currently stands as we enter into it. We provided granular analysis of the tech skills, their level of demand, concentration and transferability.

United Kingdom | Digital Talent and Workforce Report

Since 2015, we have been working with the Greater London Authority to provide insights into the city's tech talent in support of the Mayor's Digital Talent Programme, a £7m fund to equip young people with the necessary skills to fill a growing number of digital, creative and technology jobs.

In November 2017, we launched our first UK Workforce Report, drawing on the 23 million LinkedIn members based in the United Kingdom. November's report found that ten out of twelve regions of the UK are net importers of international talent, suggesting that even with Brexit approaching, the UK remains an attractive destination.

We also partnered with Tech City UK to provide insights for the first-ever report looking at UK tech skills by region, which was launched in December 2017. The report found that tech skills are evenly spread across the UK, although London and the South East have slightly higher levels than other regions. The report's findings also suggest that tech skills are highly transferable, as 36% of individuals now working in tech moved from non-tech jobs.

Italy | Work in Milano

Last June, we launched Milan's Economic Graph, examining hiring, migration, and skill trends among the 829,000 LinkedIn members in the city. The second edition of the Economic Graph report was launched this November at the "Work In Milano" event, co-organized with the Milan City Council.

> *"Milan has always been the most dynamic city for the Italian labor market… Over the years, this has allowed us to observe and understand closely how the world of work is evolving and how it needs new digital tools to give companies the chance to find new talents and candidates to be found by companies, both public and private."*
>
> - Cristina Tajani, Councilor for Labor Policy and Human Resources of the Milan City Council

Asia Pacific

India

During a meeting in 2016, Indian Prime Minister Narendra Modi requested the help of LinkedIn CEO Jeff Weiner to accelerate opportunity for India's "gray collar" workforce (e.g., individuals in jobs that incorporate both blue- and white-collar elements). In September 2017, LinkedIn co-founder Allen Blue launched Project Gray in partnership with IL&FS Skills, a government-funded program that provides gray collar offline skilling and placement. Project Gray, which combines placements.com, LinkedIn Learning, and our Login API, is designed to bridge India's widening education-to-employment gap by providing a digital vocational skilling and placement ecosystem for gray collar workers. After successful adoption at IL&FS Skills training centers across India, the government has committed to scaling adoption across 5400 skilling centers. This opportunity will help both gray-collar workers being trained at government funded skilling centers and employers hiring gray collar workers – historically offline in India -- access opportunity on the LinkedIn platform. During the course of the scaled government adoption, we expect to onboard 75,000 grey collar workers on the platform, and ingest 20,000 suitable jobs in the first year.

LinkedIn has also partnered with the Government of Kerala's flagship skilling initiative, Additional Skill Acquisition Program (ASAP). With the support of the Asian Development Bank, ASAP is creating 26 multi-skilling development 'Community Skill Parks (CSP)' across Kerala. LinkedIn is playing the important role of helping ASAP and the CSPs better understand labor market insights -- the jobs in demand in partner economies and domestic skills pipeline -- in Kerala, across India, and globally. Our insights will help the Kerala government and CSPs to optimize the use of training facilities by providing market-led courses that respond to employer demand.

To help the Indian government's ambitious Skill India Mission and fuel the workforce development ecosystem in India, LinkedIn partnered with Microsoft to connect skill infrastructure to the jobs infrastructure. The launch of Project Sangam with the Government of India in March 2017 brought together an integrated solution for skilling and employment that leverages Microsoft Azure services and the power of the LinkedIn platform. Project Sangam, scalable to the needs of government or a skill training organization, will enable users to create personalized skill profiles, and will also offer a job match and recommendations engine.

China

In November, we teamed up with Tsinghua University to launch LinkedIn's first-ever Economic Graph report on the digital talent landscape in China: The China Digital Economy Talent Report. With more than 36 million members in China today, LinkedIn has unique insight into the dynamics of China's digital talent landscape. The Report tracks the supply and demand of the unique skills in China, as represented on LinkedIn member profiles. It also looks at the rise of six different job function categories: digital strategy management, in-depth analytics, product R&D, advanced manufacturing, digital operations, and digital marketing.

Key findings include:

- **China is in the midst of a digital transformation.** The cities with the largest pools of digital talent are Shanghai, Beijing, Shenzhen, Guangzhou, and Hangzhou.

- **Technical fields of study are producing the most digital professionals in China today.** The top fields of study for professionals in digital functions are computer science, software engineering, and electrical and electronic engineering. Business administration is the top non-technical field.

- **For digital professionals in China, the two most in-demand skills are project management and Java.** The two fastest-growing skills in demand are soft skills and C++. Unsurprisingly, the top skills in demand vary between cities and industries.

Singapore

In 2017, we kicked off our first Economic Graph project in partnership with Microsoft to identify and address skills gaps and other labor market challenges in Singapore. The ongoing partnership will leverage government data input by SkillsFuture Singapore and the Institute of Adult Learning (Ministry of Education) to construct a comprehensive "just-in-time" picture of skills and jobs for the use of policymakers, educators, and jobseekers.

We have continued our partnership with the National Trades Union Congress and the Singapore Government to leverage Economic Graph insights to develop programs and partnerships that deepen and diversify the international connections of Singaporean workers though exposure to regional and global markets. The first part of our Economic Graph study supports the development and funding of a government program designed to help young Singaporean talent gain exposure to international work and educational experiences. The second report, launched at LinkedIn's Singaporean Headquarters in September 2017, provides detailed analysis on job trends, talent movements, and training and skills acquisition to better understand the changes and challenges in the Singapore labor market.

Australia

Understanding a city's industry share of employment -- and how connected its professionals are to other markets -- helps leaders identify training and investment needs and determine whether the city is susceptible to particular economic changes. In this context, we partnered with Australia's Federal Department of Prime Minister & Cabinet to analyze member connectivity and provide detailed data on employment trends across sectors to the Federal Government's National Cities Performance Framework. The Performance Framework is a dynamic online tool that brings together critical labor market data to track the performance of Australia's 21 largest cities against key measurements including jobs and skills.

In May 2017, we contributed a unique Economic Graph analysis of Australia's tech talent to the Australia's Digital Pulse report. Prepared in partnership with the Australian Computer Society and Deloitte Access Economics, the report drew on data from more than 9 million LinkedIn members in Australia, and was launched by the Hon. Angus Taylor, Minister for Digital Transformation.

Among the key findings:

- Tech workers are employed across a broad range of industries, indicating the increasing digitization of Australian businesses' operations across all sectors of the economy.

- Half of the top 20 industries posting tech-related job advertisements (as a share of total job advertisements) were non-tech industries, including a wide variety of industries including education, construction, health and management.

- The financial service industry was the most active in hiring tech workers, moving from 12th on our 2015 list, up to 4th in 2016.

- In general, employers place a high value on workers with a mix of technical capabilities and general enterprise or soft skills.

We launched the next stage of our partnership with the Regional Australia Institute (RAI), Connecting our Great Small Cities, at Australian Parliament House with the Minister for Cities. The partnership involves the analysis of LinkedIn Economic Graph data to identify the unique labor market characteristics of Australia's regional cities.

"This is the first case of government really using social media data to gauge the impact of urban policy on traditionally hard-to-measure issues. This work has been providing local leaders with critical near-time data on the skills, connections and mobility of their workers."

- Regional Australia Institute (RAI)