

Thriving in the data economy as data-fluent PhD graduates

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Abstract

We are living in an era of data deluge. With the amount of data generated increasing rapidly, organisations are in high need of individuals who are skilled at managing, analysing, and interpreting data. Data literacy is deemed as a crucial twenty-first century skill and one that will be required for a wide variety of roles. PhD graduates are a group of highly skilled professionals, many of whom have experience with handling different types of data during their research work and communicating the impact of their research to varying audiences. In this article, I look at how these professionals can add value to organisations, especially by combining their data analysis and communication skills, which can be applied across different roles in industry.

From smartwatches and fitness trackers alerting people to their health and sleep patterns, food technology apps working towards giving people an accurate picture of their personal nutrition, telemedicine helping people far and wide with precision medicine and assistive technology aiding the ageing population, applications leveraging big data are all around us and are only increasing every year. It had been estimated that by 2020, 1.7 MB of data would be created each second for every person on earth.¹ Hospitals had previously been predicted to generate approximately 665 TB of data by 2015 due to increase in medical images and electronic health records,² and the human genome is estimated to need 3 GB of storage space.

With some claims of data being the new oil or at least being a valuable currency,^{3,4} it is safe to say that we are indeed living in a data economy.⁵



Soft skills required in hybrid jobs vs. all jobs

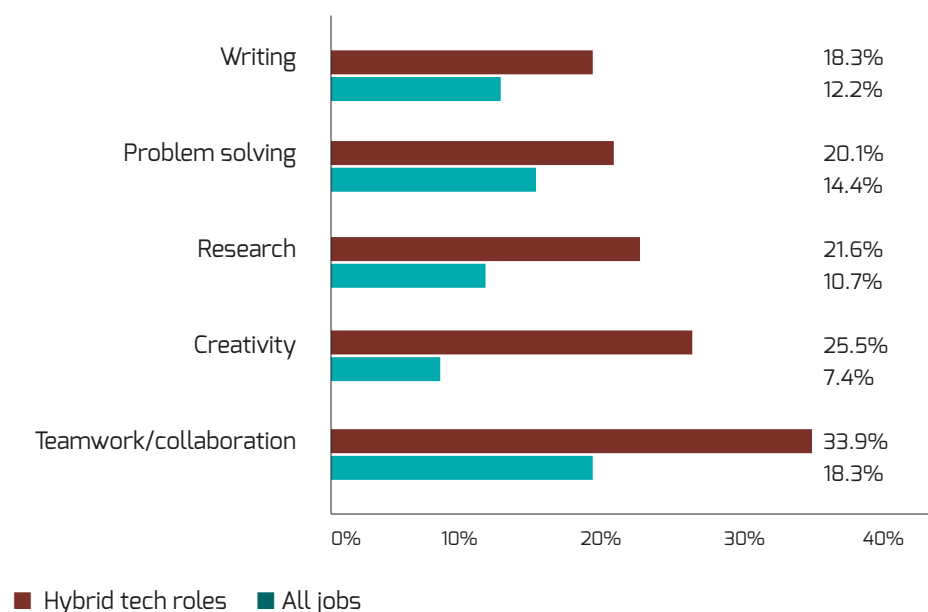


Figure 1. Soft skills required in hybrid jobs vs all jobs.

Source: Hybrid Job Economy Report 2018 by Burning Glass Technologies. Reprinted with permission.

Data literacy is recognised as a critical skill of the twenty-first century. In fact, poor data literacy was identified as a major challenge in the third annual Gartner Chief Data Officer Survey in 2017.⁶ Gartner expects 80% of organisations to initiate competency development programmes in data literacy by 2020 to ensure data fluency across different roles, which would enable employees to manage, analyse, and apply data for value in context.

In the life sciences and healthcare sector, making sense of huge amounts of data and communicating its impact effectively is now more crucial than ever. The FDA has been working on the first-ever Digital Health Innovation Plan, Germany is making digital health applications reimbursable and the number of apps or devices being classified as medical devices is on the rise. So, it is likely that people with a strong knowledge and the ability to translate real-world data insights to different stakeholders would add value to organisations.

Hybrid jobs need data skills

An interesting term that could be used for such

cross-functional roles is “hybrid jobs,” a concept coined by Burning Glass Technologies in their 2018 report about the Hybrid Economy Job Market.⁷ Hybrid jobs are said to be high-potential roles combining skills that were never needed together previously. For instance, this could be a combination of marketing and statistical analysis skills, or design and programming, just to mention two of their ideas. Despite being technology-driven, such roles may need more interpersonal skills like judgement, creativity, and collaboration. The report states, “Fully one-quarter of all occupations in the U.S. economy show strong signs of hybridisation, and they are almost universally the fastest-growing and highest-paying – and also the most resistant to automation. Some of these jobs are new, some are new versions of existing jobs, but all of them pose many different challenges for workers, students, employers, and educators.”

The number of occupations with 10,000 or more job postings requesting creativity rose from 14 to 35 between 2012 and 2018. That includes roles like computer systems engineers, IT project managers, and programme managers.

The number of occupations requiring data science and analysis as skills and with 10,000 or more job postings also increased more than twofold between 2012 and 2018. While initially analytical skills were more common in technical requirements for jobs like for systems analysts, business analysts, database administrators, software developers, they started being mentioned for other roles like product managers, HR specialists, and even retail store managers in 2018.

One group of professionals rigorously trained in working on innovative ideas, handling different types of data and communicating with different audiences are PhDs. The number of PhD researchers globally has been growing continuously,^{8,9} while the number of graduates pursuing tenure-track academic positions has declined.¹⁰ The majority of the science and engineering PhDs use their technical, transferable, and soft skills to transition into different roles in industry. So, how effective is PhD training and what careers are these highly skilled professionals taking up in the data economy?

Skills spread over time

Occupations with at least 10,000 postings requesting creativity skills

2018

Product manager, computer systems engineer, network engineer, programme manager, general manager, resources specialist

2015

IT project manager, systems analyst, public relations

2012

Software developer, marketing manager, retail store manager, restaurant supervisor, marketing supervisor, business analyst

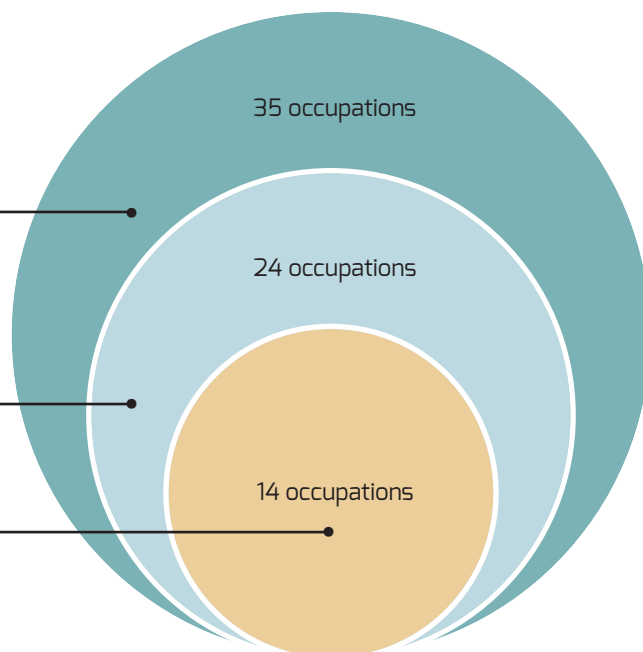


Figure 2. Occupations requesting creativity as a skill, in 2012, 2015, and 2018.

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The professional value of having a PhD

Investing 3 to 5 years on average in a PhD programme requires immense patience, grit, problem-solving skills, and, of course, the dedication and motivation to pursue knowledge while creating new knowledge. It teaches one to handle situations in the face of uncertainty and quickly change directions if projects don't go as planned. Researchers have to often participate in or lead collaborations, which could involve multiple centres, whether national or international. This, along with the fact that multidisciplinary projects are quite common, provides a good platform to interact with different stakeholders, handle expectations and manage projects while dealing with real-world data and its challenges.

One example of PhD programmes bringing various stakeholders together is the Marie Curie Innovative Training Network, which is an EU funded programme. The in3 project, funded by this initiative, focuses on reducing animal testing in the pharmaceutical industry. Fostering collaboration between 15 young researchers across Europe placed in universities, small and medium-sized enterprises, and research institutes, the network aims at knowledge exchange across various disciplines, alongside professional and personal development of future leaders. Such an environment trains the researchers in communicating their results to different audiences, analysing large amounts of data and managing different projects. Collaboration is key and is one skill that is transferable to various work environments.

In the 2017 Career Tracking Survey of Doctorate Holders carried out by the European Science Foundation- Science Connect,¹¹ in partnership with nine universities and organisations, about 2000 respondents were asked to rate their competence at the end of their doctoral studies and the importance in their current job. The most important factors that came up were critical-analytical thinking, problem-solving, and effective communication.

"A lot of employers are becoming more aware of the fact that PhDs have a lot of experience in data gathering, analysis and management. It is in their interest to leverage this training," says Dr Verity Elston, head of career advice for PhDs and postdocs at Graduate Campus University of Lausanne, Switzerland. "With the automatisations of labour and the changing employment market,



the most important skills that a machine can't have, such as creativity, critical thinking, and adaptability are what PhD graduates can offer. I sense that as we move further into the twenty-first century, we will see an increasing demand for the kind of professional that a PhD is trained to be. Employers will see the value of having a natural talent to innovate, do things differently, and learn and adapt rapidly to changing environments," continues Dr Elston.

Applications: Putting your data and communication skills into action

Dr Rajaneesh Gopinath, who pursued an academic career in life sciences and bioinformatics data analysis, used his communication skills to transition first into a freelance scientific editor role, before taking up a business development role in the same biotech media company.

"My work is part writing and part market

analysis as we report on biotech stocks, mergers, and acquisitions, and drug market analysis. So, my training as a scientist who churned data comes in handy for my current role," says Dr Gopinath.

Combining data and communication skills seems to be crucial for data scientists in general. When Kaggle surveyed about 7000 data scientists in 2017 and asked them about barriers at work,¹² the top four challenges were non-technical ones: lack of management/financial support, lack of clear questions to answer, results not used by decision-makers, and explaining data science to others. This again points towards the added value of highly skilled professionals who understand data and can communicate effectively.

"I used to do science communication on the side when I was doing my Ph.D./Postdoc and it was appreciated at all the job interviews. Communicating my thesis and writing other technical articles had already exposed me to various facets of science communication," says Dr Rebecca Alexander, data science professional at Voodoo.io. "In my current role, I write documentation or do presentations for different stakeholders at differing levels of expertise."

"The best thing about data science and good communication skills is its transferability and relevance across industries."

Dr Rebecca Alexander

Overall, it seems that the global job market is evolving rapidly, and while it is difficult to predict how it will shape up in the next decade, one thing is for sure: highly skilled professionals such as PhD graduates will add value to organisations due to their technical as well as interpersonal skills. In the life-science industry, digitalisation and data are crucial for achieving goals in precision medicine, personalised health and implementing technologies using blockchain in the future. Investing time in becoming data literate, along with improving on soft skills, can likely open many doors for any professional.

Conflicts of interest

The author declares no conflicts of interest.

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