datacamp

Data Leader's Guide to Upskilling

1 The march to data fluency

Data transformation is at the heart of digital transformation

Over the past two decades, digital-first startups such as Uber, Amazon, Airbnb, and Stripe have disrupted vital industries such as transportation, commerce, travel, and banking. Organizations across all industries have recognized the need for digital transformation to compete in the new information economy. This is especially true of the COVID-19 economy, which has been accelerating the digitization of their processes and services (PwC). Despite massive digitalization investments, the painful truth is that approximately 70% of digital transformation initiatives fail to reach their stated goal (McKinsey).

While there may be many culprits for why digital transformation programs may fail, a key reason is not recognizing that having sustainable organization-wide data skills is a prerequisite for successful digital transformation. Gartner finds that fewer than 50% of documented corporate strategies mention data analytics as a critical lever for delivering enterprise-wide value.

> "Leaders need to look at data first to succeed in their digital initiatives, rather than treating them as an afterthought to help with ad hoc projects."
>
> Mike Rollings, Research Vice President at Gartner

The underutilization of data science and business analytics dooms digital transformation initiatives from the start—to improve digital services and processes, you must have insights into the data they generate. Forrester estimates that an average of 60 to 73 percent of organization data is untouched for analysis. The key differentiators between the disruptors and the incumbents is not technology-based but in their data-driven culture, the insights they draw from data while examining and iterating upon their services, and the data fluency skills they foster.

Data transformation requires moving beyond the center of excellence

Many organizations have tried to bridge the data gap by creating data science centers of excellence and investing in data tools. But merely laying out a data infrastructure and building a data science team isolates data science as a service center and underutilizes data science as a strategic pillar of the organization's success.

When the data science team must always react to the demands of other teams, they cannot be forward-thinking. Much of their time is spent on routine reporting rather than advancing the strategic gains enabled from becoming a data-driven organization. Other teams control their time since they are a support center to the rest of the organization. And once the data team fulfills a request, they face the challenge of communicating the results to outside stakeholders, as other groups may not speak the same language of data.

The hurdle of translating their findings and creating actionable insights is compounded by the data tools they use. Data scientists typically use tools such as SQL, Python, and R, while other teams may only be familiar with Excel. Conveying data results outside of data scientists' preferred toolkit is frustrating, time-consuming, and often done poorly. Moreover, not all members of the organization have the data literacy skills to interpret the insights drawn from data scientists and critically understand the business implications of their findings.

The business stakeholders requesting data from the centralized data science team aren't happy in this scenario either. There is often a tedious—and sometimes political—process in place for prioritizing data requests. This is because the data science organization drives the roadmap on how they provide value to the organization. Data science leaders may guide priorities to protect their teams from what they might view as egregious requests. And data scientists on the receiving end of a request may not understand the full context of what they're trying to solve, since they aren't as familiar with the same daily business needs as the person making the request.

In a data-driven organization, data science—and more broadly, data fluency—is an inclusive methodology for answering organizational questions where everyone is equipped to answer questions with data. For example, a marketing analyst would be able to use data to optimize their marketing spend, and a business analyst would visualize and describe data to prescribe actionable insights.

Many organizations have tried to bridge the data gap by creating data science and analytics teams and investing in data tools. But merely laying out a data infrastructure and hiring data scientists isolates data science as a service center, and won't usher in organization-wide data fluency. In a data-driven organization, data science—and more broadly, data fluency—is an inclusive methodology for answering organizational questions where everyone is equipped to answer questions with data. For example, a marketing analyst would be able to use data to optimize their marketing spend, and a business analyst would visualize and describe data to prescribe actionable insights. The success of your digital transformation pivots on having the appropriate data skills across the organization.

The data fluency skill gap

While hiring data scientists and investing in data infrastructure and tools are key components of data transformation, companies are recognizing that they need to address data fluency skill gaps within their organizations. A McKinsey survey of over a thousand businesses from various industries found that the most pressing skill gap to be addressed was data analytics—with 43% of respondents believing it to be the most urgent priority when it comes to upskilling. Similarly, PwC's 2019 annual CEO survey found that 34% of CEOs believe skill gaps in data analytics are the most crucial threat for their organization. This skill gap exists across all organization levels—an Accenture study found that executives are almost twice as likely as middle managers to value their "gut feeling" over data-driven insights.

Addressing data fluency skill gaps has become even more important, especially when considering the cost of not doing so. Organizations digitizing their processes and services expect their employees to work with data, despite not having the necessary skills to do their best work. This results in employees who aren't empowered to act on their data and a culture where, according to Accenture, about 50% of employees avoid data-related tasks or find alternative methods to solve tasks without relying on data. All of this hurts the organization's decision making process and ability to iterate, and diminishes the opportunities for career growth across teams.

Organizations suffer when there is a clash between well-meaning digital transformation initiatives and a lack of necessary data skills to accommodate them. The same Accenture study found that 61% of employees believe that not having the required skills to extract insights from data has contributed to their workplace stress. When accounting for data-related procrastination and stress-related sick leave resulting from data and technology issues, organizations are losing around five working days per employee. This costs the US economy around $100 billion yearly.

Upskilling is the only way to become data fluent

Upskilling is the only way forward. Forward-thinking organizations are already pouring in investments to upskill their people to compete in the digital age. For example, Marks & Spencer created a retail data academy to upskill over 1,000 employees. Amazon launched a Machine Learning University to equip their engineers with the skills needed to deploy machine learning at scale in their products and services. Airbnb developed its own Data University to provide every level of the organization with the skills to make data-driven decisions. AT&T embarked on a $1 billion, 10-year long project to upskill more than half of its 250,000 people workforce.

> “This is our biggest digital investment in our people to date and the creation of the M&S Data Academy will upskill colleagues and provide them with an in-depth level of digital literacy as well as a Data Analytics qualification. Transformation of our business is key to survival and a huge part of this lies with our colleagues. We need to change their digital behaviors, mindsets, and our culture to make the business fit for the digital age.”
>
> Steve Row, CEO of Marks and Spencer

These companies are ushering in a new era for upskilling in the digital age. A McKinsey study found that more than two-thirds of organizations have or plan on having an upskilling initiative to address skill gaps. More importantly, the same study found that 70% of organizations that invested in upskilling efforts are reporting positive business impacts that exceed the initial investment in upskilling. For example, 48% of organizations have reported moderate to significant positive effects on bottom-line growth due to upskilling—and 73% of organizations have reported moderate to substantial improvements in employee satisfaction. A Deloitte survey asking executives about the data maturity of their organizations found that 88% of organizations who have undergone organization-wide analytics upskilling have exceeded business goals.

The challenges in upskilling for data fluency

Data fluency is a methodology for answering business questions rather than a singular skill to be taught and learned, like traditional learning and development initiatives. Learning journeys will vary depending on the level of interaction different individuals may have with data. For example, a marketing analyst who regularly works with Excel may need to learn R or Python to succeed at their job, while a manager or leader may only need to know how to make educated decisions using data.

This is why a role-based, persona-driven learning journey is more effective at scaling data fluency training programs. Every persona has a different relationship with data and would need to acquire competencies in different tools, and grow different skills to thrive in the digital age.

Creating scalable and personalized learning paths for data fluency across the organization requires familiarity with the broad landscape of data tools, and a nuanced view of the different types of data personas found in data-driven organizations. In short, there's no one-size-fits all when it comes to data fluency.

2 A breakdown of data tools and data personas

A breakdown of crucial data tools

While programming languages are at the forefront of data fluency upskilling initiatives, it's also essential to consider the entire landscape of data tools. Just like data science—or more broadly, data fluency—can be considered a means to an end to solve business questions, data tools can be considered a means to an end to perform data-related tasks.

1 Programming Languages

Open-source programming languages have skyrocketed in popularity over the last two decades for data workflows. Apart from being free to use, open-source programming languages provide a plethora of tools and packages that allow practitioners to hone skills and perform data tasks across all data fluency competency areas. The most relevant open-source programming languages for data science are Python, R, and Scala.

- Python is an open-source programming language used for statistical and data analysis, big data processing, data engineering, and machine learning. It's considered one of the most popular programming languages for data work and is replacing legacy tools like SPSS and SAS.
- R is an open-source programming language most commonly used in research and development, statistical analysis, data analysis, and dashboard creation.
- Scala is an open-source programming language—it's especially used for maintaining and processing big data and big data applications.

2 SQL

SQL is a structured query language that allows data professionals to query, access, and manipulate data inside of database management systems. Just like one human language can have many different dialects, there are many different dialects of SQL (i.e., PostgreSQL, Oracle SQL, SQL Server) that are used by different organizations. The differences are generally minor as they share many commonalities in syntax and features.

3 Business Intelligence Tools (BI Tools)

BI tools have gained momentum over the past decade. Business intelligence tools are essentially supercharged spreadsheet tools made for the digital age. They allow for the organization, aggregation, and visualization of data in easy to use point-and-click dashboards, with no coding required. While there are many business intelligence tools, commonly used tools include the following:

- Tableau offers a robust, flexible, and intuitive interface to connect to raw data and create beautiful and interactive visualizations that allow teams to get an overview of their data.
- Power BI offers seamless connectivity with various raw data sources and an easy point-and-click interface to visualize and process data. A key feature of Power BI is that one version of it comes with Office 365 for the Enterprise and has an interface that is slightly reminiscent of Excel.

4 Spreadsheets

Spreadsheets have always been the go-to tool for data practitioners. They allow for easy, intuitive, and drag-and-drop interfaces for manipulating, aggregating, and visualizing data. However, they fall short when processing large amounts of data and often produce bottlenecks when creating reproducible shareable analysis. The most popular spreadsheet tools are Microsoft Excel and Google Sheets.

5 Big data tools

As organizations started collecting more and more data, it became imperative to efficiently structure, organize, and store big data. Many solutions have emerged that accommodate manipulating big data and orchestrating big data workflows. Notable examples include:

- Spark is a framework that allows for large-scale data processing and manipulation. It can be used using Python, Scala, or R.
- Airflow is an open-source workflow management tool that allows you to schedule data pipelines to ensure consistency and reliability across data workflows.

6 Command line tools

Command line tools are used to systematize file handling, enable version control, work with cloud tools, execute data pipelines developed using other data tools—especially programming languages—easily and scalably. The two most notable command line tools are the following:

- Shell is a command line interface that allows running programs, automating tasks, and accessing file directories.
- Git is a version control tool that allows for easily tracking and experimenting with changes done to code repositories.

7 Cloud platforms

Cloud platforms provide tools for organizations and teams to store and process data, host applications, and deploy data pipelines all using remote computing resources hosted by cloud providers. They have become the de-facto solution for data infrastructure for many organizations as they are easier to maintain, scale, and more resilient. The most widely used cloud platform providers are Amazon Web Services (AWS), Microsoft Azure, and Google Cloud.

The different relationships with data

While each organization and the data they produce is different, there are commonalities in the different relationships individuals have with data. A useful way of thinking about and scaling data-focused upskilling efforts is with data personas. Each data persona has a different relationship with data and requires different data fluency competencies to become empowered to do their best work. Organizations can then map different roles within the organization to that persona and create a curated, personalized learning experience depending on what they need to learn.

1 Data Consumers and Leaders

Data Consumers and Leaders often work in nontechnical roles, but they consume data insights and analytics to make data-driven decisions. They often need to have conversations with data professionals and should be able to distinguish when data can and cannot be used to answer business questions.

DATA SKILLS:

Beginner

- Understand what data scientists, machine learning scientists, and data engineers do.
- Know which questions can (and can't) be answered with data.
- Interpret the results of data projects, including calculations and visualizations.

Intermediate

- Draw common visualizations and extract simple descriptive statistics from data.

Advanced

- Have a strong grasp of the fundamentals of business intelligence and BI tools.

COMMONLY USED TECHNOLOGY AND

- Spreadsheets: Google Sheets, Microsoft Excel
- Business Intelligence: Power BI, Tableau

EXAMPLE JOB TITLES:

Chief Marketing Officer, Human Resources Manager, Head of Sales

2 Business Analysts

Business Analysts are responsible for tying data insights to actionable results that increase profitability or efficiency. They have deep knowledge of the business domain and often use SQL alongside non-coding tools to communicate insights derived from data.

DATA SKILLS:

Beginner

- Draw common visualizations and extract simple descriptive statistics from data.
- Understand the business applications of data.

Intermediate

- A deep knowledge of the business domain and the ability to report and communicate insights using data.

Advanced

- Democratize access to data insights by creating dashboards and organizing data to answer organizational questions.

COMMONLY USED TECHNOLOGY AND

- Spreadsheets: Google Sheets, Microsoft Excel
- Business Intelligence: Power BI, Tableau
- SQL: PostgreSQL, SQL Server, Oracle SQL

EXAMPLE JOB TITLES:

Business Analyst, Supply Chain Analyst, Operations Analyst, Financial Analyst

3 Data Analysts

Similar to Business Analysts, Data Analysts are responsible for analyzing data and reporting insights from their analysis. They have a deep understanding of the data analysis workflow and report their insights through a combination of coding and non-coding tools.

DATA SKILLS:

Beginner

- Can draw common visualizations and extract simple descriptive statistics from data.
- Understands the business applications of data.

Intermediate

- A deep understanding of the data analysis workflow, which includes importing, manipulating, cleaning, calculating, and reporting on organization data.
- A strong grasp of business intelligence and BI tools.

Advanced

- Democratize access to data insights by creating dashboards and organizing data to answer organizational questions.

COMMONLY USED TECHNOLOGY AND TOOLS:

- Programming languages: Python, R
- Spreadsheets: Google Sheets, Microsoft Excel
- Business Intelligence: Power BI, Tableau
- SQL: PostgreSQL, SQL Server, Oracle SQL

EXAMPLE JOB TITLES:

Data Analyst, Business Analyst, Supply Chain Analyst, Operations Analyst, Financial Analyst

4 Data Scientists

Data Scientists investigate, extract, and report meaningful insights in the organization's data. They communicate these insights to nontechnical stakeholders and have a good understanding of machine learning workflows and how to tie them back to business applications. They work almost exclusively with coding tools, conduct analysis, and often work with big data tools.

DATA SKILLS:

Beginner

- Deeply understand the data analysis workflow, which includes importing, manipulating, cleaning, calculating, and reporting on organization data.

Intermediate

- Understand fundamental statistics, including distributions, modeling, and inference.
- Understand supervised and unsupervised machine learning workflows.
- Can create dashboards using coding tools such as Python and R.

Advanced

- Can apply analyses and machine learning workflows to business applications such as finance, marketing, and healthcare.
- Work with non-standard data types, such as time series, text, geospatial, and images.

COMMONLY USED TECHNOLOGY AND TOOLS:

- Programming languages: Python, R, Scala
- SQL: PostgreSQL, SQL Server, Oracle SQL
- Big data tools: Airflow, Spark

EXAMPLE JOB TITLES:

Data Scientist, Data Analyst, can include a "citizen data scientist" (i.e., someone who performs the tasks of a data scientist, but does not have the title "Data Scientist").

5 Machine Learning Scientists

Machine Learning Scientists are responsible for developing machine learning systems at scale. They derive predictions from data using machine learning models to solve problems like predicting churn and customer lifetime value, and are responsible for deploying these models for the organization to use.

DATA SKILLS:

Beginner

- Deeply understand the data analysis workflow, which includes importing, manipulating, cleaning, calculating, and reporting on organization data.

Intermediate

- Perform supervised and unsupervised machine learning workflows including feature engineering, training models, testing accuracy and making predictions.
- Can apply analyses and machine learning workflows to business applications such as finance, marketing, and healthcare.

Advanced

- Perform deep learning workflows.
- Work with APIs and coding best practices.

COMMONLY USED TECHNOLOGY AND TOOLS:

- Programming languages: Python, R, Scala
- SQL: PostgreSQL, SQL Server, Oracle SQL
- Big data tools: Airflow, Spark
- Command line tools: Git, Shell

EXAMPLE JOB TITLES:

Data Scientist, Research Scientist, Machine Learning Scientist, Machine Learning Engineer

6 Statisticians

Similar to Data Scientists, Statisticians work on highly rigorous analysis, which involves designing and maintaining experiments such as A/B tests and hypothesis testing. They focus on quantifying uncertainty and presenting findings that require exceptional degrees of rigor, like in finance or healthcare.

DATA SKILLS:

Beginner

- Deeply understand the data analysis workflow, which includes importing, manipulating, cleaning, calculating, and reporting on organization data.

Intermediate

- Perform statistical modeling workflows, including feature engineering, training models, testing goodness of fit, and inferring significance.
- Test hypotheses and design simple experiments such as A/B tests.

Advanced

- Design more complex experiments and understand Bayesian statistics.
- Understand specialist models, such as survival models, generalized additive models, mixture models, and structural equation models.

COMMONLY USED TECHNOLOGY AND TOOLS:

- Programming languages: Python, R
- SQL: PostgreSQL, SQL Server, Oracle SQL

EXAMPLE JOB TITLES:

Quantitative Analyst, Inference Data Scientist, Data Scientist

7 Programmers

Programmers are highly technical individuals that work on data teams and work on automating repetitive tasks when accessing and working with an organization's data. They bridge the gap between traditional software engineering and data science and have a thorough understanding of deploying and sharing code at scale.

DATA SKILLS:

Beginner

- Write functions to avoid repetitive code.
- Benchmark and optimize code to improve performance.

Intermediate

- Deeply understand coding best practices.
- Work with web APIs and develop packages for sharing code.

Advanced

- Develop data pipelines and work with parallel programming.
- Understand programming paradigms, such as functional programming and object-oriented programming.

COMMONLY USED TECHNOLOGY AND TOOLS:

- Programming languages: Python, R, Scala
- Command line tools: Git, Shell

EXAMPLE JOB TITLES:

Software Engineer, Data Scientist, Dev-Ops Engineer

8 Data Engineers

Data Engineers are responsible for getting the right data in the hands of the right people. They create and maintain the infrastructure and data pipelines that take terabytes of raw data coming from different sources into one centralized location with clean, relevant data for the organization.

DATA SKILLS:

Beginner

- Efficiently extract, transform, and load data from raw data sources into organization databases.

Intermediate

- Process data and automate data flows using the command line.
- Process data using cloud platforms.

Advanced

- Manage and optimize databases and process big datasets.

COMMONLY USED TECHNOLOGY AND TOOLS:

- Programming languages: Python, R, Scala
- SQL: PostgreSQL, SQL Server, Oracle SQL
- Command line tools: Git, Shell
- Big data tools: Airflow, Spark
- Cloud Platforms (e.g., Amazon Web Services)

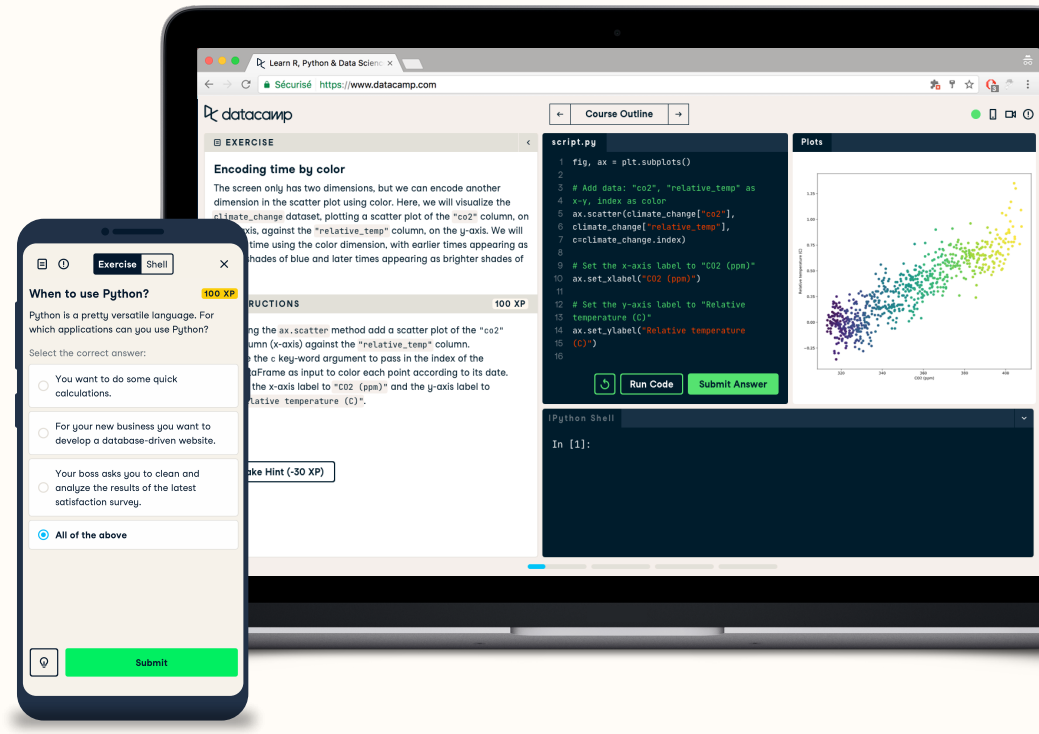
EXAMPLE JOB TITLES:

Software Engineer, Data Engineer, Dev-Ops Engineer

3

How DataCamp scales learning and development for data fluency

While clear understanding of data roles and tools are essential to scaling learning and development programs for data fluency, not every organization can create its own data university like Airbnb has done. Depending on your organization's data roles, the tools your employees use, and the data skills they have, a variety of educational programs, both online and in person, can get your team up to speed.



At DataCamp, we create persona-driven, personalized learning journeys for each role based on their skill set and desired learning outcomes. With DataCamp Signal™, learners can assess their skills in various data competency areas, including data literacy, programming, data analysis, and more—and receive personalized course recommendations based on their skill gaps. These courses were created by the best instructors and industry professionals in the world. Unlike other platforms, DataCamp features a modern learning experience with bite-sized videos and hands-on-coding exercises, so employees learn by doing and stay engaged. Our mobile app makes it easy for learners to hone skills on-the-go with short practice sessions to reinforce what they've learned. And with DataCamp projects, they can tackle real world problems in a risk-free environment and apply their new data skills right away.

This entire learning experience is easy to implement and manage for teams of any size, with an administrator dashboard that allows custom learning paths based on roles and departments, advanced analytics and insights to measure the impact of online learning, and seamless SSO and LMS integrations. Teams benefit from our Customer Success Managers, which partner with organizations to accelerate learning adoption, and provide valuable recommendations to help achieve organization-wide data fluency. We have more than 6 million learners around the world —and we're just getting started. Close the talent gap. Visit datacamp.com.