Data and Analytics in a Digital-First World

A global study of data workers’ activities and the democratization of data and analytics in organizations

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Executive Summary

70% of organizations want to be more data-driven and improve employee data and analytics skills, but challenges exist.

- 88% of organizations face data and analytics technology constraints.
- 95% of organizations report being challenged by data in creating analytic outcomes.
- 90% of organizations use multiple tools in data and analytics activities.

The spreadsheet is ubiquitous in data and analytics activities.

- 78 million data workers are advanced spreadsheet users.
- Spreadsheets are dominant for gathering and preparing data but are used less often for data science and app development.
- Users waste 7 hours per week repeating work as data changes.

Complexity, constraints, and lack of analytics automation and skills hurt productivity.

- One-third of workers' time is lost because activities cannot be completed in reasonable or expected time.
- 62.4 billion hours spent on data and analytics are lost annually worldwide.
- Democratization requires unified data and analytics tools and upskilling of data workers.
Data and Analytics Power the Future Enterprise in a Digital-First World

A digital-first company, government, or person asks, “Is there some digital-based capability or enhancement that could improve our lives and desired outcomes?”

Leveraging data and analytics is key to success.

- 71% of respondents report their executives and top managers want to be more data driven.
- Democratizing data and analytics is required at digital-first scale, yet 88% of respondents face technology constraints, and 95% report data challenges.

The data and analytics experience needs to be improved.

- Only 40% of people who work in data and analytics enjoy what they do.
- 91% admit to having skills gaps.

Source: IDC’s Worldwide Data Science and Analytics, November 2021, n = 1,117
# Generation Data: Data Workers Deliver Analytical Insights in a Digital-First World

Data workers are spread across functional areas, roles, and industries.

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- Data workers are spread across functional areas, roles, and industries.
- **Functional Area**
- **Organizational Role**
- **Industry Distribution**

### Functional Area

<table>
<thead>
<tr>
<th>Area</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT</td>
<td>34%</td>
</tr>
<tr>
<td>Product management, engineering support</td>
<td>22%</td>
</tr>
<tr>
<td>Centralized analytics</td>
<td>19%</td>
</tr>
<tr>
<td>Finance</td>
<td>7%</td>
</tr>
<tr>
<td>Marketing</td>
<td>5%</td>
</tr>
<tr>
<td>Human resources</td>
<td>4%</td>
</tr>
<tr>
<td>Supply chain</td>
<td>4%</td>
</tr>
<tr>
<td>Sales</td>
<td>4%</td>
</tr>
</tbody>
</table>

### Organizational Role

<table>
<thead>
<tr>
<th>Role</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business leader</td>
<td>25%</td>
</tr>
<tr>
<td>Other line-of-business user</td>
<td>24%</td>
</tr>
<tr>
<td>IT leader</td>
<td>17%</td>
</tr>
<tr>
<td>IT development</td>
<td>9%</td>
</tr>
<tr>
<td>Data analyst</td>
<td>7%</td>
</tr>
<tr>
<td>Data executive</td>
<td>6%</td>
</tr>
<tr>
<td>Business analyst</td>
<td>5%</td>
</tr>
<tr>
<td>Data management</td>
<td>5%</td>
</tr>
<tr>
<td>Data scientist</td>
<td>2%</td>
</tr>
</tbody>
</table>

### Industry Distribution

<table>
<thead>
<tr>
<th>Industry</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>25%</td>
</tr>
<tr>
<td>Retail</td>
<td>17%</td>
</tr>
<tr>
<td>Technology/telecom</td>
<td>15%</td>
</tr>
<tr>
<td>Financial services</td>
<td>12%</td>
</tr>
<tr>
<td>Public (government, education)</td>
<td>9%</td>
</tr>
<tr>
<td>Computer/IT services</td>
<td>9%</td>
</tr>
<tr>
<td>Healthcare</td>
<td>7%</td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
</tr>
<tr>
<td>Utilities</td>
<td>2%</td>
</tr>
</tbody>
</table>

Source: IDC's Worldwide Data Science and Analytics, November 2021, n = 1,117
Tools Data Workers Use to Deliver Data and Analytics Outcomes

Data workers use spreadsheets and commercial and open source software tools. Spreadsheets are dominant for gathering data and descriptive analytics but are much less common for data science and rare for data application development.

On average, 3 or more commercial tools are being used in addition to spreadsheets and open-source software across all data and analytic activities.

Q. Which of the following software technology alternatives are available to you to perform these data activities?

- Spreadsheets
- Commercial data software
- Open source data analytics tools

Source: IDC’s Worldwide Data Science and Analytics, November 2021, n = 1,117

On average, 3 or more commercial tools are being used in addition to spreadsheets and open-source software across all data and analytic activities.
78 Million Data Workers Are Advanced Spreadsheet Users
\[
\text{Approximated worldwide in organizations with 10 to 10,000+ employees}
\]

- Nearly half (~45%) of all spreadsheet users use advanced data and analytics features and functions.

- Microsoft Excel is used by 94% of advanced spreadsheet users.

- The percentage of advanced spreadsheet users has increased 15% in two years (2019–2021), demonstrating a measured increase in the number of data workers.

Source: IDC’s Worldwide Data Science and Analytics, November 2021, n = 1,117
IDC’s Worldwide Data Science and Analytics, February 2019, n = 836
Time Spent in Spreadsheets Is Often Ineffective

Data workers spend 27% of their time in spreadsheets repeating the same or similar activity steps every time a data source has been updated or refreshed.

This is equivalent to an average of 7 hours per week.

Source: IDC's Worldwide Data Science and Analytics, November 2021, n = 1,117

46% Commercial or open source software

54% Spreadsheets
Data Workers Expect to Spend More Future Time in High-Level Activities

Data workers anticipate spending more of their future time in data science and data application development activities rather than in prep and descriptive analytics. A large part (72%) of a data worker’s weekly time is spent in data-related activities.

**Distribution of Weekly Time by Activity**

- 28% Non-data activities
- 22% Data preparation
- 17% Data analytics
- 17% Data science
- 16% Data application development

**Future Time Expectations**

- 78% More
- 71% More
- 72% More
- 63% More

Q: Thinking about a typical work week, how many hours per week do you spend on the following activities?

Q: Looking ahead, how do you expect your efforts to change for the following activities in the next 12-18 months?

Source: IDC’s Worldwide Data Science and Analytics, November 2021, n = 1,117
Time Is Wasted Every Week Because Activities Take Too Long

Data science activities require the most data exploration and preparation, resulting in more unsuccessful time.

Average Percentage of Unsuccessful Time Spent by Activity

Q: What percentage of the time are you unsuccessful in these activities?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data science</td>
<td>35%</td>
</tr>
<tr>
<td>Data preparation</td>
<td>33%</td>
</tr>
<tr>
<td>Data application development</td>
<td>32%</td>
</tr>
<tr>
<td>Data analytics</td>
<td>32%</td>
</tr>
</tbody>
</table>

On average, this is equivalent to nine hours every week per person.

61% of data workers perform activities in spreadsheets only. This includes 13% who have access to alternative tools.

Weekly Time Spent in Data Activities

- unsuccessful: 33%
- successful: 67%

Source: IDC’s Worldwide Data Science and Analytics, November 2021, n = 1,117
Productivity Suffers as Workers Lose 800 Hours Annually

Productivity loss is caused by complexity and challenges associated with data and analytics democratization.

More than 62 billion hours are wasted every year worldwide because workers are not able complete tasks in a reasonable or expected amount of time. Time is also lost from repeating work in spreadsheets every time an underlying data source changes.

| Weekly hours spent repeating tasks in spreadsheets | 7 |
| Weekly hours of unsuccessful data activity effort* | 9 |
| Total weekly hours lost | 16 |
| Weeks per year | 50 |
| Number of advanced spreadsheet users worldwide | 78 million |
| Worldwide hours wasted annually | 62.4 billion |

Source: IDC's Worldwide Data Science and Analytics, November 2021, n = 1,117
*Unsuccessful time may not be mutually exclusive from time spent repeating activities in spreadsheets.
Complexity and Multiple Tools Impede Productivity

In their efforts to democratize data and analytics, 88% of organizations report that technology constraints limit improvement.

### Technology Constraints on Improvement

**Q. Which of the following activities would you like to improve on but are limited by technology constraints?**

- More effectively prepare data: 45%
- More effectively gather data: 45%
- Spreadsheet task automation: 44%
- Predictive or prescriptive analytics: 34%
- Create packaged spreadsheet apps: 34%
- Descriptive analytics: 33%
- Do not have technology constraints: 12%

88% have constraints!

### Number of Commercial Tools in Use

**Q: How many different commercial data or analytics software vendors are used for each activity?**

- One: 10%
- Two: 17%
- Three: 19%
- Four: 24%
- Five: 30%

Source: IDC’s Worldwide Data Science and Analytics, November 2021, n = 1,117
Obstacles to Democratizing Data and Analytics

Almost all organizations (95%) report difficulties with data when performing analytic activities, mainly in complexity, data quality, data access, and analytics skills.

### Data-Specific Challenges

Q. What are the top 3 data-specific challenges you have when performing data analytics activities?

- Managing data complexity: 45%
- Knowing data quality scores: 38%
- Finding and accessing external data: 32%
- Improving my analytic skills: 31%
- Data governance compliance: 29%
- Data and analytic tech limitations: 28%
- Scaling big data analytics: 25%
- Finding and accessing internal data: 25%
- No data challenge: 5%

### Non-Data-Specific Challenges

Q. What are the top 3 primary non-data-specific challenges you have when performing data analytics activities?

- Time spent in data preparation: 39%
- Complexity of analytic tools: 32%
- Understanding of advanced analytics: 30%
- Analytic model versions: 29%
- Collaboration: 26%
- Analytic operationalization: 25%
- Access to proper analytical tools: 25%
- Unwillingness to share analytics: 20%

Source: IDC’s Worldwide Data Science and Analytics, November 2021, n = 1,177
Most Organizations Lack Advanced Skills in Data and Analytics

Q. Please select the top 3 areas of data skills gaps that you believe exist in your organization?

- Advanced spreadsheet scripting skills: 44%
- Advanced analytics or statistical skills (predictive/prescriptive/machine learning): 44%
- Application development skills: 44%
- Data preparation and blending SQL skills: 42%
- Data storytelling/presentation/visualization skills: 35%
- No areas of data skill gaps: 9%

91% have skills gaps!
Skills and Technology Improvements Are In Demand to Address Data and Analytics Complexity

Data pipelines are processing highly distributed, diverse, and dynamic data at scale and delivering it to multiple assets for consumption.

### Data Sources

Q. Select all the data management technologies that are being used to store and/or process data, including cloud and on-premises implementations.

- Spreadsheets: 98%
- Flat files: 51%
- Streaming data: 42%
- Application databases: 42%
- Data lakes: 37%
- Online analytical processing: 36%
- NoSQL: 31%
- Online transaction processing: 30%
- Legacy mainframe: 28%

### Data Types

Q. What types of data are being integrated or blended as part of your data preparation for analytics or data science?

- Master data: 64%
- Transactional data: 46%
- External data: 31%
- Multimedia data: 30%
- Log file data: 26%
- Semi-structured data: 25%
- Internet of Things data: 7%
- Spatial data: 4%
- Social media data: 4%

### Analytics Consumption

Q. Select the top three ways your data and analytics outputs are being operationalized.

- Data applications: 47%
- Data science models: 46%
- Reports: 43%
- Process automation: 39%
- Dashboards: 37%
- Embedded Analytics: 32%

Source: IDC's Worldwide Data Science and Analytics, November 2021, n = 1,117
Regional Highlights

North America
- Lower-than-average ratio of advanced spreadsheet users
- Biggest employee challenge compared to other regions: improving data and analytics skills
- Largest barrier to implementing alternative data and analytic tools: corporate IT standards and policies
- More data and analytics workloads moved to the cloud compared to other regions
- Highest belief that a complete overhaul of data and analytics is required compared to other regions

Western Europe
- Second-lowest ratio of advanced spreadsheet users
- Lowest number of commercial tools in use
- Least significant part of data and analytics strategies now compared to before COVID-19: improving employee skills
- Least resistance to implementing alternative data and analytics tools compared to other regions
- Least desire to improve data and analytics compared to other regions

Central and Eastern Europe, Middle East, and Africa
- Lowest ratio of advanced spreadsheet users
- Least successful in completing data and analytics activities compared to other regions
- Big focus on improving employee data and analytic skills

Asia/Pacific
- Highest ratio of advanced spreadsheet users
- Highest number of commercial tools in use
- Most time spent in data science activities compared to other regions
- Primary data and analytics strategy now versus pre-pandemic: improving employee skills
- Largest barrier to implementing alternative tools: compatibility with data technology

Latin America
- Higher-than-average ratio of advanced spreadsheet users
- Most successful in completing data and analytics activities compared to other regions
- Mainframes a significant source of data for analytics

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- North America
- Western Europe
- Asia/Pacific
- Latin America
- Central and Eastern Europe, Middle East, and Africa
Essential Guidance

Democratize data and analytics with tool reconciliation, consolidation, and worker upskilling.
- Prioritize solutions that offer unified and automated data prep and analytic experiences.
- Seek solutions that enable upskilling to improve data literacy and analytic outcomes.

Understand the skill sets of data natives and implement solutions that enable upskilling.
- Data natives want to improve analytics and data application development skills.
- Data literacy continues to be a challenge but is now mandatory as decisions are increasingly data driven.

Review your data and analytics environment and understand the challenges data natives face.
- A multiplicity of tools impact effective data operations and analytic processes.
- Data sources, formats, quality, scale, compliance, processing, and consumption are too complex.
- Manual and repetitive activities are used instead of analytics process automation.
- Technology and skills constraints inhibit self-service data preparation, analytics, and data science.
- Spreadsheets are inadequate to perform data science and app development.
Demographics

Methodology

IDC conducted a very international sample in five regions: North America; Western Europe; Asia/Pacific; Latin America; and Central and Eastern Europe, Middle East, and Africa.

- United States: 25%
- Canada: 6%
- Germany: 5%
- France: 4%
- United Kingdom: 9%
- Italy: 4%
- Brazil: 8%
- Mexico: 7%
- Australia: 3%
- China: 3%
- India: 6%
- Singapore: 3%
- Japan: 4%
- Russia: 4%
- South Africa: 4%
- UAE: 4%

Total sample size: 1,117

All respondents:
- Are currently employed
- Use a spreadsheet (Excel, Google, Zoho, etc.) to analyze data for work
- Regularly use advanced features (pivoting data, VLOOKUP, cross-tabulation, statistical modeling, etc.) to analyze data

Size of Organization

The sample included a significant number of large organizations, including about half with more than 1,000 employees. Data was collected from all five regions of the world.

Q: What is the number of employees in your worldwide organization?

<table>
<thead>
<tr>
<th>Number of Employees</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 500</td>
<td>33%</td>
</tr>
<tr>
<td>500–999</td>
<td>17%</td>
</tr>
<tr>
<td>1,000–1,999</td>
<td>14%</td>
</tr>
<tr>
<td>2,000–9,999</td>
<td>23%</td>
</tr>
<tr>
<td>10,000–24,999</td>
<td>9%</td>
</tr>
<tr>
<td>More than 25,000</td>
<td>5%</td>
</tr>
</tbody>
</table>

Source: IDC’s Worldwide Data Science and Analytics, November 2021, n = 1,117
## Industries

(Percentage of Respondents)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology/ software and Telecom</td>
<td>17%</td>
</tr>
<tr>
<td>Financial Services and insurance</td>
<td>13%</td>
</tr>
<tr>
<td>Manufacturing (incl. discrete, high tech, process, and consumer goods)</td>
<td>11%</td>
</tr>
<tr>
<td>Retail/ wholesale</td>
<td>10%</td>
</tr>
<tr>
<td>Healthcare, life sciences and biotechnology (incl. payers-insurance)</td>
<td>8%</td>
</tr>
<tr>
<td>Professional and technical services</td>
<td>8%</td>
</tr>
<tr>
<td>Construction</td>
<td>7%</td>
</tr>
<tr>
<td>Education</td>
<td>7%</td>
</tr>
<tr>
<td>Government</td>
<td>6%</td>
</tr>
<tr>
<td>Travel/ leisure/ hospitality</td>
<td>6%</td>
</tr>
<tr>
<td>Real estate, rental and leasing</td>
<td>2%</td>
</tr>
<tr>
<td>Utilities</td>
<td>2%</td>
</tr>
<tr>
<td>Transportation, warehousing and logistics</td>
<td>1%</td>
</tr>
<tr>
<td>Energy, mining, oil and gas resources</td>
<td>1%</td>
</tr>
<tr>
<td>Membership/ nonprofits</td>
<td>1%</td>
</tr>
<tr>
<td>Advertising, media and entertainment</td>
<td>1%</td>
</tr>
</tbody>
</table>

Source: IDC’s Worldwide Data Science and Analytics, November 2021, n = 1,117

### Grouping Industry

<table>
<thead>
<tr>
<th>Grouping</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail</td>
<td>• Travel/leisure/hospitality</td>
</tr>
<tr>
<td></td>
<td>• Retail/wholesale</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>• Construction</td>
</tr>
<tr>
<td></td>
<td>• Manufacturing</td>
</tr>
<tr>
<td></td>
<td>• Energy, mining, oil and gas resources</td>
</tr>
<tr>
<td></td>
<td>• Transportation, warehousing and logistics</td>
</tr>
<tr>
<td>Public</td>
<td>• Education</td>
</tr>
<tr>
<td></td>
<td>• Government</td>
</tr>
<tr>
<td>Financial services</td>
<td>• Financial services and insurance</td>
</tr>
<tr>
<td>Healthcare</td>
<td>• Healthcare, life science and biotechnology</td>
</tr>
<tr>
<td>Technology/telecom</td>
<td>• Advertising, media and entertainment</td>
</tr>
<tr>
<td></td>
<td>• Technology/software and telecom</td>
</tr>
<tr>
<td>Computer services</td>
<td>• Professional and technical services</td>
</tr>
<tr>
<td>Utilities</td>
<td>• Utilities</td>
</tr>
<tr>
<td>Other</td>
<td>• Membership/nonprofits</td>
</tr>
<tr>
<td></td>
<td>• Real estate, rental and leasing</td>
</tr>
</tbody>
</table>
Microsoft Excel Dominates the Spreadsheet Alternatives in Use for Advanced Analytics

Q. Which spreadsheet software do you use the most for advanced data and analytics activities?

- **94%** Microsoft Excel
- **4%** Google Sheets
- **2%** Other
  - Open Office Calc: 1%
  - Apple Numbers: 0.5%
  - Zoho Sheet: 0.4%
  - Lotus 1-2-3: 0.3%

Source: IDC’s Worldwide Data Science and Analytics, November 2021, n = 1,117
Definitions

**Data preparation**: Shaping, cleansing, deduplicating, blending, filtering, and moving data from transaction systems to data lakes/warehouses for subsequent analysis.

**Descriptive or diagnostic analytics**: The act of aggregating, pivoting, and synthesizing results to determine what happened and why.

**Data science**: Methods include correlation, statistical modeling, regression analysis, predictive analysis, and data algorithm development.

**Data application development**: The process of building data-oriented applications and operationalizing data science models.

**Advanced spreadsheet users**: People who regularly use advanced features (pivoting data, VLOOKUP, cross-tabulation, statistical modeling, etc.) to analyze data for work.

**Commercial data software tools**: Any data software that companies license or sell to end users. Examples include Alteryx, Tableau Prep, Microsoft Power BI, SAS, SAP, etc.

**Open source data analytics tools**: Any data analytics tool that can be used, modified, enhanced, or distributed freely by users. Examples include Grafana, Redash, Pentaho, Apache Spark, etc.
About the Analyst

Stewart Bond is Research Director of IDC's Data Integration and Intelligence Software service. Mr. Bond's core research coverage includes watching emerging trends that are shaping and changing data movement, ingestion, transformation, mastering, cleansing and consumption in the era of digital transformation. Having worked in the IT industry for over 25 years, from early experience in database and application development, through solution design and deployment, to strategic architectural consulting, Stewart has worked through some significant changes in the IT industry. His depth of field experience coupled with market insight gives him a unique perspective, valued by his customers and peers.

More about Stewart Bond
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