

The New Foundational Skills of the Digital Economy

Developing the
Professionals of the Future



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The New Foundational Skills of the Digital Economy

Developing the Professionals of the Future

Skills often move along a path from the arcane to the useful to the universal. Long division, for example, was largely the province of mathematicians and scientists until the 19th century. Now it is taught in elementary schools. More recently, we have seen a similar pattern with coding, data science, 21st century or “soft” skills, and other on-the-job competencies.

The foundational human, digital, and business skills that will be needed in the digitally intensive economy of the future are already in high demand today.

This paper reports on a search for the New Foundational Skills of the digital economy. How and when do evolving skills change the job market? Which skills are in demand

in both digitally intensive jobs, and more broadly? Which skills retain their value over time? If such a set of emergent, critical skills exists, how do the skills interact, and what do they mean for job seekers and incumbent employees, educators, and employers?

To find out, the Business-Higher Education Forum (BHEF) commissioned Burning Glass Technologies to examine skills in the job market by drawing from a set of more than 150 million unique U.S. job postings, dating back to 2007. The research identified 14 skills that have become foundational in the new economy, which converge in three interrelated groups: Human Skills, business skills, and digital skills. Human Skills have a long history of close study, so BHEF and Burning Glass are especially pleased to subject these two other major segments of the skills continuum – Business Enabler and



Digital Building Block Skills – to similar scrutiny.

These 14 foundational skills play major roles in the economy and in the lives of job seekers and incumbent employees. They increase in value when used in combination. They often command salary premiums. They help individuals and institutions keep pace with change. Critically, they are in high demand in multiple sectors, and are spreading rapidly throughout the wider economy.

The job seekers and incumbent employees who are building a range of capacities across

these groups of skills form a new cohort we call blended digital professionals. Their mixed abilities give them and their employer substantial advantages, and position them to thrive in current and future markets and workplaces. Educators and employers alike will be wise to explore the most effective ways to foster the continued emergence of these much-needed professionals, who are destined to play a large role in the future of the workplace and the global economy.

Brian K. Fitzgerald

Business-Higher Education Forum

Matt Sigelman

Burning Glass Technologies

1.

Executive Summary

Are essential skills in digitally intensive sectors spreading to the wider world of work? Are the demands of the digital economy, and its gradual transformation of the wider economy, creating a set of New Foundational Skills requested across workplaces, including those outside of technology and analytics?

Building on its prior work, the Business-Higher Education Forum commissioned Burning Glass Technologies to examine the new skills in the job market of the digital economy, analyzing roughly 56 million resumes and more than 150 million unique U.S. job postings. This is the first time the universe of skills has been analyzed in order to better understand the most valuable combinations of skills for the digital economy.

Here is what emerged.

The New Foundational Skills for the digital economy emerged in three groups:

- **Human Skills** apply social, creative and critical intelligence. These skills – critical thinking, creativity, communication, analytical skills, collaboration, and relationship building – appear on many lists of sought-after “soft skills,” and are still in high demand across the digitally intensive economy.
- **Digital Building Block Skills** are critical to many vocations, and increasingly useful outside traditional digitally intense job families. These skills are especially useful to current or aspiring functional analysts and data-driven decision makers. These skills include analyzing data, managing data, software development, computer programming, and digital security and privacy.
- **Business Enabler Skills** play a synthesizing, integrative role in the workplace. These skills allow the other skills to be put to work in practical situations, and include project management, business process, communicating data, and digital design.

Within these three skills groups, 14 New Foundational Skills are in high demand in both digitally intensive sectors, and in the wider economy. In 2017, one or more of the 14 foundational skill areas were requested

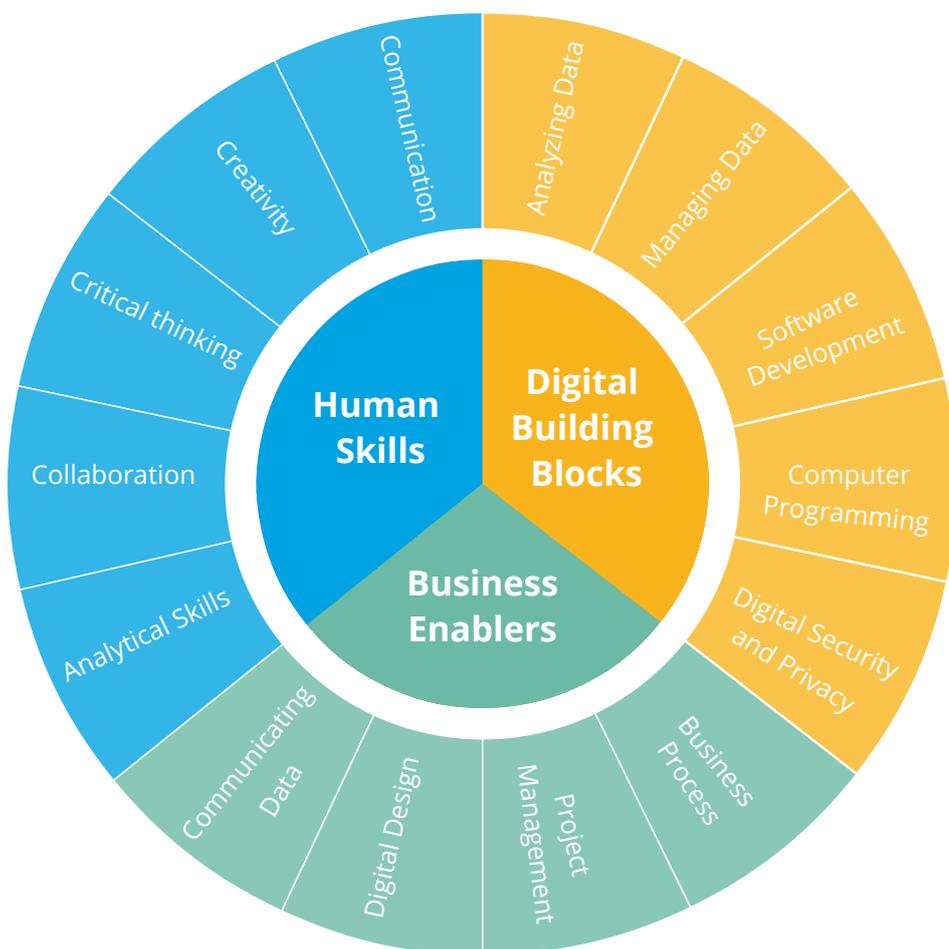
in 11.9 million job openings – 53% of the 22.4 million total openings that year. In addition, two skill areas already have over one million annual openings and nine others have more than two million annual openings. All 14 skills have seen an increase in demand, averaging 32% over the past five years.

The New Foundational Skills are not confined to the digital economy or technical professions. They are already sought in the majority of jobs across the economy, regardless of their relation to the digital economy. Although all of these skills show up frequently in postings from the digitally intensive areas of the economy, most actually fall outside of the digital economy. For nine of the skill areas, the majority of job openings are outside of the digital IT and analysis job families, confirming that the demand for digital skills goes well beyond the tech economy.

Job seekers and incumbent employees need skills from each of the three skill groups in order to thrive, but less than a fifth currently claim skills in all three groups on their resumes.

No one individual is likely to need all 14 skills, but people can mix and match skills to become the blended professionals required in an economy that is becoming increasingly digitized. While all three groups of skills are valuable, combining skills drawn from

The New Foundational Skills for the Digital Economy



different groups increases their value. For instance, a person or a business team with high levels of skill in software development, a Digital Building Block, can increase their earning power and productivity by developing skills in project management, a Business Enabler. However, while those who prepare for the digital economy by building skills in all three groups will enjoy a clear advantage, fewer than one in five job seekers in this research claim to have done so.

Those who develop the New Foundational Skills earn significantly more. The average advertised salary of jobs requesting at least one of the New Foundational Skills was \$61,000; \$8,000 more than the average for all other jobs. In addition, each of the nine skills in the Digital Building Block and Business Enabler skill groups boasts a salary premium, ranging from 7% to 38% higher than the average. Software development and computer programming offer the largest salary bumps of 34% and 38%, respectively.

New Foundational Skills increase in value as careers advance. Skills in all three of the skills groups appear to be of enduring value, often becoming more important as people advance. Overall, these New Foundational Skills are 49% more likely to be requested in senior or managerial level roles than in other jobs.

Each of the New Foundational Skills spans a continuum of ability levels, from baseline

to expert. The multiple levels increase from minimum or baseline competencies, through core competencies honed in specific work contexts, to distinguishing competencies at high levels of expertise.

Many of the New Foundational Skills contain opportunity for further learning. The progression of ability levels within each skill can, if facilitated and supported by employers and educators, help jobseekers

Demand for the New Foundational Skills

Digital Building Blocks		Business Enablers		Human Skills
Foundation Skill Area	Total Openings: 2017	Growth: 2012-2017	Share of Openings Outside IT and Analysis Job Families	Average Salary Premium
Managing data	 3,527,740	 24%	 29%	14%
Software development	 3,326,192	 44%	 21%	34%
Computer programming	 2,571,728	 35%	 15%	38%
Analyzing data	 1,320,678	 68%	 58%	7%
Digital security & privacy	 895,547	 75%	 28%	17%
Business process	 3,215,648	 18%	 70%	19%
Project management	 2,354,230	 21%	 68%	21%
Digital design	 1,427,981	 2%	 54%	2%
Communicating data	 147,219	 323%	 32%	17%
Communication	 9,185,978	 27%	 85%	-
Critical thinking	 3,666,249	 31%	 73%	-
Collaboration	 3,480,175	 46%	 82%	-
Analytical skills	 2,395,145	 24%	 78%	-
Creativity	 1,217,062	 23%	 80%	-

and incumbent employees keep pace as technology and other workplace transformations increasingly render work more complex.

Job seekers and incumbent employees possessing a diversity of the New Foundational Skills experience increased job mobility. While each of these skills is valuable, those who build and draw on skills in each of the three groups are most likely to advance into senior roles. Individuals who develop and apply skills from all three groups can acquire a range of capacities and skills that are highly valued. Such multi-skilled jobseekers and incumbent employees can be considered blended digital professionals.

Employers and jobseekers appear to place very different value on these skills—at least based on the signals they send. Employers often seek these skills in job postings, but resumes show that most jobseekers claim very few of them. While 78% claim at least one new foundational skill, only a small minority of the millions of resumes studied claim three or more of these skills. Even the three most frequently claimed skills – business process, communication, and critical thinking – are cited in barely a quarter of the sample. One in four jobseekers claim none of these skills. It is not clear whether jobseekers

“The New Foundational Skills drive change. Over time, these skills reliably trickle down from specialized jobs and fields, as increasing demand makes them routine. They create mobility for individuals, as one person’s Digital Building Block Skills, for example, are enhanced by their Business Enabler or Human Skills. And, perhaps most significantly, they increase in value over the course of a career. People and institutions that acquire and blend these skills become more powerful, flexible and dynamic.”

Matt Sigelman
CEO, Burning Glass Technologies

do not possess these skills, or simply fail to signal them, but either way this mismatch between the skills signaled by jobseekers and the skill requirements signaled by employers strongly suggests that opportunities are being missed.

Implications

Incumbent employees and jobseekers who possess the New Foundational Skills have the potential to thrive in a digital economy – becoming more adaptable to future disruption, increasing their earning power, and improving their long-term career prospects. But for this transformation to

occur, the large gap between demand and supply of these skills must be overcome.

In order to acquire and signal these skills, current and future workers need to know just how valued and needed these skills are, and they need the leadership of business, higher education, and intermediary organizations to take new and focused action. Employers with strong representation of these skills in their workforces can position themselves at a significant advantage. Educators who incorporate learning opportunities that effectively impart these skills will not only equip their graduates for career success but may also prove themselves effective partners to industry. Intermediary organizations in the education, business, policy, and workforce sectors have much to gain from applying these insights to their ongoing efforts.

Recommendations

Intermediary organizations including business and higher education associations, should treat the New Foundational Skills as essential to their members' competitiveness, and take on critical supply-and-demand challenges.

- Publish market intelligence signaling business' skill and talent needs.
- Spotlight education and career

strategies for job seekers, new hires, and incumbent employees.

- Promote investments in work and learning partnerships that build skills.

Employers should aggressively signal their new foundational skill demands, and restructure their hiring to better attract and develop talent.

- Recognize the New Foundational Skills as critical to core competitiveness.
- Ensure that all job postings feature New Foundational Skills.
- Develop individualized learning plans and engage partners in their use.
- Seek new and more diverse sources of skills and talent in key adjacencies.
- Communicate the role of these new foundational skills across industries.
- Work with higher education partners to coordinate goals for classroom and work-based learning, internships, and job skills development.

Higher education must increase the value of its credentials by teaching these skills in all its disciplines and fields.

- Recognize these skills as essential outcomes for 21st century learners.
- Engage faculty and administrators in building the teaching and learning of these skills into coursework

- and overarching curricular goals.
- Integrate skills into admissions processes and on-campus student advising.
- Provide capstone learning opportunities to build and document these skills.
- Coordinate with businesses and employers on expectations for classroom and work-based learning, internships, and job skills development.

College students should recognize the importance of these skills to career growth and develop a personal plan to acquire, demonstrate, and signal these skills.

- Value the importance of these skills for landing jobs and advancing careers.
- Build a mindset to become a continuous learner.
- Seek out hands-on opportunities to acquire New Foundational Skills.
- Signal possession of new foundational skills in one’s resume.

- Develop by pursuing volunteer, internship, or work-based opportunities.
- Learn to identify how the foundational skills manifest in new fields.

Current job seekers and incumbent employees should recognize the importance of the New Foundational Skills and pursue strategies to acquire and signal them.

- Identify gaps in current knowledge around new foundational skill areas.
- Use internal training, MOOCs, boot camps, or education benefits to build skills.
- Learn to effectively communicate with, and learn from, digitally savvy peers.
- Gain experience with adjacent tasks and functions, to develop the new skills.
- Learn to signal demonstrable competencies in new foundational skills areas.



2.

The Context

Rapid Transformations of Work and Skills

The world of work is changing. A broad swath of occupations is at risk for transition or elimination through automation and artificial intelligence, and such risks are highest in highly developed economies like that of the U.S.¹ At the same time, many economies and industries that are losing occupations to automation are already re-purposing existing occupations, and creating new jobs.² In fact, the pace of this transformation of work is quickening. In a recent global study, McKinsey & Company found that for most jobs, more than a third of skills necessary in 2016 would no longer even be required for the same job by 2020 – a mere four years later.³

Skills are the vectors by which these transformations of industries and economies take place. As jobs come to be redefined by new modes of work, the result is a hybridization that mashes together skills from disparate domains, and demands greater breadth and flexibility of the workforce.⁴ In the global economy, and especially in the U.S., digitally intensive jobs are mushrooming, and they are increasingly influencing work done outside of traditionally technical industries and sectors. Not only is the economy predicated on the workforce's acquisition of new skills, but also there is explosive demand across multiple sectors for people who can synthesize multiple skills that include a digital or technical element.⁵

Fortunately, there is a growing body of evidence that skills, and their acquisition, can drive mobility, even for those most at risk of losing jobs or of having their jobs change.⁶ Modern jobs integrate an array of broadly demanded skills. These are not the specialized skills of the engineer

or the physicist, working with advanced mathematical models, so much as they are those of the analyzer of complex bodies of data, the software programmer, the project manager, and the critical thinker.

A core benefit of foundational skills is the capacity to adapt: having a broader skill base isn't simply about meeting the needs of today's jobs. Rather, these skills equip jobseekers and incumbent employees for the future, enabling them to navigate a dynamic landscape of accelerating change: job losses, job changes, and job creation.⁷ Raising one's level of academic attainment is the most familiar such adaptation. By securing targeted training, and by seeking out hybrid jobs – such as those that require a mix of technical and marketing skills or that combine computer science and business skills – one can command salary premiums without an advanced degree.⁸

Multiple studies cite the development of social and emotional skills, creativity, and high-level cognitive skills as a powerful

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1. Frey, Carl & Osborne, Michael. "The Future of Employment: How Susceptible are Jobs to Computerisation?" (Oxford, United Kingdom: Oxford Martin, 2013)
 2. Bughin, Jacques. "Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation" (New York: McKinsey Global Institute, McKinsey & Co., 2017)
 3. World Economic Forum. "The Future of Jobs" (Geneva, Switzerland: World Economic Forum, 2016)
 4. Burning Glass Technologies and General Assembly. "Blurring Lines: How Business and Technology Skills are Merging to Create High Opportunity Hybrid Jobs" (New York: General Assembly, 2015)
 5. Burning Glass Technologies. "Quant Crunch: How the Demand for Data Science Skills is Disrupting the Job Market" (Boston: Burning Glass Technologies, 2017)
 6. World Economic Forum. "Towards a Reskilling Revolution: A Future of Jobs for All" (Geneva, Switzerland: World Economic Forum, 2018)
 7. Bughin, Jacques. "Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation" (New York: McKinsey Global Institute, McKinsey & Co., 2017)
 8. General Assembly and Burning Glass Technologies. "Blurring Lines: How Business and Technology Skills are Merging to Create High Opportunity Hybrid Jobs" (New York: General Assembly, 2015); Restuccia, Dan, with Pang-Cheng Liu and Zoe Williams. "Rebooting Jobs: How Computer Science Skills Spread in the Job Market" (Boston: Burning Glass Technologies, 2017)
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Skills Trickle Down Over Time

In 1880, accountants and mathematicians were the “data scientists” of note, manipulating calculations understood by a select few. Today, many workers across multiple professions perform calculations far more complex, and millions of people understand and manipulate data using tools and techniques that would confound even the most skillful of 19th century experts. Yet most people consider the modern data scientist to have a rarified set of skills, unlikely to be learned in the future, by themselves or by others.

The advanced skills of the past become the foundational skills of the future. John Snow solved a mystery and ended a London cholera outbreak in 1854, inventing epidemiological tools that middle and high school students now use routinely in environmental fieldwork. Procedures that only doctors did in the 1920s and 1930s are now handled by millions of nurse’s aides, family members, and patients. Few people now over fifty had exposure to computers in their youth, yet many have since mastered sophisticated digital tools.

At some moment in the future, many of the high levels of skill that currently seem confined to the upper reaches of the digital economy, or to larger, more complex organizations, will become the norm among jobseekers, incumbent employees, and workplaces. This dynamic movement of skills, through time and across contexts, is an essential part of the story of the New Foundational Skills. Though highly concentrated in the digital economy, they are spreading... fast.

accelerator of adaptability.⁹ Employers prize these skills but can have great difficulty finding them in the workplace.¹⁰ Recent research suggests that rather than declining in importance, these skills are likely to become even more essential, both for jobseekers and incumbent employees and for the success of their workplaces.¹¹ Further research suggests that those who can combine skills like empathy, cooperation, and negotiation with mathematical and analytic skills will thrive in an economy that increasingly relies on both.¹²

Absent from this review of recent literature is a recognizable, reliable framework for identifying the skills that are foundational both to the rapidly evolving digital economy, and to the wider economy from which it will one day be indistinguishable. BHEF has documented the importance of soft skills in its report on 21st century workplace competencies.¹³ With this research from Burning Glass Technologies, BHEF adds to its earlier analysis by investigating the Business Enabler and Digital Building Block Skills, as well as the Human Skills, required for career success.

In 2018, the New Foundational Skills...

- Are concentrated in digitally intensive jobs and industries, but have already spread across the economy
- Represent a large fraction of ALL skills
- Include a diverse array of skill areas
- Span a baseline-to-expert continuum
- Add value across many roles
- Increase in value over a career
- Advance job mobility
- Often command better pay
- Are under-claimed by some job seekers and incumbent employees
- Are not possessed by others

9. Frey and Osborne; Bughin et al.

10. Burning Glass Technologies. "The Human Factor: The Hard Time Employers have Finding Soft Skills" (Boston: Burning Glass Technologies, 2015)

11. Pearson and Jobs for the Future. "Demand Driven Education: Merging work and learning to develop the human skills that matter" (London: Pearson, 2018)

12. David Deming. "The Growing Importance of Social Skills in the Labor Market" (The Quarterly Journal of Economics, vol 132(4), pages 1593-1640)

13. Business Higher-Education Forum. "Promoting Effective Dialogue Between Business and Education Around the Need for Deeper Learning" (Washington, D.C.: Business-Higher Education Forum, 2013)

3.

Methodology

A team of Burning Glass Technologies analysts, working with a set of close to 56 million resumes and more than 150 million unique job postings collected by Burning Glass since 2007, analyzed Burning Glass's taxonomy of over 17,000 skills and clustered them into 14 foundational skill areas that meet the following criteria:¹⁴

- **In high demand**, or in rapidly growing demand, appearing in a minimum of one million postings in 2017, or showing a minimum of 70% growth since 2012.
- **Common to digitally intensive roles**, with at least 20% more concentration in highly digital job families such as IT and Analysis.

- **Already spreading to less digitally driven parts of the economy**, with at least 15% of openings outside of the IT and Analysis job families.

These skills were then grouped in three groups: Digital Building Block Skills, Business Enabler Skills, and Human Skills.

Human Skills

- Often drive automation and technology, rather than being driven by it
- Are more likely – not less – to be in demand in digitally intensive jobs
- Are essential to the success of teams and enterprises
- Are valued by employers and educators for workers at all levels
- Are the most transferable of all New Foundational Skills
- Can be applied across any other skill set or work context
- Are the hardest to connect to specific career opportunities or jobs in the digital economy
- Are useful across most jobs, but must be complemented by other skills
- Unlike the other New Foundational Skills, are not yet treated as measurable competencies that can be taught and learned

14. See appendix.

Digital Building Block Skills

- Represent essential skills for those who seek to thrive in the digital economy
- Are great for getting one's foot in the door
- Often have credentialing systems that signal efficiently and align with a clear progression of skills
- Serve as a reliable means to earn more, and to advance professionally, across job families
- Have high salary premiums: computer programming (38%) and software development (34%) offer the greatest salary bumps of any New Foundational Skills
- Enable individuals to adapt and leverage new technologies

Business Enabler Skills

- Act as connective tissue between people with disparate skills and roles
- Close technological, knowledge, and communication gaps
- Function as a set of bridges between roles, workers, teams, and domains
- Inform R&D with consumer, marketplace, and business insight
- Apply the creative power of digital science to the overall business enterprise
- Unlock, add, and communicate the value of digital technologies



4.

Findings

- I. **The New Foundational Skills are in high demand across the economy, and jobseekers and incumbent employees with abilities in each of three skill groups have a powerful advantage**
- II. **The New Foundational Skills are the gifts that keep on giving, unlocking opportunities throughout one's career**
- III. **Employers and jobseekers appear to place very different value on the New Foundational Skills**

I. The New Foundational Skills are in high demand across the economy, and jobseekers and incumbent employees with abilities in each of three skill groups have a powerful advantage

The New Foundational Skills for the digital economy emerged in three groups: Human Skills, Business Enabler Skills, and Digital Building Block Skills.

- Human Skills are the skills that are required for idea development and therefore innovation, and that also serve as the foundation for other key skills and abilities across the digital economy.
- Business Enabler Skills are skills required across job families that enable individuals to bridge the capabilities of digital technologies with broader business goals. These skills are critical to unlocking and communicating the value of digital technologies and applying them to address stakeholder needs.
- Digital Building Block Skills leverage digital tools to add value and align with functional domains that are critical to the digital economy. Increasingly, these skills spread across job families and beyond purely technical fields. Digital Building Block Skills are transferrable. They promote career progression and

open pathways to a broad array of career opportunities.

The 14 New Foundational Skills are in increasingly high demand across the digital economy. Employers want these skills, and demand is rising fast. Nearly 12 million job openings in 2017 – representing 53% of all openings – sought at least one of these skills. All but two of the 14 skills had a million posted openings, and nine had over 2 million postings in 2017. Since 2012, demand for five of the skills has grown over 40% and demand for all but one skill has grown over 15%. The skill for which demand is increasing most rapidly, Communicating Data, has a growth rate of 323%.

The New Foundational Skills are not confined to the digital economy or technical professions. They are already sought in the majority of jobs across the economy, regardless of their relation to the digital economy. In 2017, one or more of the 14 new foundational skill areas were requested in 53% of over 22.4 million unique job openings in the United States, or 68% of all job postings listing at least three identifiable skills of any kind. Although all of these skills show up frequently in postings from the digitally intensive areas of the economy, most actually fall outside of the digital economy. Indeed, nine of the 14 skills are more likely to show up outside the

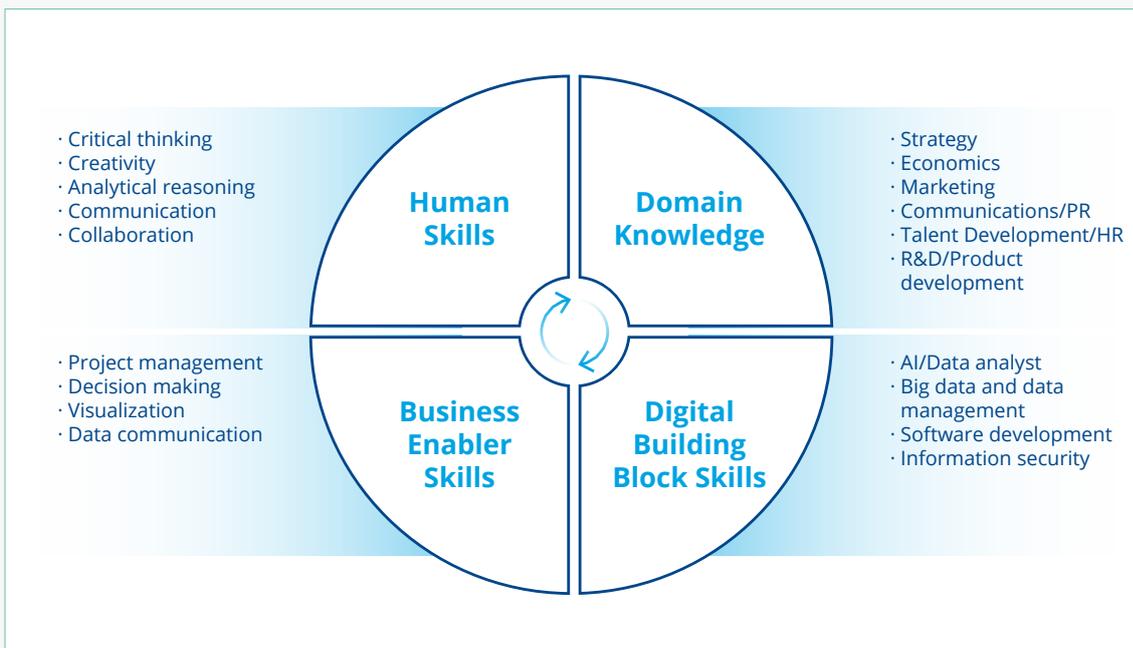
digitally intensive job families of IT and Data Analysis, including one of the Digital Building Block Skills, three of the four Business Enabler Skills, and all five Human Skills.

Jobseekers and incumbent employees need skills from each of the three buckets to be prepared for the digital

economy, but few currently claim this mix of skills on their resumes. Not every person will need every skill, but jobseekers and incumbent employees can mix and match skills to become the blended digital professionals required in a broader economy that is increasingly becoming the digital economy. A key point is that these three

The Blended Digital Professional

The blended digital professional is someone who combines Human, Business Enabler, and Digital Building Block Skills with domain knowledge that is specific to a company, organization, or workforce. Competency or expertise in any of the three new foundational skill areas can be paired with domain-specific knowledge – in any sector of the economy, in a wide array of industries and workplaces – to create the role of a “blended digital professional.” In this model, the three foundational skill areas provide the base of competency or expertise necessary to adapt to new domains, and to new jobs or opportunities, throughout one’s career.



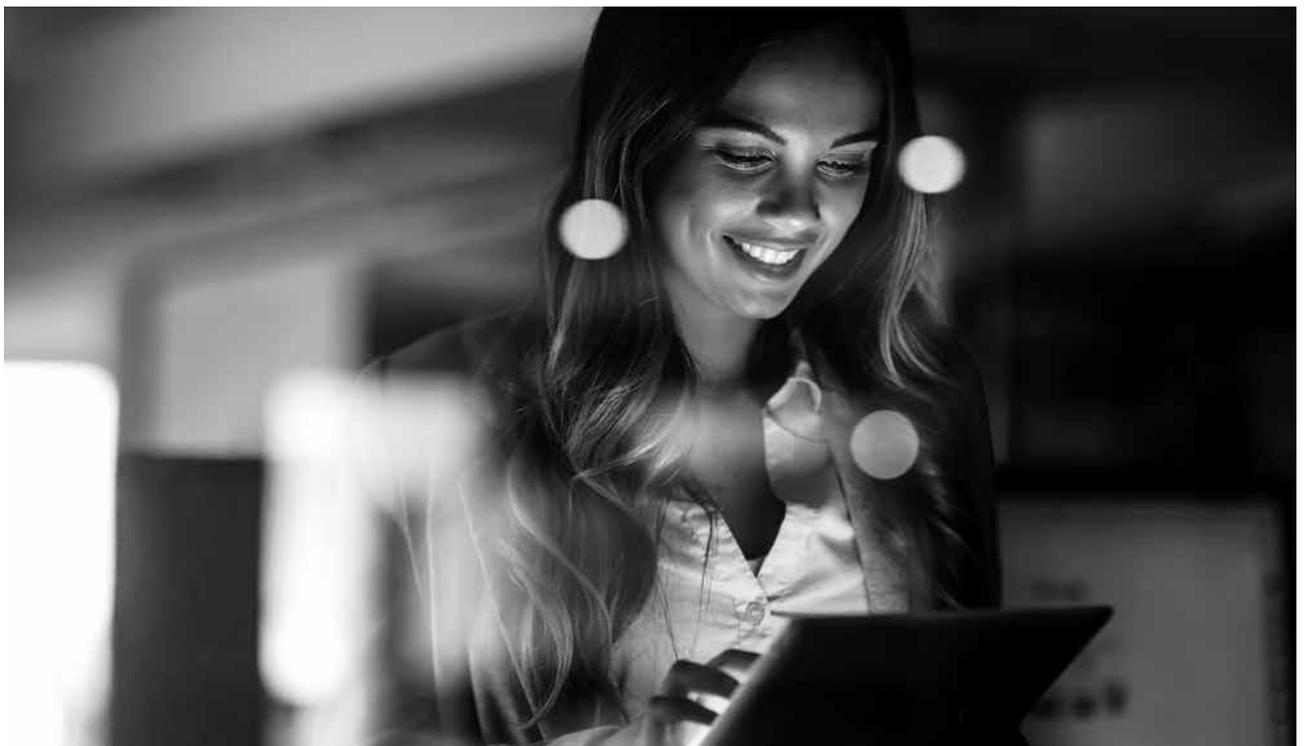
groups of skills interface and relate with one another. While they are all valuable, it is the combinations drawn from all three groups that make them uniquely valuable, and that support the ongoing learning of individuals and the adaptability of workplaces. These skills help people and institutions keep pace as technology and other workplace transformations render work more complex: They are the skills necessary for jobseekers and incumbent employees to acquire new skills, and for workplaces to adapt and thrive.

It is also noteworthy that having skills from all three of these large skill areas, while clearly a predictor of advancement and career mobility, is relatively uncommon. While 78% of reviewed resumes claim a single skill, only 46% claim to have skills in two of the three

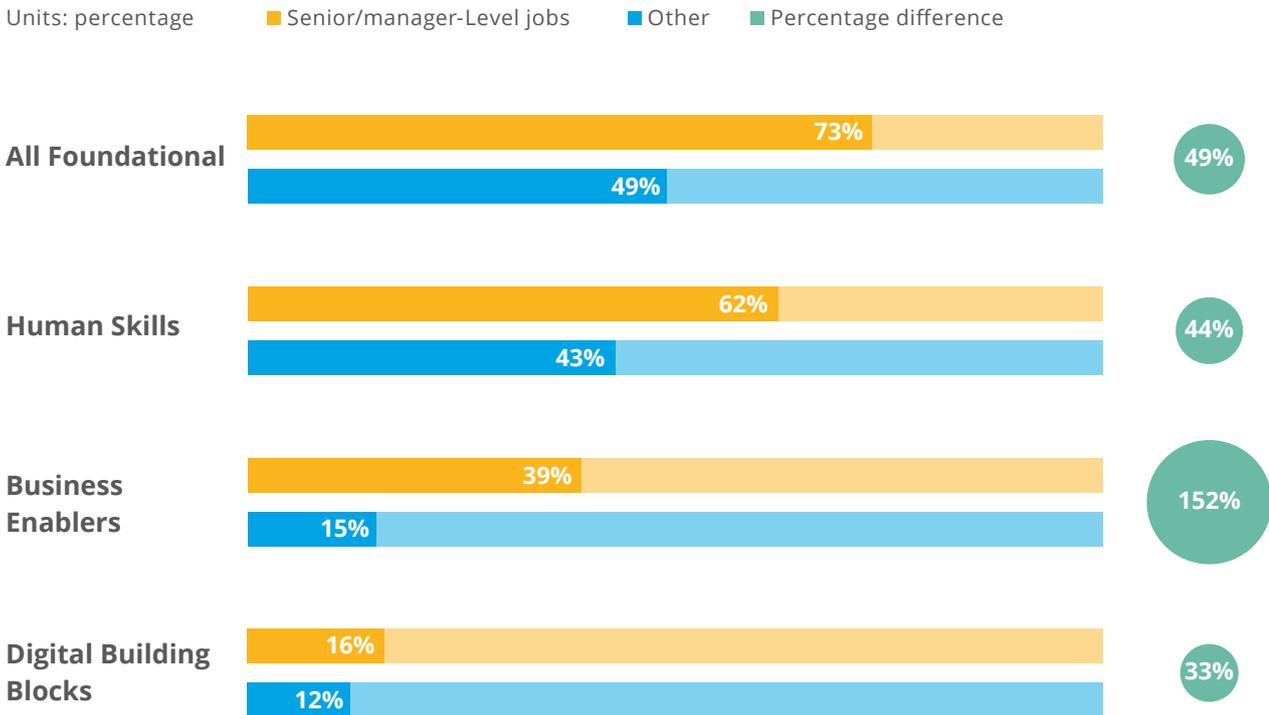
skill areas, and a mere 19% claim at least one skill in each of the three groups.

II. The New Foundational Skills are the gifts that keep on giving, unlocking opportunities throughout one's career

Workers with the New Foundational Skills earn more. The average advertised salary of jobs requesting at least one of these skills was \$61,000 compared to \$53,000 for jobs requesting none of these skills – an average salary premium of \$8,000. Each of the nine skills in the Digital Building Block Skills and Business Enabler Skills groups boasts a salary premium, ranging from 7% to 38%. Software development and computer



Share of Openings Requesting Skills



programming offer the largest salary bumps of 34% and 38%, respectively.

The New Foundational Skills are broadly needed, and deliver increasing value over the course of a career.

A skill that is requested more often for advanced jobs is one that has increasing value over the course of a career. More broadly required skills that are especially sought after in postings for senior leaders are likely to have more ongoing career relevance.

In the graphic above, the likelihood of a new foundational skill being requested for advanced jobs is contrasted with skill requests in postings for other jobs. Across all

three skills groups, data show that advanced job postings are far more likely to seek out New Foundational Skills than are postings for other jobs, from 33% more likely in Digital Building Block Skills, to 44% in Human Skills, to a remarkable 152% more likely among Business Enabler Skills. In the aggregate, advanced jobs are 49% more likely than other jobs to seek out the New Foundational Skills, showing that the value of these skills rises over the progression of a career.

Workers can aspire to different levels of competency within many of the New Foundational Skills, enabling these skills to serve as platforms for further learning and career advancement. For both Digital

Building Block and Business Enabler Skills, workers can develop more advanced and specialized skills by progressing to higher levels of competency. Each progression builds on the skills and competency levels that precede it and increases workers' earning potential and employment options. The different levels of competency include the following:

Baseline Competencies provide the ability to understand and navigate a wide diversity of roles, challenges, and opportunities. Required in workplaces across the digital and the global economies, they can be learned on the job or in a course. They form a platform upon which people can build further expertise, if desired, to develop new areas of core competencies and qualify for more technically advanced jobs in the future. Although not all workers need to develop each of the 14 New Foundational Skills, the jobseeker or incumbent worker who develops multiple baseline competencies, in a diversity of skills areas, has a distinct advantage in the workplace. For example, the baseline competencies associated with analyzing data – such as data collection, data analysis, and pivot tables – are useful tools for workers regardless of role.

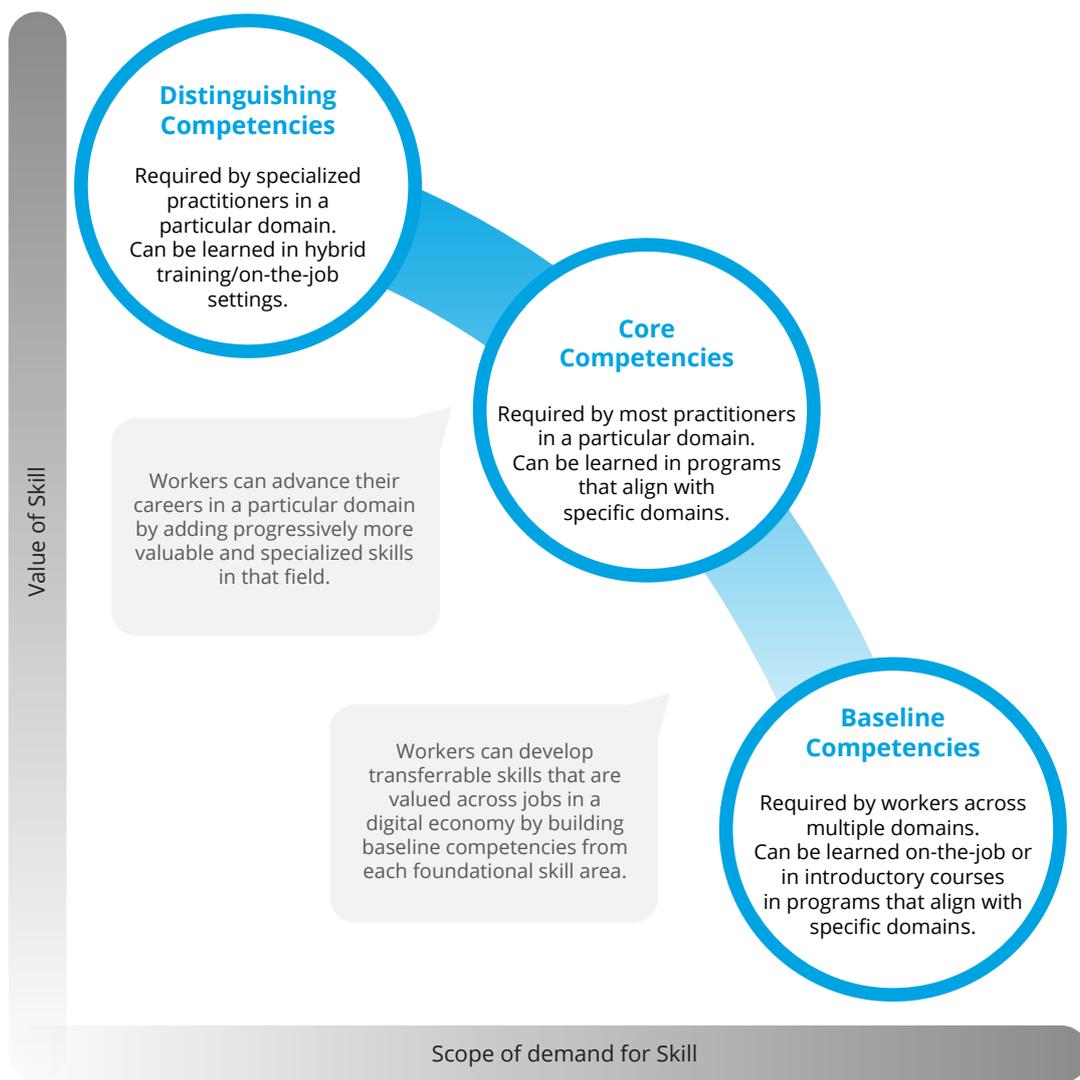
Core Competencies build upon baseline competencies and serve as the pathways to higher-paying jobs in more specialized

fields. These abilities may be taught within fields or within specific training programs or companies. In contrast with baseline competencies, which are less likely to change drastically in the near future, core competencies evolve over time, requiring continual training over one's career. Within analyzing data, for instance, workers who build core competencies such as data science, R, or data governance can qualify for many analytically rigorous roles, but will need to remain abreast of evolving skill requirements within the field and adapt their competencies accordingly.

Distinguishing Competencies are highly valued abilities learned by specialized practitioners, often in a particular division of a company or within a specific skill area. They can be learned through formal schooling, on the job training, or in a hybrid context. They build on prior baseline and core competencies, and their value is highest both because their supply is low and because they enable teams and organizations to achieve more complex and difficult goals. Workers who have developed core competencies associated with analyzing data, for example, can build on these competencies and specialize in highly valued distinguishing competencies such as deep learning and computer vision, which typically results in a significant salary premium.

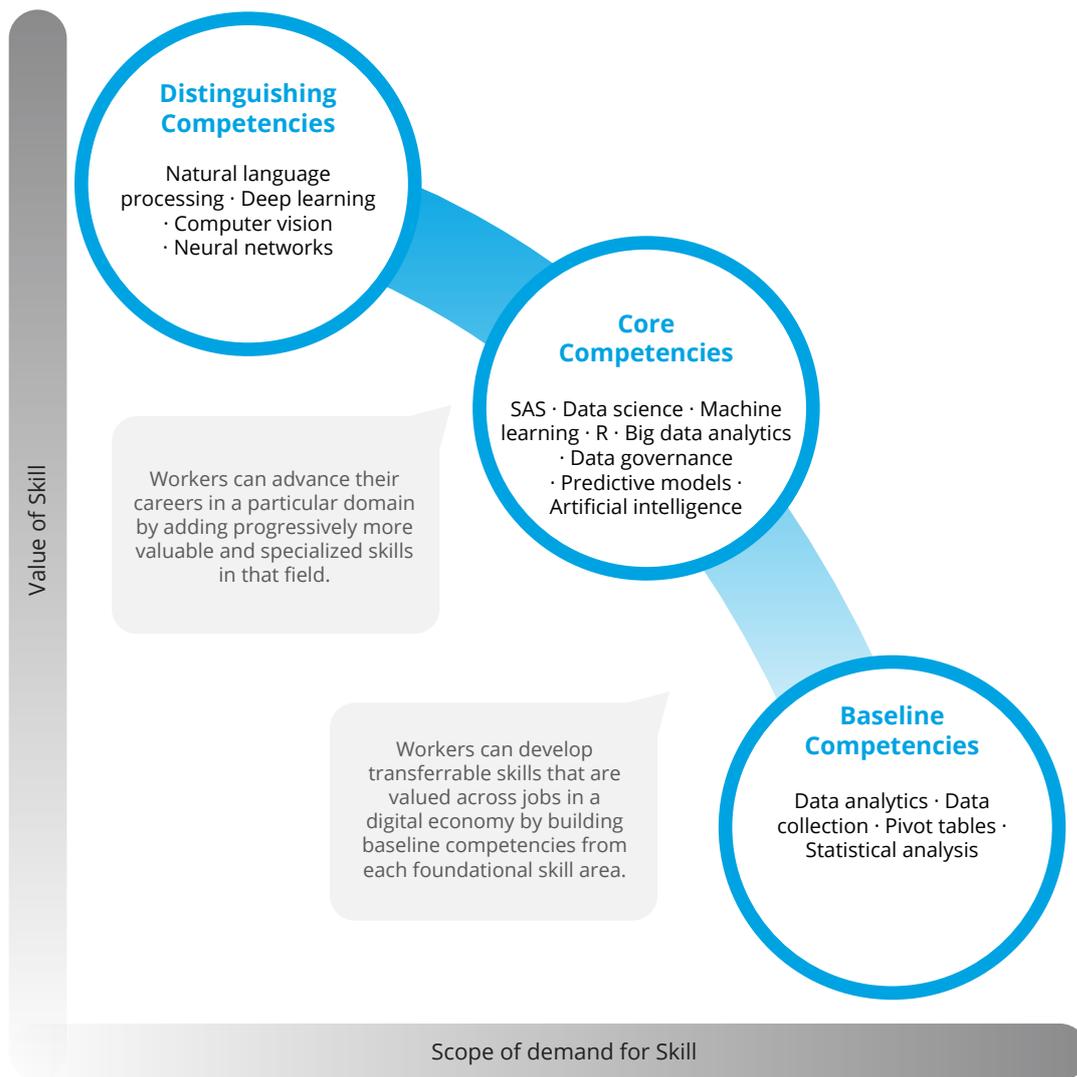
Which Skills Support Career Mobility?

Identifying Transferrable and Stackable Skills



Sample Drill-Down

Analyzing Data



III. Employers and jobseekers appear to place very different value on the New Foundational Skills

Despite the broad-based and growing demand for these skills, jobseekers and incumbent employees frequently do not claim these skills on their resumes.

An analysis of close to 56 million resumes reveals that many people are missing opportunities to add the New Foundational Skills to their portfolios – or, as applicable, to signal them to employers. Even where jobseekers and incumbent workers indicate that they possess some of these skills, they are likely to list very few of them. More than half (60%) of resumes list fewer than three of these skills, and more than a fifth (22%) list none of the New Foundational Skills at all. The two fastest growing skill areas – digital security and communicating data – are listed in only 7% and 2% of resumes, respectively. Even the three most frequently claimed skills – business process, communication, and critical thinking – are each claimed by barely a quarter of the workforce.

Admittedly, this analysis doesn't determine the degree to which this pattern reflects an actual deficit of skills, on the one hand, or a failure by jobseekers to signal their possession of a sought-after skill, on the other. Nonetheless, the evidence in hand makes a powerful statement: There is a glaring mismatch between what employers say their workers need, and what jobseekers and incumbent workers say they have to offer. Put differently, whether the mismatch between the supply and demand for these skills reflects an actual supply shortage or simply a signaling failure, employers are not finding the talent they need, and the resumes of jobseekers and incumbent employees are not yet responding effectively to the demands of the workplace.

There is a glaring mismatch between what employers say their workers need, and what jobseekers and incumbent workers say they have to offer.

5.

Implications

Incumbent employees and jobseekers who possess the New Foundational Skills will thrive in a digital economy – whether in digital roles like software development or in the broad array of work of the global economy, which is increasingly enabled by technology and data. These New Foundational Skills are valuable to the individual at all levels of a career and make jobseekers and incumbent workers more adaptable to future digital disruption by giving them the skills to acquire new skills and, thereby, adapt. However, for incumbent employees, jobseekers, and students to develop and signal these skills, they need to know that these skills are in fact valued and often required. Otherwise, people will forgo opportunities to build them, or will neglect to communicate their competence or proficiency to employers, losing out on valuable career advancement opportunities.

Jobseekers and incumbent workers can and must take action, but leaders within education and industry have the greatest opportunity to effect change that is informed by, and responsive to, these findings.

The growth and magnitude of recent demand for these skills indicates that they are already of considerable importance to enterprise. Given the supply-demand mismatch for these New Foundational Skills, those employers with strong representation of these skills in their workforces may find themselves at a significant advantage. That is not only because these capabilities are themselves key to 21st century work, but also because they position organizations well for the future. Just as these skills make people more adaptable to future digital and sectoral disruptions, they can do the same for employers.



Educators who incorporate learning opportunities that effectively impart these skills will not only equip their graduates for career success but may also earn a reputation as effective partners to industry. While a number of the New Foundational Skills can be learned online, in class, and in hybrid learning systems, many will be learned in on-the-job applied learning and workplace training. Education is likely to continue to struggle to anticipate the rapidly altering needs of business: there are few tasks more challenging than to align

post-secondary training with the workforce demands of a region's economy in a practical, high-impact, and sustainable way.

The New Foundational Skills also speak to the cultures and values of both the education and business sectors. The central role of Human and Business Enabler Skills reduces emphasis on what can be viewed as "vocational training" that is antithetical to the mission of the academy. At the same time, the research finds that the value of Human Skills, which are core to the academic enterprise, is only fully actualized when combined with the more applied Digital Building Block and Business Enabler Skills that are integral to the needs and culture of the 21st century workplace. These newly defined skills are of enduring value to jobseekers and incumbent workers. They represent a framework that bridges between the values of creativity and critical thinking that are the bedrock of higher education and the practical capabilities that individuals will need to accrue in the workplace, over the course of their careers.

"If we do this right, the skills of today's digitally intensive workers – which this research shows are neither rarified nor static – will become the New Foundational Skills of millions of workers, in thousands of workplaces, across the US. These blended digital professionals will develop proficiencies within each of the three core groups – Digital Building Block, Business Enabler, and Human Skills. Indeed, their ability to draw on, and weave together, these diverse skill sets will set them apart from workers of the past, and lay the foundation for the economy of the future."

Brian K. Fitzgerald
CEO of BHEF

6.

Recommendations



Employers

Employers should aggressively signal skill demands and restructure their hiring plans to attract and develop talent and skills to power their digital business strategy.

- Recognize that the New Foundational Skills are critical to core business activities and company competitiveness.
- Ensure that all formal job postings include the New Foundational Skills as essential for the performance of job responsibilities.
- Conduct periodic digital skills assessments and develop individualized learning plans for all job seekers and incumbent employees; engage learning and training partners in the use of these tools.
- Seek new and more diverse sources of skills and talent, by exploiting the skill adjacencies of both job seekers and incumbent workers.
- Expressly develop work-based learning that expands opportunities to link learning to work and develop these skills in the workforce.
- Communicate the role of these skills, and of these clusters of skills, to all levels of job seekers and incumbent employees, across companies and industries.
- Work closely with higher education partners and other providers to coordinate goals and expectations for classroom learning, internships, job skills development, and work-based learning – particularly in technical programs seeking to develop Business Enabler Skills or Human Skills, and in liberal arts or general education programs hoping to stress Business Enabler Skills or Digital Building Block Skills as key skills of the future.



Intermediary Organizations

Intermediary organizations, including regional and national business and higher education associations, should recognize the importance of the New Foundational Skills for their members' competitiveness, and take steps that illuminate and help members address current and future supply-and-demand challenges.

- Signal business' skill and talent needs by publishing market intelligence on members' talent acquisition and development challenges.
- Spotlight effective strategies for job seekers, new hires, and incumbent employees to address these challenges.
- Promote investments in market-driven partnerships and programs that build foundational skills and link learning to work.



College Students

Students should recognize the importance of these skills to career growth and develop a personal plan for using a diverse set of learning opportunities to acquire, demonstrate, and signal these skills.

- Value the importance of these skills for landing jobs and advancing careers.
- Build a mindset to become a continuous learner.
- Seek out opportunities to acquire New Foundational Skills through curricular and co-curricular activities and hands-on learning.
- Signal possession of New Foundational Skills by including them in one's resume or by acquiring certifications that have currency with employers.
- Develop and learn by doing: Supplement coursework with volunteer work, internships, or work-based learning opportunities.
- Continuously seek out information about the evolving skill requirements in the labor market; learn to identify how these skills manifest in new fields.



Higher Education

Higher education must recognize that the digital economy presents an opportunity to increase the value of higher education credentials by ensuring that all graduates possess appropriate domain, human, business, and digital skills.

- Recognize these skills as essential learning outcomes for the 21st century, and of core importance to the success of students and graduates.
- Engage faculty and administrators regarding the criticality of these skill sets in the digital economy and society.
- Build the teaching and learning of these skills into coursework and overarching curricular goals.
- Integrate skills into admissions processes and on-campus student advising.
- Provide capstone or signature learning opportunities that increase and document students' skills.
- Work closely with business and employers to coordinate goals and expectations for classroom learning, internships, job skills development, and work-based learning.
- Communicate the role of these skills and skill clusters to students, prospective students, and the general public.



Current Job Seekers and Incumbent Employees

Current job seekers and incumbent employees should recognize the importance of the New Foundational Skills for career adaptability and flexibility as technologies shift and job functions change. They should continuously identify strategies to acquire essential skills.

- Identify gaps in current knowledge around new foundational skill areas.
- Develop strategies, using internal training, MOOCs, boot camps, or employers' education benefits, to continuously acquire new skills.
- Learn to effectively communicate with, and learn from, digitally savvy peers.
- Position oneself for career growth by gaining experience with adjacent tasks and functions that require the development of new skills.
- In resumes and other presentations, signal confirmed levels of competency, including certifications, in each of the three groups of New Foundational Skills.



7.

Foundational Skill Drill Downs

Digital Building Blocks

- I. Managing Data
- II. Software Development
- III. Computer Programming
- IV. Analyzing Data
- V. Digital Security and Privacy

Human Skills

- X. Communication
- XI. Critical Thinking
- XII. Collaboration
- XIII. Analytical Skills
- XIV. Creativity

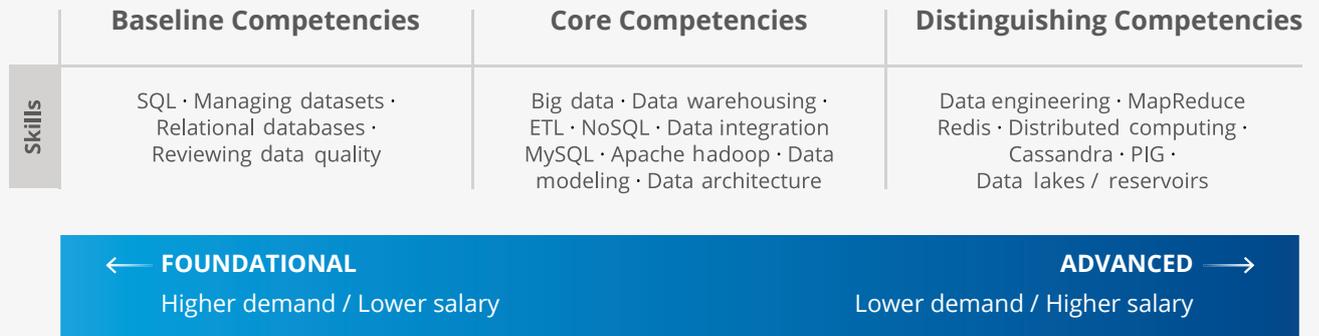
Business Enablers

- VI. Business Process
- VII. Project Management
- VIII. Digital Design
- IX. Communicating Data

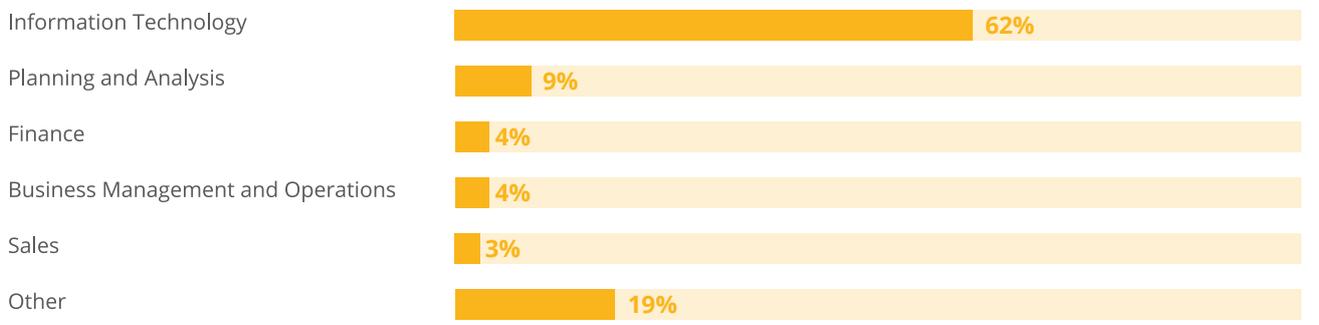
Digital Building Blocks

I. Managing Data

Skill spectrum



Distribution of Openings that Request Managing Data



Demand in Digital vs. Non-Digital Occupation Families

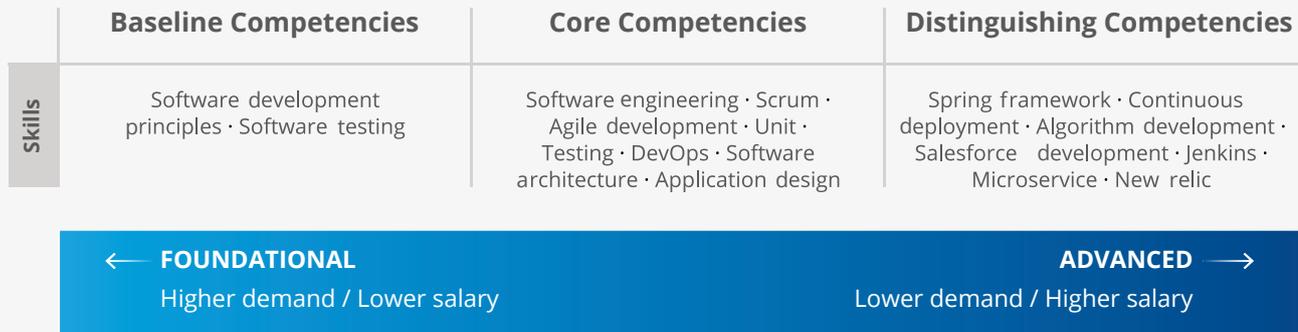
Share Openings



Digital Building Blocks

II. Software Development

Skill spectrum



Total Openings: 2017

3,326,192

Growth Since 2012 - 2017

44%

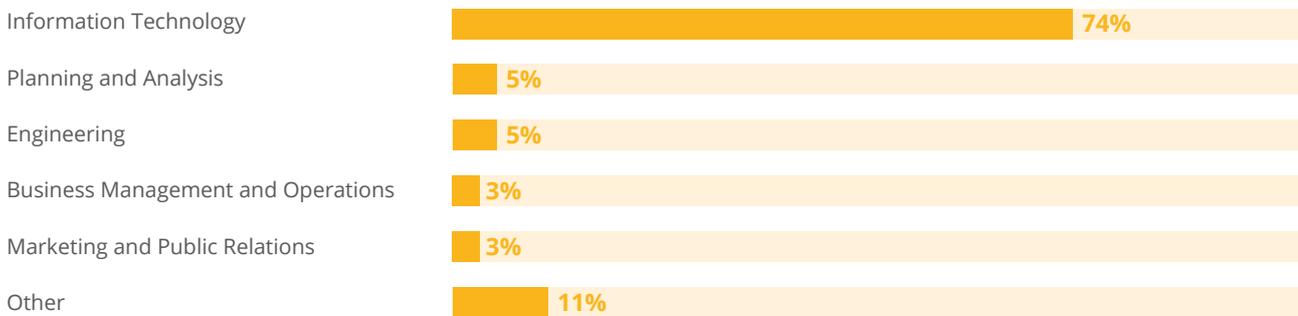
Share of Resumes Listing Skill

17%

Average Salary Premium

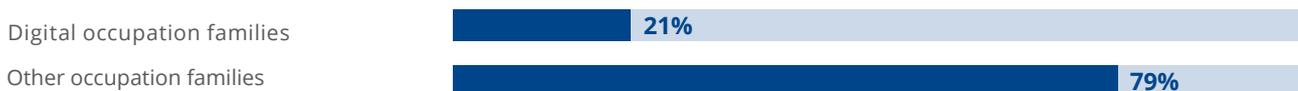
34%

Distribution of Openings that Request Software Development



Demand in Digital vs. Non-Digital Occupation Families

Share Openings



Digital Building Blocks

III. Computer Programming

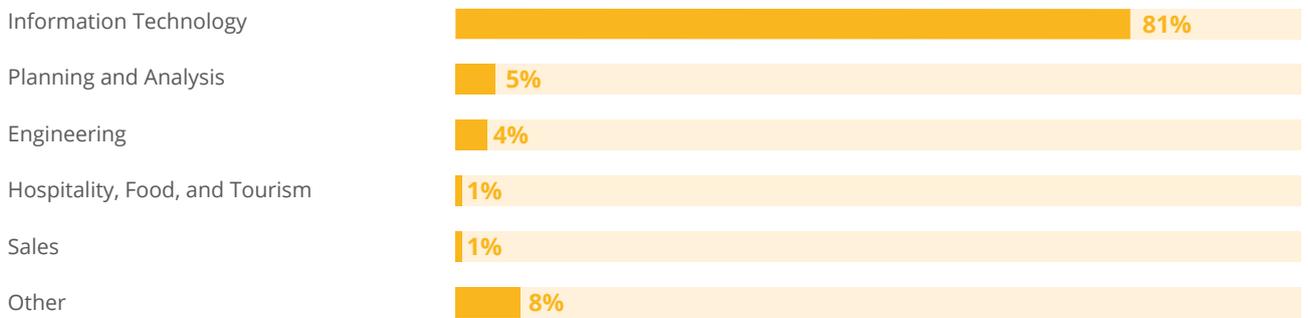
Skill spectrum

	Baseline Competencies	Core Competencies	Distinguishing Competencies
Skills	JavaScript · Python · Debugging	Java · C / C++ · AngularJS	Multithreaded programming · Domain-specific · Programming languages



Total Openings: 2017	Growth Since 2012 - 2017	Share of Resumes Listing Skill	Average Salary Premium
2,571,728	35%	14%	38%

Distribution of Openings that Request Computer Programming



Demand in Digital vs. Non-Digital Occupation Families

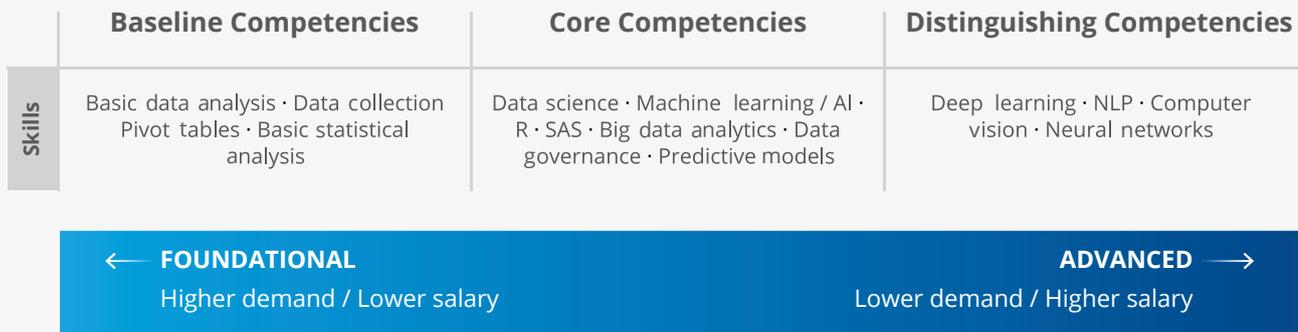
Share Openings



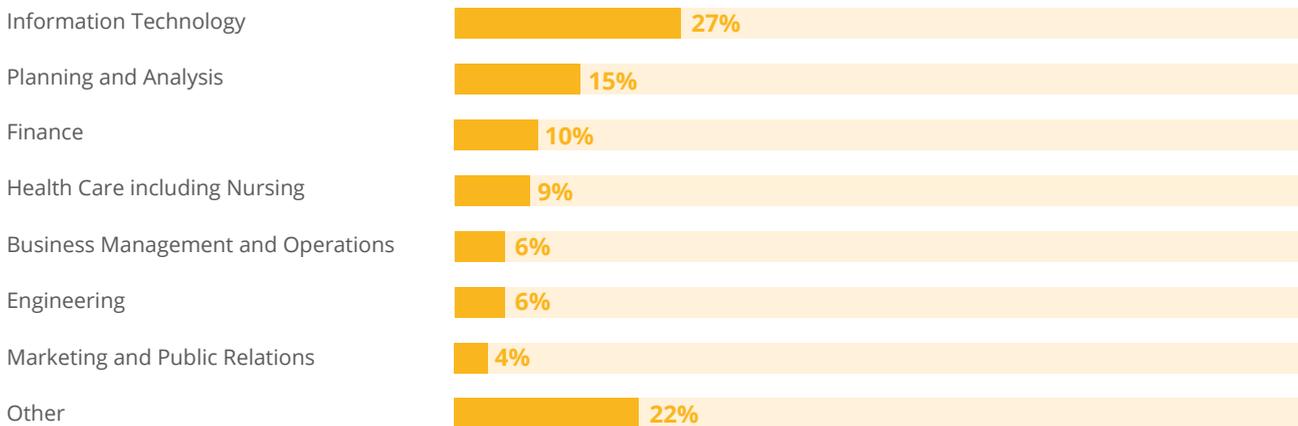
Digital Building Blocks

IV. Analyzing Data

Skill spectrum



Distribution of Openings that Request Analyzing Data



Demand in Digital vs. Non-Digital Occupation Families

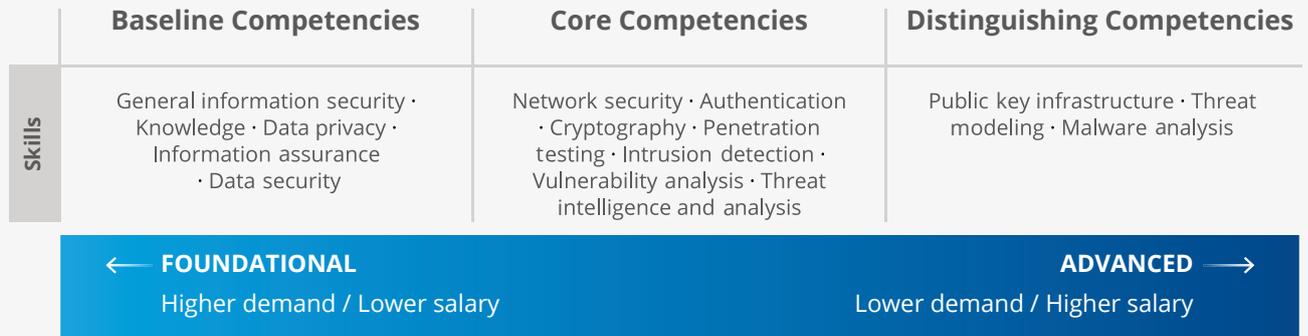
Share Openings



Digital Building Blocks

V. Digital Security and Privacy

Skill spectrum



Total Openings: 2017

895,547

Growth Since 2012 - 2017

75%

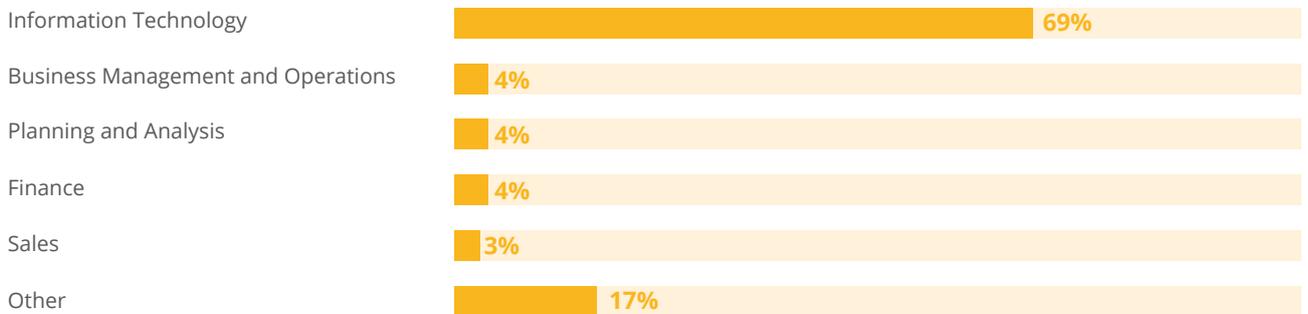
Share of Resumes Listing Skill

7%

Average Salary Premium

17%

Distribution of Openings that Request Digital Security and Privacy



Demand in Digital vs. Non-Digital Occupation Families

Share Openings



Business Enablers

VI. Business Process

Skill spectrum



Total Openings: 2017

3,215,648

Growth Since 2012 - 2017

18%

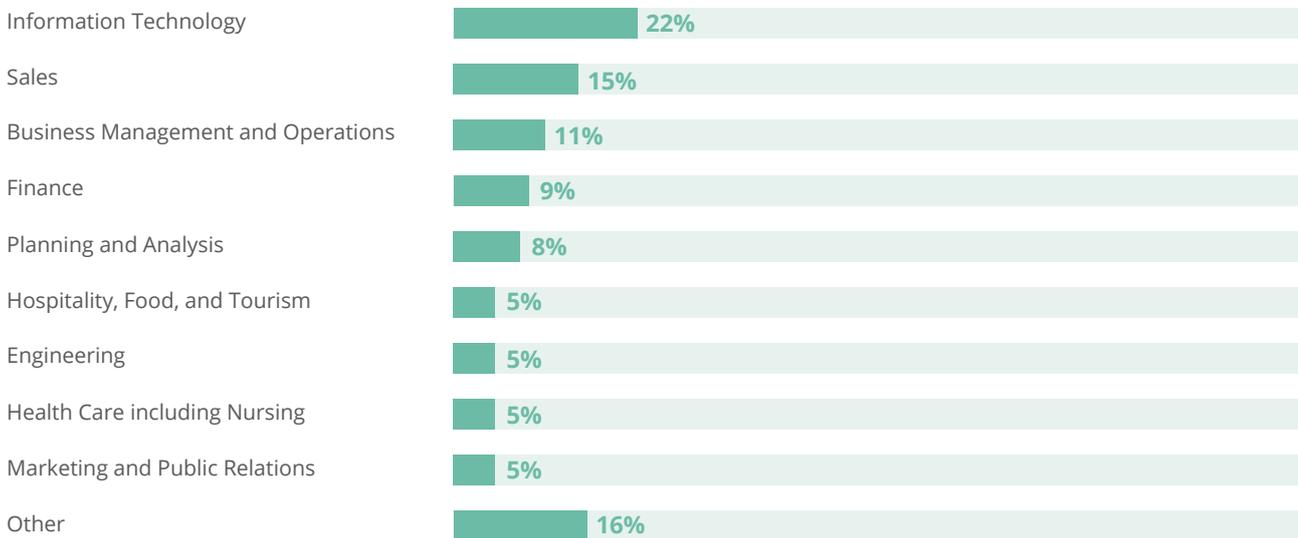
Share of Resumes Listing Skill

27%

Average Salary Premium

19%

Distribution of Openings that Request Business Process



Demand in Digital vs. Non-Digital Occupation Families

Share Openings



Business Enablers

VII. Project Management

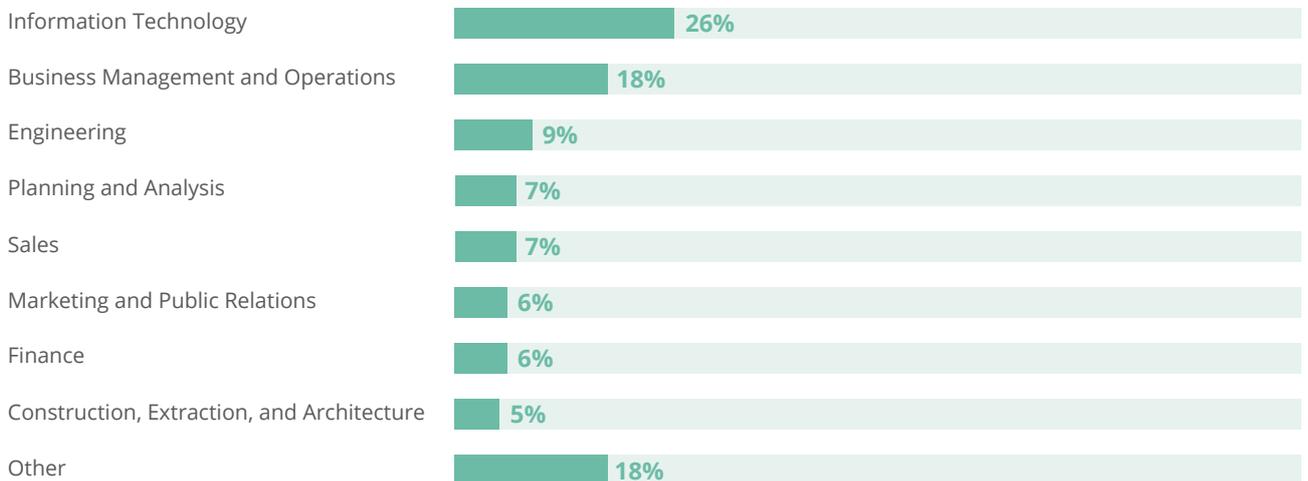
Skill spectrum

	Baseline Competencies	Core Competencies	Distinguishing Competencies
Skills	Project management principles · Project planning and development	Stakeholder management · Microsoft project · Primavera	Technical project management · Specific project management methodologies (e.g. Waterfall)



Total Openings: 2017	Growth Since 2012 - 2017	Share of Resumes Listing Skill	Average Salary Premium
2,354,230	21%	23%	21%

Distribution of Openings that Request Project Management



Demand in Digital vs. Non-Digital Occupation Families

Share Openings



Business Enablers

VIII. Digital Design

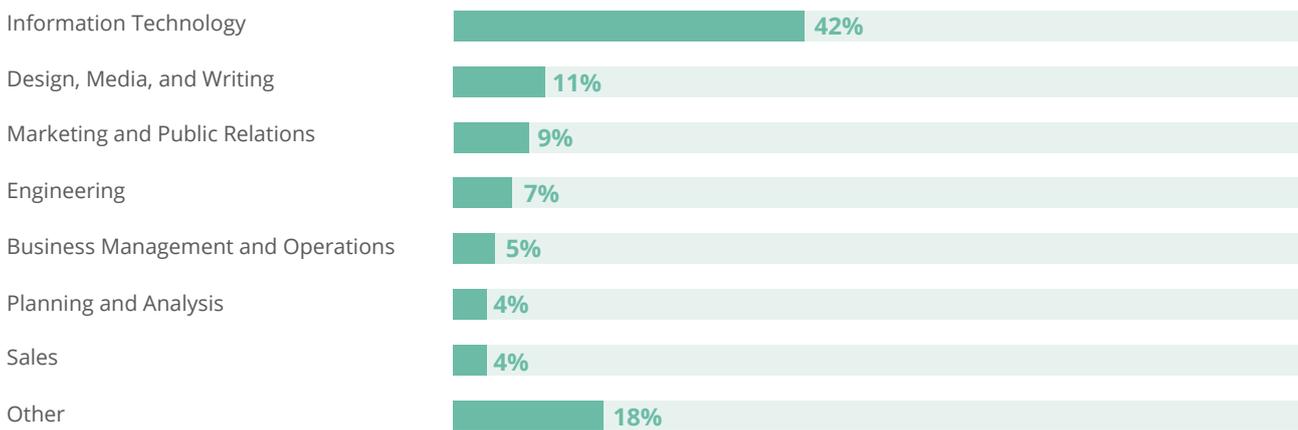
Skill spectrum

	Baseline Competencies	Core Competencies	Distinguishing Competencies
Skills	Graphic design principles · Design software (e.g. Adobe InDesign)	Website design · UI / UX design · CMS · GUI · Information architecture	Interface design · Salesforce Visualforce · Human-computer interaction



Total Openings: 2017	Growth Since 2012 - 2017	Share of Resumes Listing Skill	Average Salary Premium
1,427,981	2%	20%	2%

Distribution of Openings that Request Digital Design



Demand in Digital vs. Non-Digital Occupation Families

Share Openings



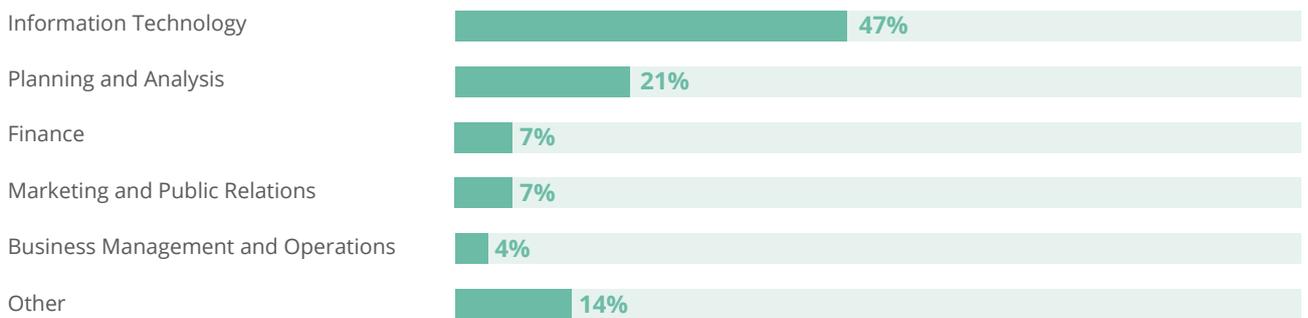
Business Enablers

IX. Communicating Data

Skill spectrum



Distribution of Openings that Request Communicating Data



Demand in Digital vs. Non-Digital Occupation Families

Share Openings



Human Skills

X. Communication

Total Openings: 2017

9,185,978

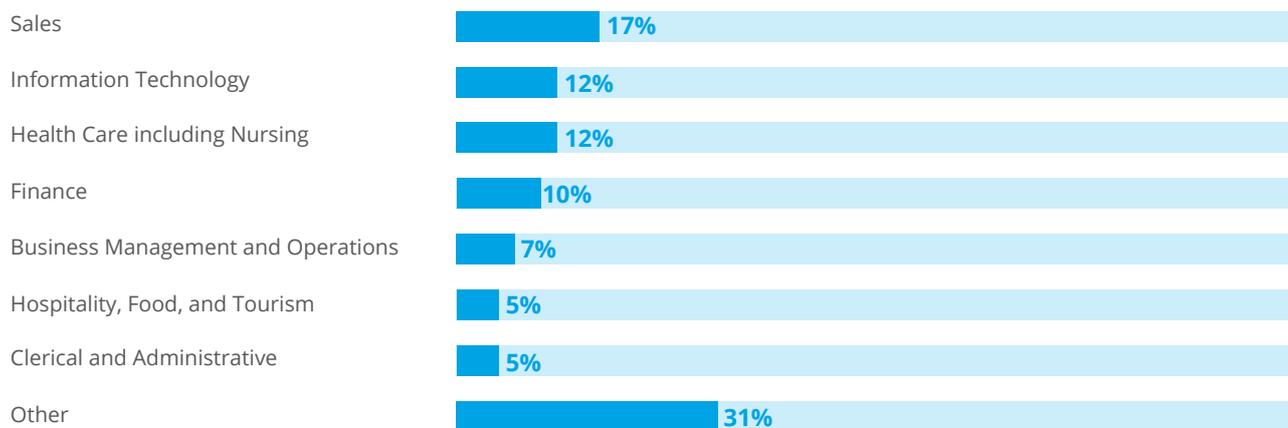
**Growth Since
2012 - 2017**

27%

**Share of Resumes
Listing Skill**

27%

Distribution of Openings that Request Communication



Demand in Digital vs. Non-Digital Occupation Families

Share Openings



Human Skills

XI. Critical Thinking

Total Openings: 2017

3,666,249

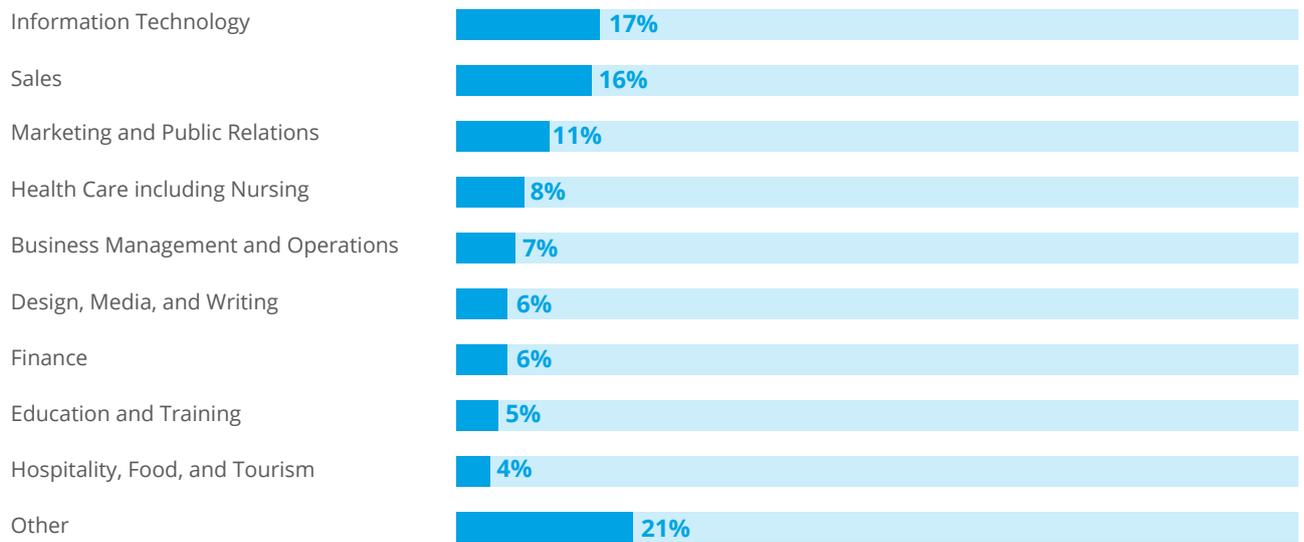
**Growth Since
2012 - 2017**

31%

**Share of Resumes
Listing Skill**

27%

Distribution of Openings that Request Critical Thinking



Demand in Digital vs. Non-Digital Occupation Families

Share Openings



Human Skills XII. Collaboration

Total Openings: 2017

3,480,175

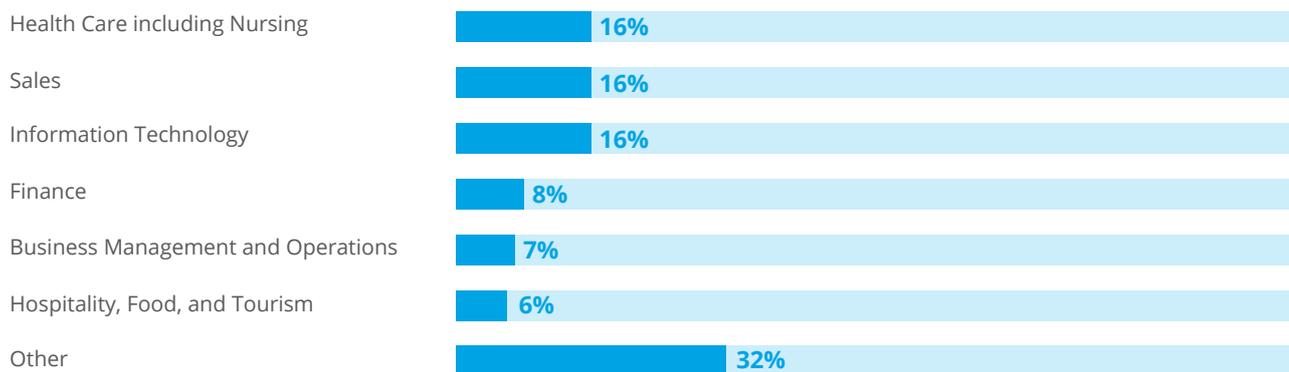
**Growth Since
2012 - 2017**

46%

**Share of Resumes
Listing Skill**

22%

Distribution of Openings that Request Collaboration



Demand in Digital vs. Non-Digital Occupation Families

Share Openings



Human Skills

XIII. Analytical Skills

Total Openings: 2017

2,395,145

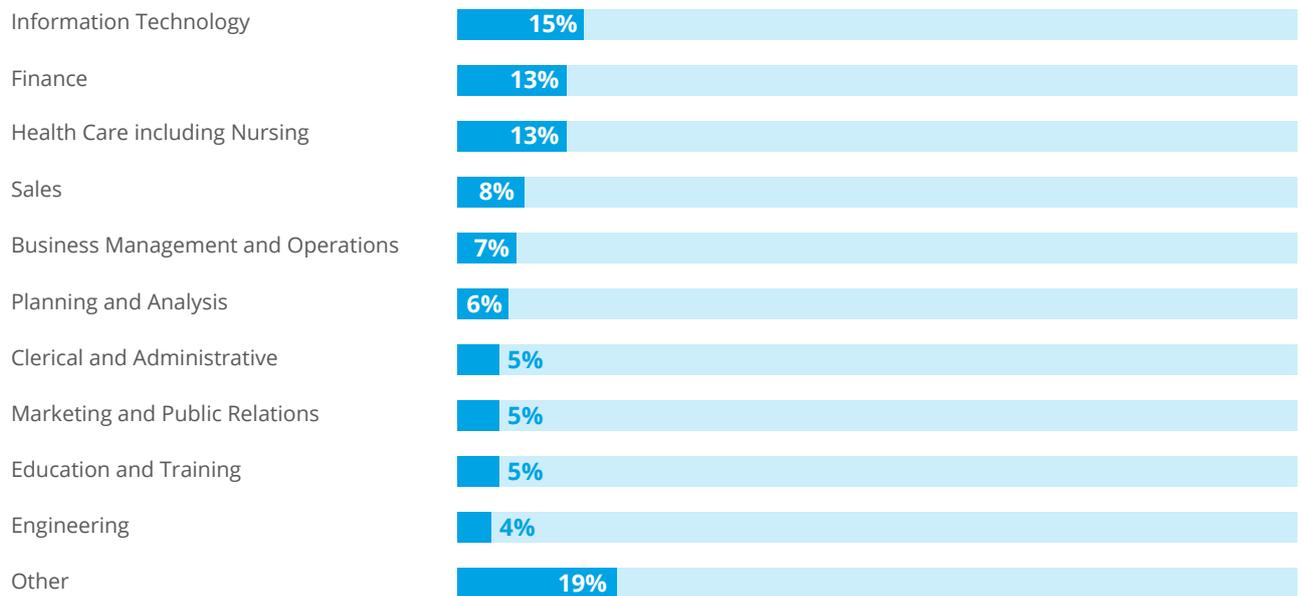
**Growth Since
2012 - 2017**

24%

**Share of Resumes
Listing Skill**

24%

Distribution of Openings that Request Analytical Skills



Demand in Digital vs. Non-Digital Occupation Families

Share Openings



Human Skills
XIV. Creativity

Total Openings: 2017

1,217,062

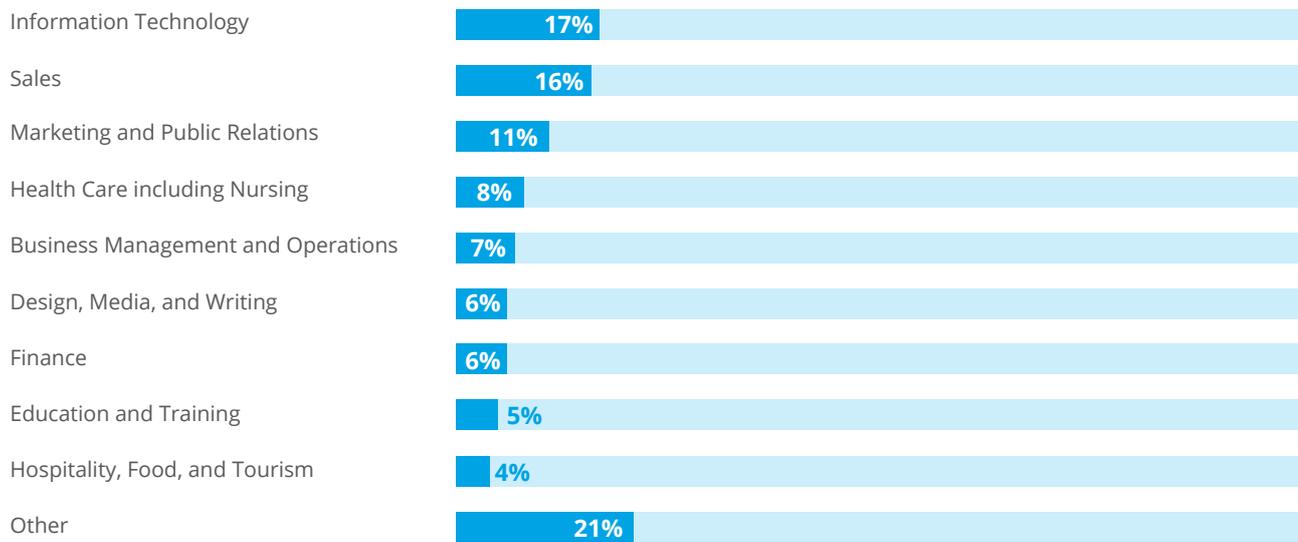
**Growth Since
 2012 - 2017**

23%

**Share of Resumes
 Listing Skill**

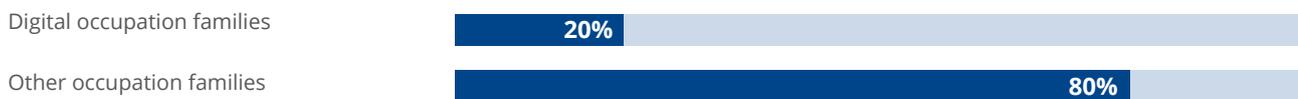
11%

Distribution of Openings that Request Creativity



Demand in Digital vs. Non-Digital Occupation Families

Share Openings



8.

About the Data

Online Job Posting Data from Burning Glass Technologies

To support this research, Burning Glass mined its dataset of more than 150 million unique online job postings dating back to 2007. Burning Glass Technologies' "spidering" extracts information from close to 50,000 online job boards, newspapers, and employer sites on a daily basis and de-duplicates postings for the same job, whether it is posted multiple times on the same site or across multiple sites.

Burning Glass applies detailed text analytics to code and extract granular data from job postings. This approach contextualizes each job posting and therefore can extract more relevant data than keyword-based approaches. For example, Burning Glass software distinguishes between budget analysis as a skill, a contractor who must complete jobs on-time and on-budget, and a clerk at Budget Rent a Car. At the same time, the software also recognizes that statistical analysis, quantitative data analysis, and big data analytics are all manifestations of the broader skillset of data analysis. Burning Glass maintains a team of analysts who constantly monitor labor market trends to identify new and emerging skills and include them in Burning Glass Technologies' coding rules and taxonomies.

Resume Data from Burning Glass Technologies

This study also uses data from Burning Glass Technologies' proprietary database of resumes, comprising more than 56 million documents, to evaluate the skills claimed by job seekers. Resumes were sourced from a variety of Burning Glass partners, including recruitment and staffing agencies, workforce agencies, and job boards. Burning Glass applies the same detailed text analytics on resumes that it uses to code and extract data from job postings.

9.

Acknowledgements

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Special thanks to:

Brian K. Fitzgerald,

Chief Executive Officer, BHEF

Janet Chen,

Director, BHEF

Matt Sigelman,

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Business-Higher Education Forum and
Burning Glass Technologies would like to
gratefully acknowledge Anita Zucker for her
support of this research.

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