The Lightcast Open Skills Taxonomy

Understanding a Fast-Changing Labor Market

Lightcast

Lightcast

ABOUT LIGHTCAST

Lightcast provides trusted global labor market data, analytics, and expert guidance that empowers communities, corporations, and learning providers to make informed decisions and navigate the increasingly complex world of work. With a database of more than one billion job postings and career profiles, our team provides best-in-class customer service with robust data, clear analysis, and expert guidance on skills, jobs, and opportunities.

Headquartered in Boston, Massachusetts, and Moscow, Idaho, Lightcast is active in more than 30 countries and has offices in the United Kingdom, Italy, New Zealand, Canada, and India. The company is backed by global private equity leader KKR.

For more, visit lightcast.io

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Introduction

In a rapidly changing labor market, skills required of jobseekers are emerging in new combinations, and in occupations old and new. As a result, education providers, trainers, and even employers are having trouble keeping up. Two software developers, for example, may require dramatically different skill sets—one may need to know basic Java, but another might need to know AI functions like deep learning. Skills underpin individual jobs as well as the overall job market—but the change in skills is disrupting jobs at breakneck speed.

Skills have displaced occupations as the unit of analysis by which the job market should be measured. By thoroughly understanding the skills demanded in the current market, different players can adapt to new changes more effectively. Skills enable jobseekers to better understand their current role and career path, or even plan for a career transition. Skills also enable training providers and educators to ensure that their content is relevant and up-to-date, while also enabling employers to build more effective talent pipelines for their future needs. The demand for skills is also an essential way of measuring future work trends across the job market, such as rates of artificial intelligence adoption, job automation, or increases in green jobs.

An understanding of what skills are in demand is also necessary to bridge the gap between demand and supply: what employers are looking for isn't always the same as what educators are teaching or what training providers are offering. Without a common language, these gaps remain and grow wider. Skills create a common language to navigate that gap.

> **Understanding skills is a key component of creating a labor market that works for everyone.**

An understanding of what skills are in demand for a given position can empower:

  » Employers, by allowing them to identify capable candidates who may not have previously stood out,

  » Workers and jobseekers, who will be able to better identify what skills they can develop to break into new careers of industries,

  » Educators, by informing them of what skills need to be added to their curricula or training programs to better prepare their students for the workforce.

Understanding reskilling and upskilling requirements in a specific and granular way can lower the cost of these transitions and make good jobs accessible to everyone.

Developing the Open Skills Taxonomy

The first step to understanding skills is to build an organizing structure, or taxonomy, of skills. Many existing skills taxonomies are developed by individual companies or by government agencies through survey data. Without a cohesive, universally applicable skills taxonomy, the benefits of a skills-focused hiring approach are made less accessible. Further, because of the time it takes to field a survey and collate responses, these taxonomies often leave out new or emerging skills, and can be difficult to adapt. This results in taxonomies that are incomplete or out-of-date.

As our labor market changes more and more, these taxonomies fail to reflect an accurate picture of the skills in demand.

Lightcast remedies this problem by collecting data from online job postings and social profiles. These novel sources provide insights about the labor market that are less apparent in traditional, survey-based data. Social profiles (like online resumes) offer real-world maps of career pathways, and job postings provide information on how newly emerging technologies like artificial intelligence, blockchain, and autonomous vehicles affect the labor market. By using these sources, the Lightcast Open Skill Taxonomy can quickly reflect rapid changes in the labor market that would take longer to identify through other methods of data collection.

Dynamic Taxonomy Updates

Lightcast uses a big data approach to taxonomy development, which allows for real-time updates as skills evolve and new ones emerge. Lightcast updates its taxonomy on an ongoing basis to address the needs of the world's leading firms and to capture data on cutting edge skills in the job market. Importantly, when we add a new skill to our taxonomy, we are able to search for it in our historical data and map its emergence in historic data, which is not possible using survey-based or industrial-organizational psychological approaches.

Lightcast's Multifaceted Approach to Taxonomy Updates

Algorithmic Methods

Qualitative Methods

Partner Requests

Real-Time Skills Taxonomy Updates
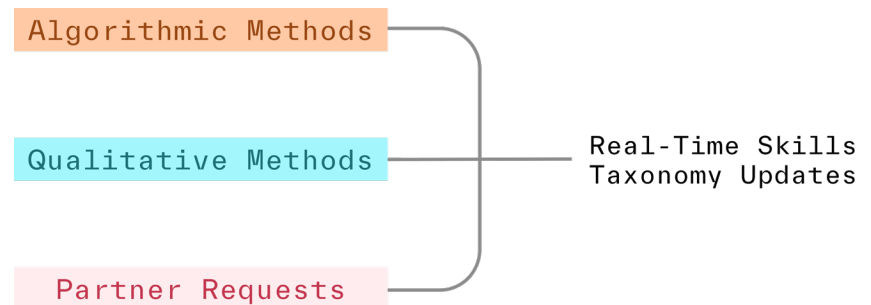
Algorithmic Methods: Lightcast's data scientists have developed machine-learning algorithms to identify potential skills in job postings and other source materials that are not yet in the Lightcast taxonomy. Those skills are then validated by Lightcast's team of job market experts and entered into the taxonomy.

Qualitative Methods: Lightcast maintains a team of quantitative and qualitative researchers, including labor market analysts with expertise across a range of domains and in each of our client markets. They conduct qualitative research in those areas of the job market that are most volatile to ensure emerging skills are entered into the taxonomy.

Partner Requests: Lightcast has the privilege of working with many of the world's most innovative companies. These organizations often suggest highly specialized skills that are relevant to their industry. This enables Lightcast to leverage the expertise and experience of a range of industry leaders in its taxonomy development.

This multifaceted approach ensures that Lightcast's taxonomy remains up-to-date and allows our clients to rely on our team to continuously update and modernize their taxonomies.

> Lightcast's data collection methodology fills in the gaps that occur in traditional taxonomies.

The Lightcast Open Skills Taxonomy is:

1. Granular

Our taxonomy is detailed enough to account for a variety of specific jobs and skills, allowing users to focus on distinct subsections of the labor market. Simultaneously, the taxonomy is organized to be accessible in aggregate, allowing for robust analysis.

2. Specific

Lightcast's taxonomy accounts for both general skill areas as well as more distinct skills, allowing users to narrow in on precise aspects of a given career area.

3. Global

The taxonomy can be used across different businesses, industries, regions, or countries. The taxonomy can also be used in tandem with governmental labor market data, allowing for global comparisons.

4. Responsive

Our taxonomy is updated regularly, accounting for up-and-coming skills and technologies.
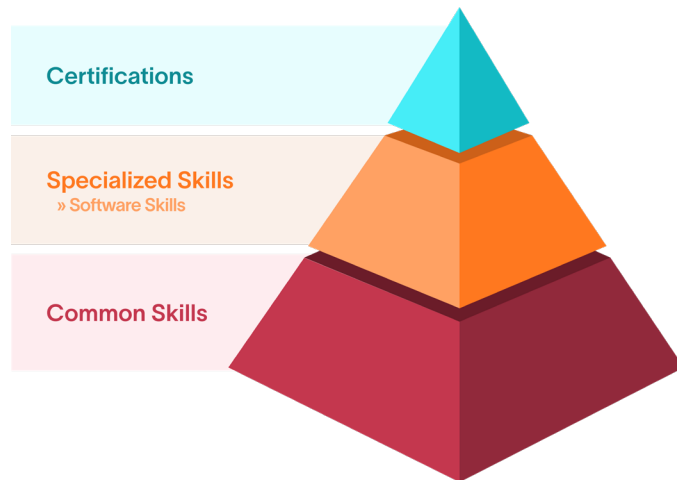
Open Skills Taxonomy Overview

Lightcast's taxonomy of over 32,000 skills has been developed by a team of taxonomists studying the labor market for more than a decade. Using data from both job postings and online profiles, Lightcast is able to hone in on market-relevant skills to provide actionable data and insights to a range of audiences, including jobseekers, employers, students, educators, employers, government leaders, and researchers across the globe.

Each skill in Lightcast's taxonomy is defined, tagged with a skill type, and placed in a category of similar skills.

Lightcast Skills Types

Certifications

Specialized Skills
» Software Skills

Common Skills

Skills Types

Lightcast's Open Skills Taxonomy includes four skill types:

1. Common Skills, sometimes referred to as baseline skills, are prevalent across many different occupations and industries, and include both soft and learned skills. Some examples include communication, problem-solving, and creativity.

2. Specialized Skills, also known as technical skills or hard skills, equip workers to perform a specific task. These skills are usually specific to a given occupation. Some examples include NumPy and Hotel Management.

> **» Software Skills** are a subset of specialized skills that indicate proficiency with computer software such as Adobe Photoshop, SQL, and AutoCAD.

3. Certifications are recognizable qualification standards assigned by industry or educational bodies, such as Project Management Professional (PMP) Certification or Dental Technician Certification.

Skills Hierarchy

In order to help users navigate our list of skills, we have organized them into a **three-layer** taxonomy.

Categories ————————————
Categories roughly adhere to career areas (e.g. Information Technology, Finance, and Health care).

Subcategories ————————————
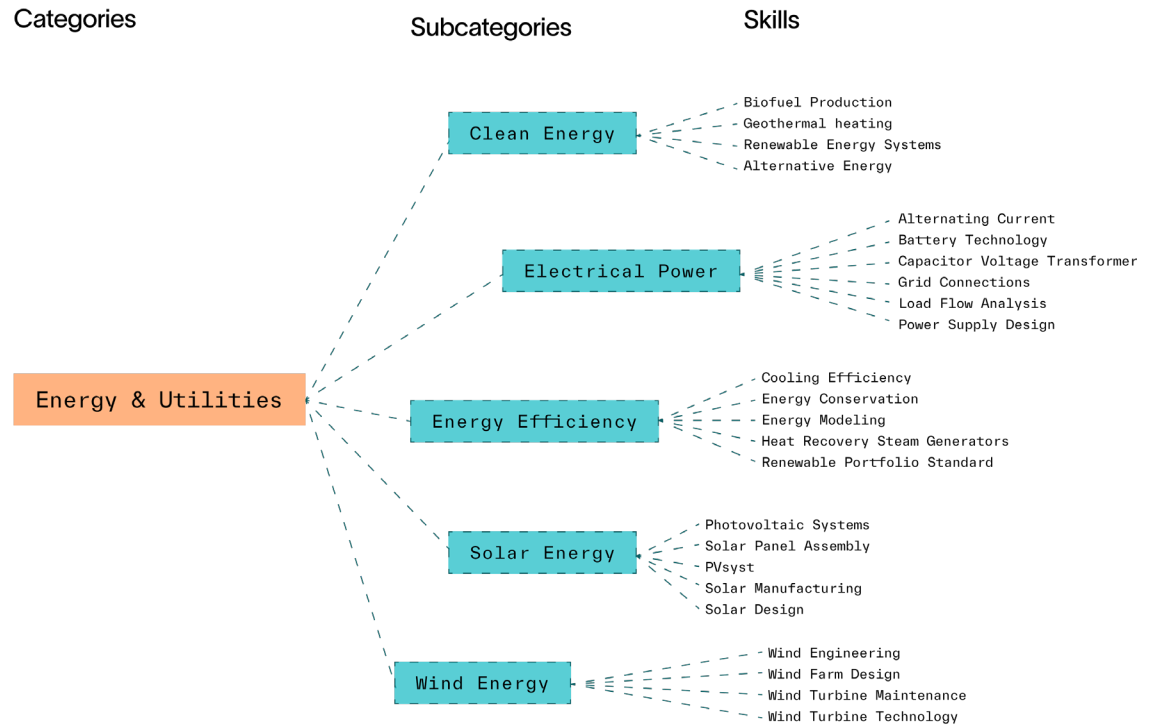Subcategories are groups of skills specific to performing a particular aspect of a job (e.g. . Subcategories are developed using a combination of statistical clustering methodologies and curatorial review by domain experts.

Skills ————————————
Skills are the basic unit of classification in our taxonomy.

Energy and Utilities Skills Hierarchy

Categories   Subcategories   Skills

Energy & Utilities

Clean Energy
- Biofuel Production
- Geothermal heating
- Renewable Energy Systems
- Alternative Energy

Electrical Power
- Alternating Current
- Battery Technology
- Capacitor Voltage Transformer
- Grid Connections
- Load Flow Analysis
- Power Supply Design

Energy Efficiency
- Cooling Efficiency
- Energy Conservation
- Energy Modeling
- Heat Recovery Steam Generators
- Renewable Portfolio Standard

Solar Energy
- Photovoltaic Systems
- Solar Panel Assembly
- PVsyst
- Solar Manufacturing
- Solar Design

Wind Energy
- Wind Engineering
- Wind Farm Design
- Wind Turbine Maintenance
- Wind Turbine Technology

Skills Data

Lightcast maintains a rich set of data that provide further details for each skill. This information can be used to identify how skills relate to one another and to track which skills are most important overall and in specific occupations.

Lightcast data allow for insight about traits of a skill that may change based on the context of the labor market or the popularity of the skill. Some examples of these insights include:

Similar Skills: Identifies the most similar skills to a given skill so jobseekers may expand the range of jobs for which they qualify.
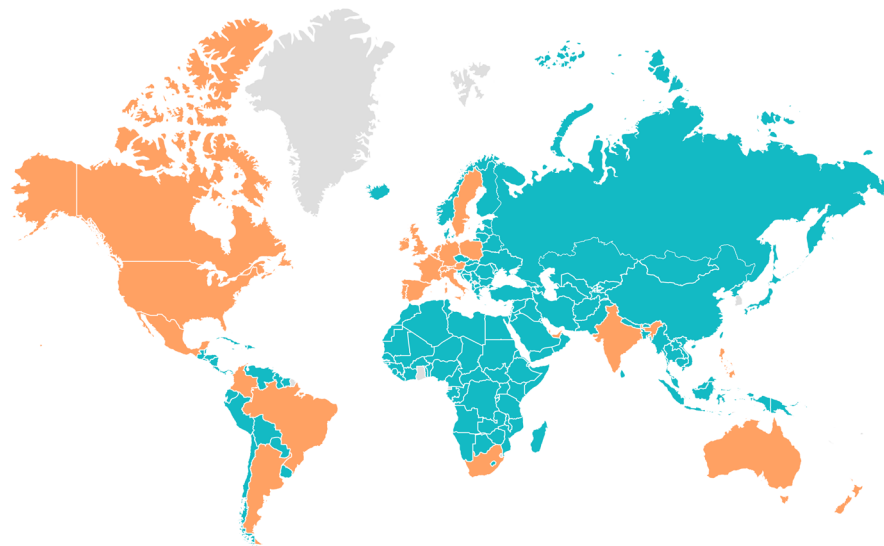
Demand: Describes how often employers request a skill. Demand can be considered in a number of different contexts, including location, industry, experience, and education level. This allows users to track skill importance within relevant subsectors of the economy.

Projected Growth: Projects future demand for each skill so jobseekers and training programs may target emerging skills and deemphasize irrelevant ones.

Market Salary: Highlights how much employers typically pay for a given skill, based on job postings. Does possessing this skill provide jobseekers an incremental salary increase over similar profiles without this skill?

Global Relevance

The Lightcast Open Skills Taxonomy is designed to be actionable for a range of different labor market players. Employers can use this data to have a better understanding of what assets they want potential candidates to have, increasing the size of their hiring pool. Jobseekers can use an understanding of the skills in demand for their given field to upskill and leverage themselves into different positions. Educators and training providers can use skills data to ensure that their curricula best equips their students to meet the needs of a quickly changing labor market.

> Lightcast has data for a range of countries, allowing for insight into how skill demand differs across regions. This asset also opens up opportunities for research about how workforces differ around the world.

Based on these principles, Lightcast has provided taxonomy development services for multinational businesses including Accenture and Cisco, major job boards including Monster, as well as government agencies like the US Department of Labor's O*NET, the UK Office of National Statistics, and over a dozen US states. These organizations build on Lightcast's job posting data, standardized taxonomy, and consulting resources to ensure that they have comprehensive and up-to-date taxonomies that address their talent development needs.

Global Lightcast Data

■ Social Profile Data Available

■ Job Posting Data and Social Profile Data Available
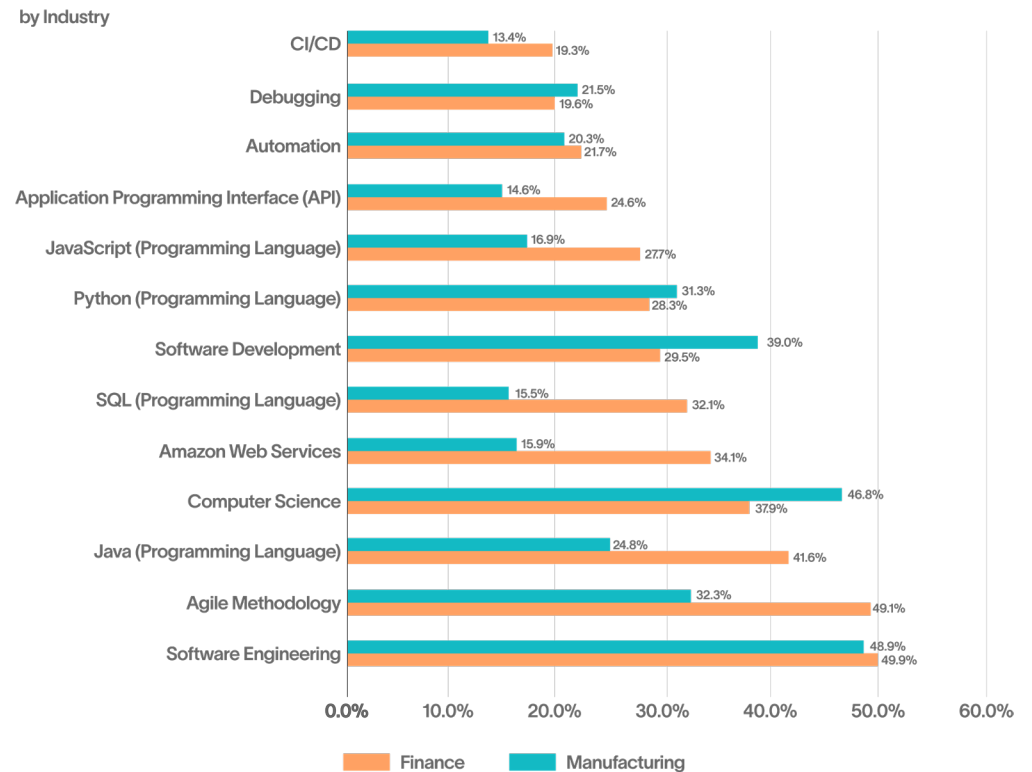
Using Skills Data in Practice

Understanding Skills in an Occupational Context

In order to provide detailed information for students, jobseekers, workers, and other users of the taxonomy, skills need to be placed in the context of the careers in which they are relevant.

The Lightcast job posting database can be used to identify the skills typically required of a certain career and their relative importance to employers in the market, allowing for a rigorous understanding of the relationships between skills, jobs, and industries. This means not only understanding the relationships within categories—such as how skills are related to one another —but also understanding the relationships across categories.

For example, we can track how the skill requirements for a given job are evolving, or how skill requirements differ from industry to industry, or between occupations. The chart below shows how skill requirements vary for Software, Web and Multimedia Developers across the Finance and Manufacturing industries.

Top Specialized Skills for Software, Web, and Multimedia Developers

by Industry

Skill	Finance	Manufacturing
CI/CD	19.3%	13.4%
Debugging	19.6%	21.5%
Automation	21.7%	20.3%
Application Programming Interface (API)	24.6%	14.6%
JavaScript (Programming Language)	27.7%	16.9%
Python (Programming Language)	28.3%	31.3%
Software Development	29.5%	39.0%
SQL (Programming Language)	32.1%	15.5%
Amazon Web Services	34.1%	15.9%
Computer Science	37.9%	46.8%
Java (Programming Language)	41.6%	24.8%
Agile Methodology	49.1%	32.3%
Software Engineering	49.9%	48.9%

Legend: Finance, Manufacturing

We can also track which skills are growing fastest or are becoming more valuable to employers. The automated nature of this approach allows skill profiles to adapt in real time without expensive and complex profiling of roles.

The skills data described in the prior section allows for the development of multifaceted and detailed occupation profiles that highlight which skills are required for a role. Is a skill core to succeeding in a role, or is it something nice to have, perhaps coming with a salary boost? Is a skill versatile across a range of occupations, or does it have a distinct set of roles in which it is valuable? To better understand a skill's role within a given occupation, each skill identified within a specific career is categorized within our occupational skills framework.

Necessary skills

Necessary skills are required for a specific job and are also relevant across other similar jobs. An employee needs these skills as building blocks to perform the more complex Defining Skills. Examples of necessary skills include: business development for Marketing Managers, data entry for Administrative Assistants, and machine operation for Machinists.

Defining skills

Defining skills represent the day-to-day tasks and responsibilities of the job. An employee needs these skills to qualify for and perform successfully in a certain role. Examples of defining skills include accounting for Bookkeepers, the ICD-10 coding system for Medical Coders, and entry-level programming languages such as Javascript and HTML5 for Web Developers.
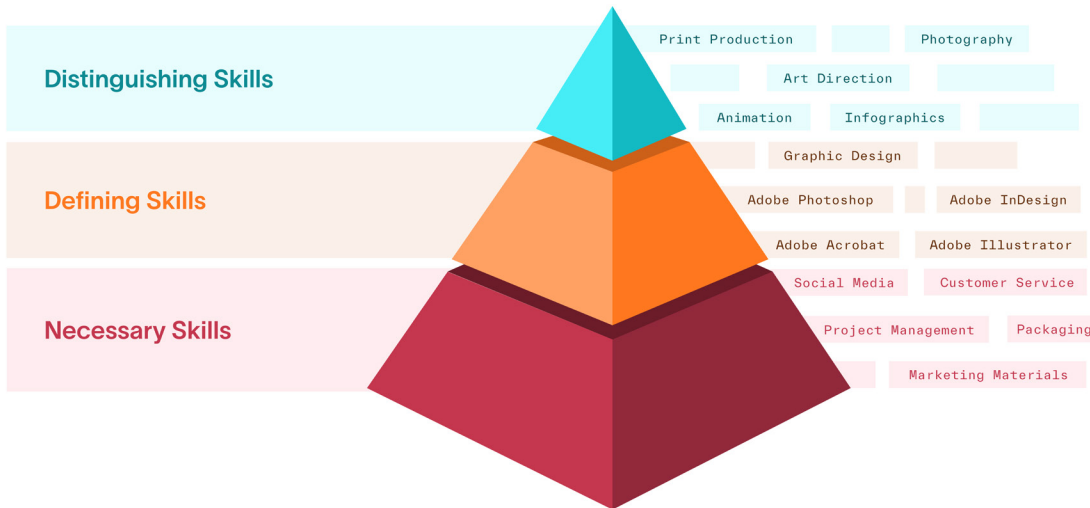
Distinguishing skills

Distinguishing skills are sets of skills that allow jobseekerst to highlight their technical proficiency in a given role and to differentiate themselves from other candidates. These are skills that are less commonly required than defining skills and often represent the specific tools or digital skills in which jobseekers can specialize. Examples of distinguishing skills include specific types of marketing platforms such as Marketo and Google Adwords for Marketing Specialists, and creative design and video editing for Graphic Designers.

The diagram below shows examples of these three different types of skills for a Graphic Designer/Desktop Publisher.

Distinguishing Skills

Print Production   Photography
Art Direction
Animation   Infographics

Defining Skills

Graphic Design
Adobe Photoshop   Adobe InDesign
Adobe Acrobat   Adobe Illustrator

Necessary Skills

Social Media   Customer Service
Project Management   Packaging
Marketing Materials

Using Skills to Develop Career Pathways

A common application of Lightcast skills and data is in the form of Career Pathways. By using information from government data sources and job postings, Lightcast can identify common pathways for workers looking to advance their careers. Our Career Pathways tool (available in the Analyst suite of products) shows the job market in aggregate, looking at jobs outside of their industries and identifying opportunities for career advancement based on overlapping skills, education, experience, and training requirements, and advertised salary. This big-picture approach allows users to identify what skills are needed for success as a career progresses– not only within a given occupation, but also across industries. An understanding of Career Pathways can help employers identify new sources of talent, or help workers achieve upward mobility.

The Career Pathways tool organizes job-to-job movement into four categories:

1. Similar Movement is a progression from one job to another that pays a comparable salary and is within the same occupation group as the source occupation.

2. Lateral Transition is a movement from one job to another that pays a comparable salary but requires transition to a new occupation group, different from the source occupation.

3. Advancement is a movement from one job to another that pays more and is within the same occupation group as the source occupation.

4. Lateral Advancement is a movement from one job to another that pays more but requires transition to a new occupational group.

For example, an individual currently working as a Marketing Assistant has many of the requisite skills required to become a Marketing Specialist (Advancement), or a Talent Agent (Lateral Advancement). The skills taxonomy can help identify what specific skills are needed for effective advancement.

Career Pathways can also be thought of in the inverse, and used to identify which specific jobs may allow for advancement into a certain position. Workers from a wide range of positions may be able to make a lateral advancement into the same job. An understanding of both next-step and feeder jobs can equip jobseekers to seek the training needed to best leverage their careers.

Career Pathways can also be used by employers as a method of expanding their talent pipeline or retaining employees, by educational institutions to maximize the utility students take away from their programs, and by community leaders to identify the best opportunities for workers within a region.

For an example of career pathways in context, please see Towards a Reskilling Revolution, produced with the World Economic Forum and the Boston Consulting Group, where Lightcast uses skills to assess the degree of transferability from one occupation to the next so that underemployed and at-risk workers may reskill toward jobs that offer more stability and better wages.

Marketing Assistant/Associate Career Pathways
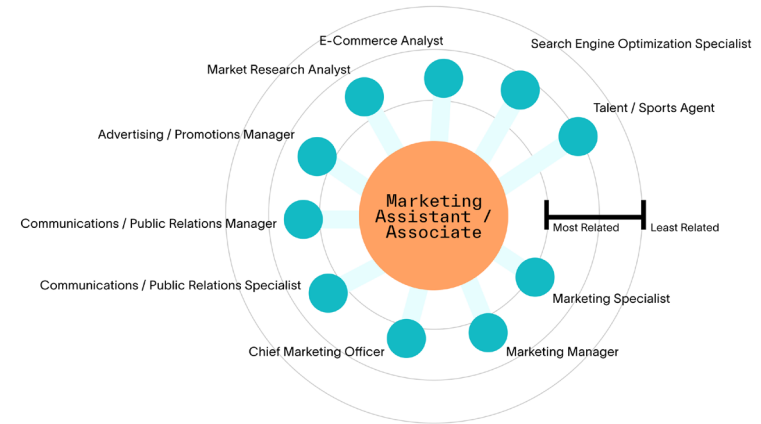
General Manager Career Pathways
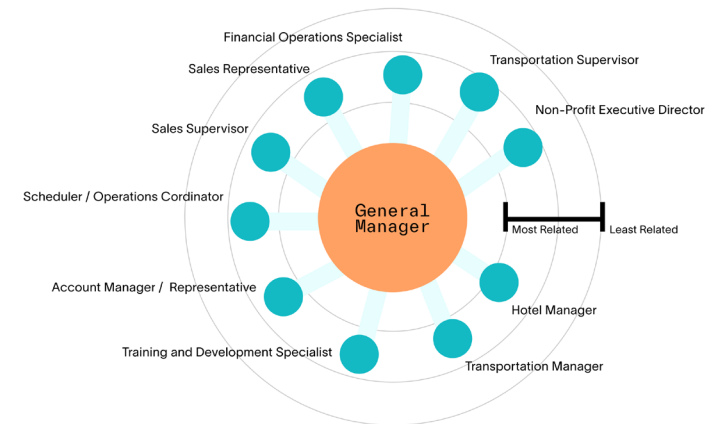
Lightcast Data In Practice

Accenture

Lightcast has worked with Accenture to build a modern skills taxonomy that addresses its needs as a global technology leader with a workforce of 400,000 people. Lightcast worked with Accenture first to organize its legacy taxonomy, eliminate duplicate entries, retire obsolete skills and apply market-relevant naming conventions. Currently, Lightcast provides ongoing maintenance to Accenture's taxonomy, adding emerging skills on a quarterly basis, and producing ongoing skills intelligence reports on global market demand. Accenture uses these data to ensure that it is fully capitalizing on potential business opportunities. Each new technology skill presents a business opportunity for Accenture. Their HR Strategy group uses Lightcast data to ensure they are building the talent pipeline needed to capitalize on those opportunities. Accenture has become a global leader in hiring for blockchain skills, based in part on the early warning of future demand provided by Lightcast's data.

O*NET

O*NET uses Lightcast's job postings data to track new skills in the market, identify elements that are missing from their official taxonomy, and to flag occupations where their I/O Psychology profiles are out of date and should be updated. Their "hot technologies" tag for skills is based in part on job postings data provided by Lightcast.

US Bureau of Labor Statistics

The US Bureau of Labor Statistics uses Lightcast data to update their Occupational Requirements Survey to include the activities, skill demands, and qualifications of each role. The updated survey reduces research costs and improves the punctuality and granularity of survey questions.

UK Office of National Statistics

As the UK Office of National Statistics pursues innovative approaches to measuring the modern economy, researchers have developed a proof of concept for establishing a national skills taxonomy and other labor market information products based on online job postings data delivered by Lightcast.

Further Reading

Below are selections of research papers that leverage Lightcast skills data to characterize current demand, track the evolution of the labor market, or define skill-based career progressions.

- In "The Global Skills Marketplace: Using Remote Work to Solve the Talent Crisis," Lightcast collaborated with Revelio Labs to analyze the growing trend of working remotely, and how skills are transferable across countries and continents affording employers more options for their workforce.

- In "Shifting Skills, Moving Targets, and Remaking the Workforce," Lightcast collaborated with Boston Consulting Group to determine the fastest growing skills in the labor market and the occupations most affected by a projected shift in demanded skills.

- In "Rebuilding our Semiconductor Workforce: Making the Most of the CHIPS Act," Lightcast proposed tactics for the United States manufacturers to re-establish domestic semiconductor production while navigating labor shortages by upskilling and redeploying existing workers..

- In "The Relevance of Artificial Intelligence in the Digital Transformation of the UK Labour Market," Lightcast researchers analyzed the role AI skills play in the UK labor market, how the demand for AI skills in the UK market differs from that of other countries, and which specific industries had the highest demand for AI skills in the UK.

- In "Green Jobs Now," Lightcast collaborated with WorkingNation to identify "green" jobs—defined as jobs that support a green economy by having a positive impact on the environment—and identified the skills needed to upskill the current workforce to fill green job openings.

- In "Moving Up and Moving Forward: Advancing Mobility for Adult Learners," Lightcast researchers assert that encouraging adults to enroll in higher education is a solution to decreasing enrollment trends, and found that adult learners saw more career mobility and higher salaries than those without degrees, identifying which career areas and degrees offered the most economic advancement.

- In "The Emerging Degree Reset: How the Shift to Skills-Based Hiring Holds the Keys to Growing the US Workforce at a Time of Talent Shortage," Lightcast researchers observed a decrease in middle-skill roles that required a bachelor's degree, reversing a trend in degree inflation.

Lightcast

LIGHTCAST DATA

Insight for the real world—at every level of the labor market.

Lightcast software, consulting, and data delivery are all powered by best-in-class data, with the world's most detailed information about skills, jobs, and supply and demand throughout the labor market. We deliver clarity to enterprise and staffing, education institutions, and regional leaders.

CONTACT

For more information, please visit https://lightcast.io/contact