Future Skills, Future Cities

New Foundational Skills in Smart Cities

burningglass TECHNOLOGIES

BHEF BUSINESS-HIGHER EDUCATION FORUM

CIT CENTER FOR INNOVATIVE TECHNOLOGY

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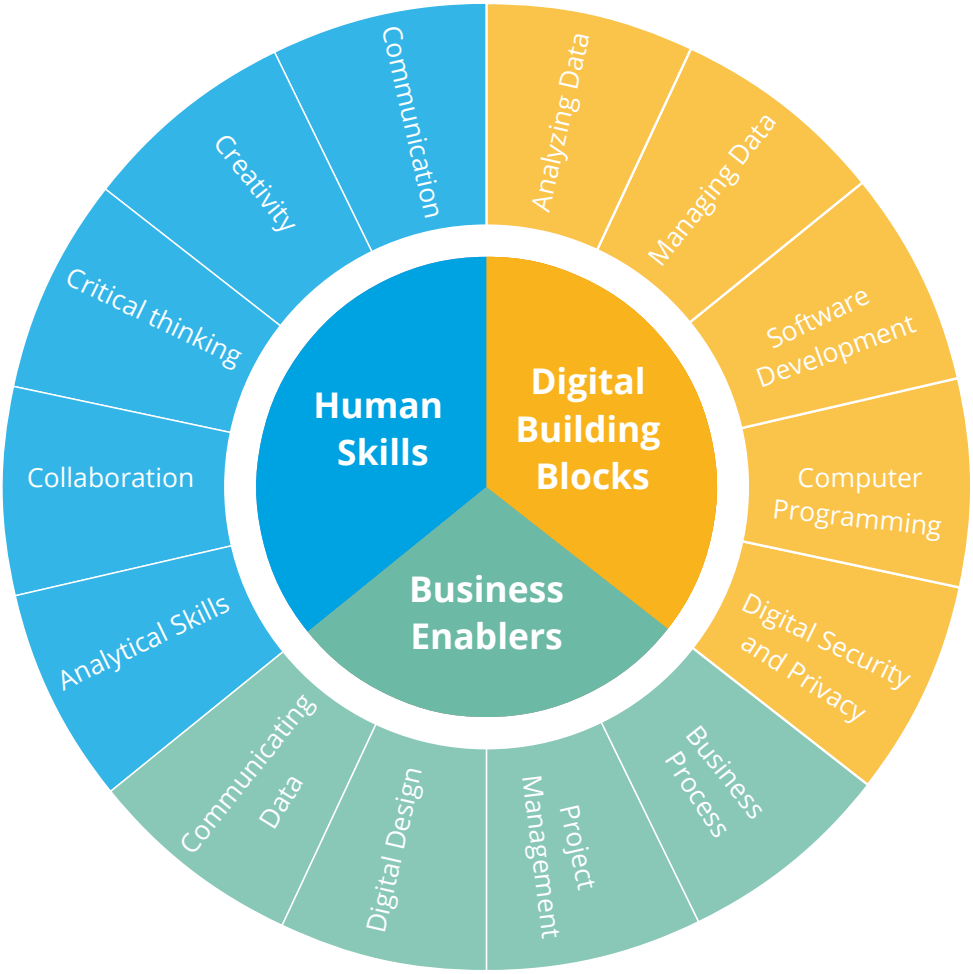
1.

Introduction

In recent decades, communities across the globe have been transformed by the spread of technology to all corners of life. This transformation has extended to the world of work and has disrupted the skills that workers must develop to remain competitive.

In a 2018 special report, "The New Foundational Skills of the Digital Economy: Developing the Professionals of the Future," the Business-Higher Education Forum (BHEF) commissioned Burning Glass Technologies to identify the skills that form the foundation of the new digital economy. An examination of more than 150 million unique U.S. job postings revealed 14 New Foundational Skills that converge around three interrelated groupings: Human Skills, Digital Building Blocks, and Business Enablers. Human Skills apply social, creative, and critical intelligence; Digital Building Blocks require understanding of the specialized methods, programs, tools, and frameworks that are most valuable and transferrable in a digital world; and Business Enablers play a synthesizing, integrative role in the workplace and allow other skills to be put to work in practical solutions. The report detailed the importance of these skills for job seekers and employers across the U.S. economy.

The New Foundational Skills of the Digital Economy



To fully grasp the impact of these new skills, however, it is necessary to look beneath broader economic trends and investigate how these skills are affecting communities at a local level. This report aims to do just that by turning the lens on a specific cohort of communities that are pioneers of the new digital economy: smart cities.

Smart cities are defined as those that have adopted digital technology into their infrastructure, governance, and workforce, and are home to disruptive innovations and emerging industries. In smart cities, both the public and private sectors leverage data to improve the provision of goods and services. This report examines how that environment translates into labor market demand for New Foundational Skills. Because smart cities may serve as a bellwether for the broader economy, this skills-based analysis can inform future approaches to economic development aimed at helping workers build these skills.

2.

Methodology

To pinpoint a set of smart cities in which to evaluate demand for the New Foundational Skills, we surveyed existing literature and sources—which are listed in the appendix—and identified cities that were consistently ranked highly on measures of smart technology adoption. Because much of the existing literature on smart cities focuses on large, global cities, we restricted the analysis to cities with at least 600,000 residents. The resulting list includes New York; Boston; San Francisco; Washington, D.C.; Chicago; Los Angeles; Philadelphia; and San Diego. We then mined Burning Glass Technologies' database of more than 150 million unique online job postings to identify jobs within these cities requesting one or more of the New Foundational Skills. These data were analyzed and benchmarked against the nation overall to understand how demand for the New Foundational Skills differs in the most digitally advanced economies.

3.

Findings

New Foundational Skills are in greater demand in smart cities than in the nation as a whole.

Around half of all job openings in the United States requested a New Foundational Skill in 2017, but that figure rises substantially in smart cities, where 70% of job openings requested at least one of these skills.

In fact, demand is greater for every New Foundational Skill in smart cities compared to the nation. The table below shows the percentage of job openings by skill grouping: Human Skills, Digital Building Blocks, and Business Enablers. The expanded table shows these figures for the individual skills within each skill grouping.

Percentage of Job Openings Requesting Each New Foundational Skill Cluster

Skill Cluster	Smart Cities	Nation
Any New Foundational Skill	70%	53%
Human Skills	60%	47%
Business Enablers	28%	17%
Digital Building Blocks	23%	13%

Despite increased demand for Digital Building Block skills in smart cities, Human Skills are also in stronger demand in these communities.

Smart cities called for each Digital Building Block skill nearly twice as often as the nation overall, demonstrating the increased need for these skills in a more digital world. The two Digital Building Blocks with the greatest increase in their demand shares were managing data and software programming, which reflects the increased data holdings and reliance on software in digitally advanced communities.

However, the new digital economy does not just revolve around digital skills. Human Skills remain vitally important in smart cities. In fact, Human Skills are in greater demand in smart cities, where they are requested in 60% of job openings compared

Percentage of Job Openings Requesting Each New Foundational Skill Cluster

Skill Cluster	Skill Group	Smart Cities	Nation
Human Skills	Analytical skills	17%	10%
	Collaboration	21%	15%
	Critical thinking	18%	15%
	Creativity	11%	5%
	Communication	40%	31%
Digital Building Blocks	Analyzing data	7%	4%
	Managing data	12%	6%
	Software development	12%	6%
	Computer development	9%	5%
	Digital security and privacy	3%	2%
Business Enablers	Business process	16%	10%
	Project management	13%	7%
	Digital design	6%	3%
	Communicating data	1%	1%

to 47% nationwide. This difference is driven in large part by significantly greater demand for creativity and analytical skills in smart cities—creativity was requested in 5% of jobs nationwide compared to 11% of jobs in smart cities, and analytical skills were requested in 10% of jobs nationwide compared to 17% in smart cities. But uniformly, all Human Skills are requested more frequently in smart cities than in the nation.

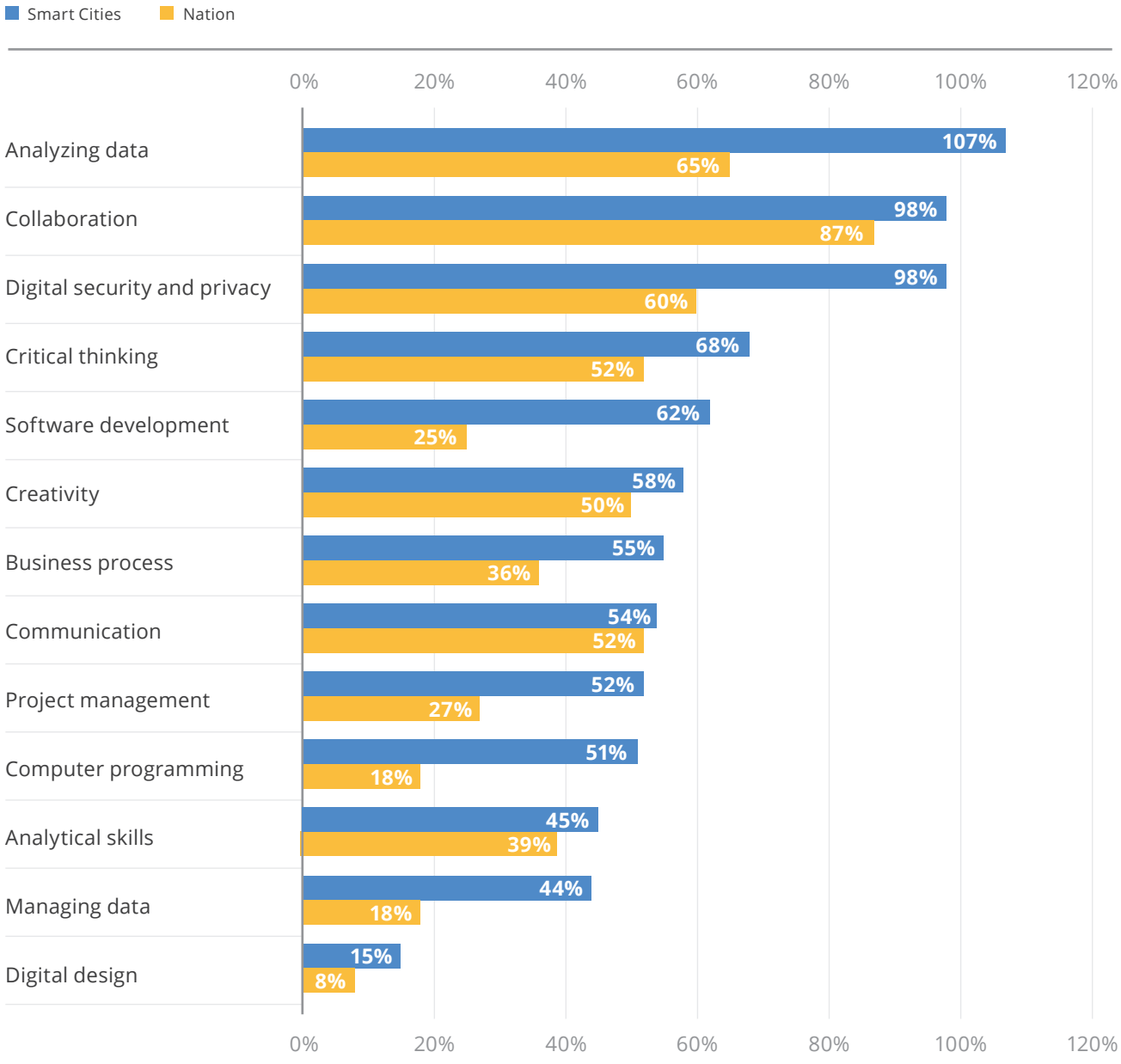
Percentage of Job Openings that Request at Least One New Foundational Skill

Skill Cluster	Smart Cities	Nation
Information technology	94%	92%
Analysis	91%	89%
Science and research	91%	84%
Marketing and public relations	87%	82%
Design, media, and writing	85%	80%
Business management and operations	83%	64%
Engineering	80%	75%
Finance	73%	65%
Human resources	73%	67%
Sales	71%	58%
Construction, extraction, and architecture	67%	47%
Clerical and administrative	66%	57%
Law, compliance, and public safety	66%	62%
Education and training	64%	50%
Customer and client support	62%	60%
Manufacturing and production	61%	46%
Maintenance, repair, and installation	60%	50%
Community and social services	51%	42%

New Foundational Skills are spreading to new career areas in smart cities.

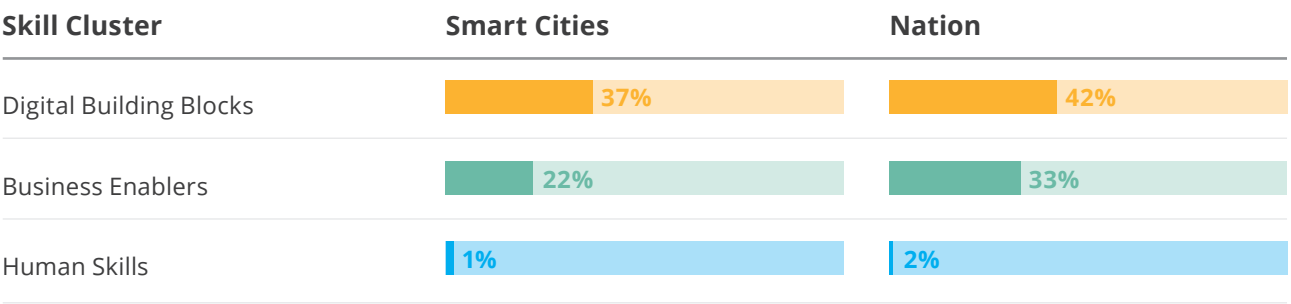
While career areas like Information Technology and Analysis are clearly driven by digital skills, it is important to note that New Foundational Skills are important across many occupations. In most career areas, at least one New Foundational Skill is requested in over half of all openings. This is especially true in smart cities. In some professions, New Foundational Skills are ubiquitous. In IT and Analysis, for example, over 90% of job openings request at least one New Foundational Skill. In smart cities, however, even career areas not traditionally associated with digital skills are commonly requesting them. For example,

Growth in Job Openings That Request One New Foundational Skill, 2012-2018



67% of construction-related jobs in smart cities request at least one New Foundational Skill, compared with only 47% in the nation overall. This may be directly related to the more sophisticated digital infrastructure in smart cities. Similarly, business jobs and manufacturing and production roles are far more likely to request these skills in smart cities than the nation overall.

Average Salary Premium by Skill Grouping



Demand for all New Foundational Skills is growing, but their growth in smart cities is significantly faster.

From 2012 to 2017, the share of job openings requesting New Foundational Skills was on the rise. Growth in demand was robust for every skill, but growth was most rapid in both smart cities and the nation overall for analyzing data, collaboration, and digital security and privacy. In smart cities, there was considerably faster adoption of Digital Building Block skills, and growth in such skills was often twofold in smart cities compared to the nation.

New Foundational Skills—particularly Business Enabler skills and Digital Building Block skills—command a salary premium in both smart cities and the nation, but the premiums are greatest where these skills are less common.

On average, both Digital Building Blocks and Business Enablers offer strong salary premiums in both smart cities and the nation. However, they command larger salary premiums outside of smart cities, where these skillsets are less common. Specifically, Digital Building Blocks offer an average salary premium of 37% in smart cities, compared with a 42% premium nationwide, and Business Enablers offer an average salary premium of 22% in smart cities versus a premium of 33% nationwide.

Emerging Smart City Drill Down: Virginia Beach

As smart cities pull the nation into the new digital economy, many other cities are in a period of transition. One such city is Virginia Beach, Va. Virginia Beach has invested in many "smart" initiatives—such as a regional broadband task force, free wireless for K-12 schools, and web-based apps that foster greater transparency. The city also has a slightly greater share of openings requesting at least one of the New Foundational Skills than the national average—55% versus 53%—and has recorded strong growth in demand for many New Foundational Skills since 2012. Growth in demand for many New Foundational Skills in Virginia Beach outpaced even smart cities, showing that there is energy for a transitional city like Virginia Beach to catch up to the cities of the future.

Percentage of Job Openings

Skill cluster	Virginia Beach
Any New Foundational Skill	55%
Human Skills	47%
Business Enablers	17%
Digital Building Blocks	3%

That said, the strongest growth in demand for New Foundational Skills in Virginia Beach was concentrated in Human Skills and Business Enablers. Given the city's recent investments in upgrading its digital infrastructure, however, it is likely that Virginia Beach will see growth in demand for Digital Building Blocks in the future.

Growth in Demand by Skill 2012-2017

Human Skills Digital Building Blocks Digital Building Blocks

Skill Cluster	Virginia Beach	Smart Cities
Analytical skills	45%	80%
Collaboration	98%	124%
Critical thinking	68%	84%
Creativity	58%	82%
Communication	54%	88%
Analyzing data	107%	42%
Managing data	44%	39%
Software development	62%	30%
Computer development	51%	24%
Digital security and privacy	98%	50%
Business process	55%	56%
Project management	52%	108%
Digital design	15%	20%
Communicating data	592%	900%

At present, workers who develop any of the New Foundational Skills are likely to earn significant salary premiums in Virginia Beach. Openings requesting Digital Building Blocks in Virginia Beach offer an average salary premium of 40%, and openings requesting Business Enablers in Virginia Beach advertise average salaries 36% greater than all roles in the city. Both salary premiums are in-line with or higher than nationwide salary premiums for these skills and underscore the value of developing these skills in emerging digital economies such as Virginia Beach.

Average Salary Premium by Skill Grouping

Skill Grouping	Virginia Beach	Nation
Digital Building Blocks	40%	42%
Business Enablers	36%	33%
Human Skills	6%	2%

4.

Conclusions and Implications

This report analyzed the relative growth and importance of New Foundational Skills to understand the nature of demand for the skills of the future in the cities of the future.

These skills are more commonly demanded in smart cities, are growing faster in smart cities, and are weaving their way into new types of jobs in smart cities. In addition, these skills also command salary premiums for workers across the economy and unlock the greatest value for workers and firms when integrated with one another. Understanding how demand for these skills has evolved in smart cities offers critical guidance for a variety of stakeholders, in smart cities and beyond, to harness the value of these skills.

Implications for Students and Job Seekers

Cities across the globe are enhancing their digital infrastructure, and this has implications for workers across career areas. If you are targeting a career in digitally intensive fields, developing these skills is essential, but even workers in other fields will benefit from incorporating these skills into their portfolio. Therefore, students and workers can seek out opportunities to develop these skills—traditional university programs, short-term training options such as boot camps, or work-based learning opportunities—in order to position themselves for the jobs of the future.

Implications for Employers

A digitally literate workforce is becoming a critical hedge against disruption in all industries, nowhere more so than in digitally advanced communities. Firms in smart communities must already ensure that their workforce is well-versed in the New Foundational Skills, but firms in regions with emerging digital economies must also build these competencies in order to remain competitive. Offering workers training opportunities that help them build and improve their digital, human, or business skills—through either internal training programs or partnerships with external training providers—can support greater retention and ensure that your workforce has the skills necessary to compete in a rapidly evolving economy.

Implications for Educators

The New Foundational Skills will be critical for workers across regions and across disciplines, so educators must ensure their students are developing these skills in order to succeed. This can be done by teaching these skills in existing training programs, developing new short-term training programs dedicated specifically to these skills, and embedding new digital technologies and collaborative, team-based assignments into curricula.

5.

Appendix: Sources Reviewed to Identify Smart Cities

1 **2007 Smart Cities Index, EasyPark,** https://easyparkgroup.com/smart-cities-index/

2 **Smart Cites—What's in It for Citizens? Juniper Research,** https://newsroom.intel.com/wp-content/uploads/sites/11/2018/03/smart-cities-whats-in-it-for-citizens.pdf

3 **Top Smart Cities of 2017, Smart Cities Library,** https://www.smartcitieslibrary.com top-10-smart-cities-of-2017-responsible-business/

4 **Digital Cities Survey, Government Technology,** http://www.govtech.com/dc/digital-cities/Digital-Cities-Survey-2017.html

6.

Acknowledgements

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