

# GEOSCIENCE DATA MANAGEMENT REPORT

“83% of respondents rank data management as a critical or top 5 issue for their Geoscience organization”

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# Executive Summary

Geoscience data management is a key issue across various industries and while organizations recognize it as critical, they continue to struggle with the challenges it presents. The 2017 Geoscience Data Management Survey identified key challenges and barriers to success, while looking at the approaches geoscience organizations are taking to overcome these obstacles.



The 2017 survey garnered 1400 responses from 1072 organizations. Regardless of role or industry, 83% of respondents continue to believe that data management is a critical or “top 5 issue” for their organization with almost 60% of respondents noting that their geoscientists are spending more than 20% of their time on data management.



When ranking key data management challenges, almost half of all respondents ranked the inability to find and access all geoscience data via one integrated search tool as the biggest challenge. It is clear that the majority of organizations surveyed have a large volume and variety of data to manage and make accessible, so it is promising to see that over 60% of respondents have a high level of confidence in their organization’s current handling of both the quantity and quality of their data.



There are a number of common barriers to success when geoscience organizations are working to overcome data management challenges, from the point of selecting and implementing a solution to maintaining and populating the solution. Lack of resources, perceived high and prohibitive cost, as well as a poor internal culture for data management progress and change were all found to be major obstacles faced by survey respondents.



The survey aimed to understand how geoscience organizations are solving their data management challenges. It is clear that most respondents prefer to purchase commercial solutions versus developing internal proprietary solutions or outsourcing the service. With the Cloud becoming a more common solution for geoscience data management, the survey found that over half of all respondents are ready to leverage the Cloud or are already doing so albeit with some reservations, primarily around security.



In terms of resolving data management challenges, getting the full value from the data is a key desired outcome for 40% of respondents. Providing one point of access for all data is also an important outcome for respondents. This aligns with the 2017 finding that almost half of respondents feel the ability to search and access all data via an integrated search tool is a top priority.

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# Introduction

Geosoft ran the fourth Geoscience Data Management Survey in June 2017, garnering 1400 responses from over 1000 organizations. The survey consisted of 14 questions designed to gather insights from geoscience organizations into the following topics:

- The importance of geoscience data management
- Key challenges in geoscience data management
- Barriers to geoscience data management success
- How geoscience organizations are overcoming the challenges
- Managing a breadth of geoscience data

This year the survey was expanded with three new questions. The new questions provide insight into geoscience organizations’:

- Main challenges faced when implementing a data management solution
- Level of readiness to leverage the Cloud for data management and access
- Main challenges when leveraging the Cloud for data management and access

**1400**  
RESPONSES

**1072**  
ORGANIZATIONS

**115**  
COUNTRIES

## Survey Statistics

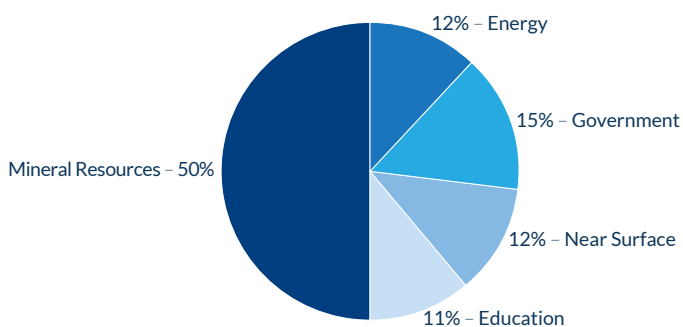
The 2017 Geoscience Data Management Survey had responses from a broad global audience, with participants from over 115 different countries. In total the survey received 1400 responses from 1072 organizations and their subsidiaries around the world.

The survey was distributed to a wide range of roles within mineral resources, energy, government, near surface (environmental, marine, and UXO) and education organizations involved in the geosciences.

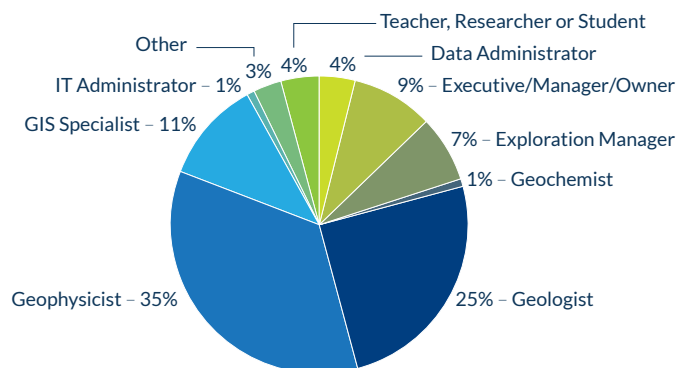
Geophysicists, geologists, GIS specialists, and geochemists represent approximately 70% of the survey respondents with executives/managers/owners, data and IT administrators, and teachers/researchers/students representing the remaining 30%.

**70%**  
GEOPHYSICISTS  
GEOLOGISTS  
GIS SPECIALISTS

**Respondents by Industry**



**Respondents by Job Title**



# Part 1: The Importance of Geoscience Data Management

Managing geoscience data is crucial to maximizing the value of data. The 2017 survey opened by asking respondents to rank geoscience data management as an issue in their organization. The survey aimed to gauge how respondents from various geoscience organizations feel about this issue.

## Where does ‘geoscience data management’ rank as an issue?

According to the 2017 survey, 83% of respondents believe that geoscience data management is of great importance, with 47% of respondents seeing it as critical and 36% seeing it as a “top 5 issue” for their organization (see figure 1).

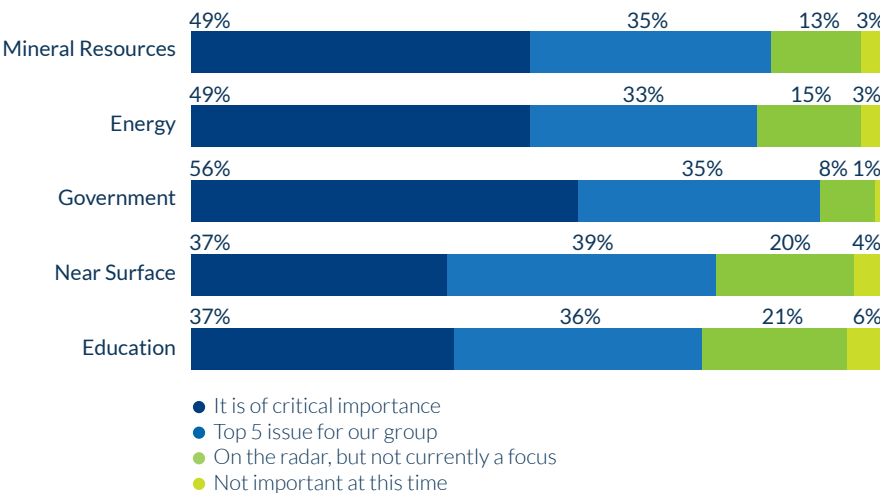
Figure 1: Ranking of Data Management as an Issue

|   | 2017 | 2015 | 2013 |
|---|------|------|------|
| It is of critical importance            | 47%  | 48%  | 44%  |
| Top 5 issue for our group               | 36%  | 37%  | 38%  |
| On the radar, but not currently a focus | 14%  | 12%  | 15%  |
| Not important at this time              | 3%   | 3%   | 3%   |

No one job role sees the issue differently than peer roles, implying that the concern is felt similarly throughout the organizations, from those working directly with the data (geoscientists, data administrators, IT administrators) to managers and executives.

Upon further analysis to determine if different industries perceive the issue to be more critical than others, it was found that all industries included in the survey place a high level of importance on managing geoscience data. Government organizations do rank this issue as slightly more critical than the other groups with over half of them reporting it is of “critical importance” and only 1% reporting that it is not important. Near surface organizations and educational institutions had slightly higher numbers of respondents reporting that data management is “on the radar, but not currently a focus” (see figure 2).

Figure 2: Ranking of Data Management by Industry



The 2017 results are consistent with the past four data management surveys with over 80% of respondents consistently reporting that they believe data management to be critical to the success of their geoscience organizations. This also indicates that in the seven years since the first survey, there has been little change in how organizations feel about managing their data.

This could be interpreted as the survey receiving more responses from organizations that are facing data management challenges and lower response rates from organizations who are happy with their data management. This interpretation is not statistically supported though, as a large number of organizations repeat through the multiple surveys, indicating it is an ongoing issue.

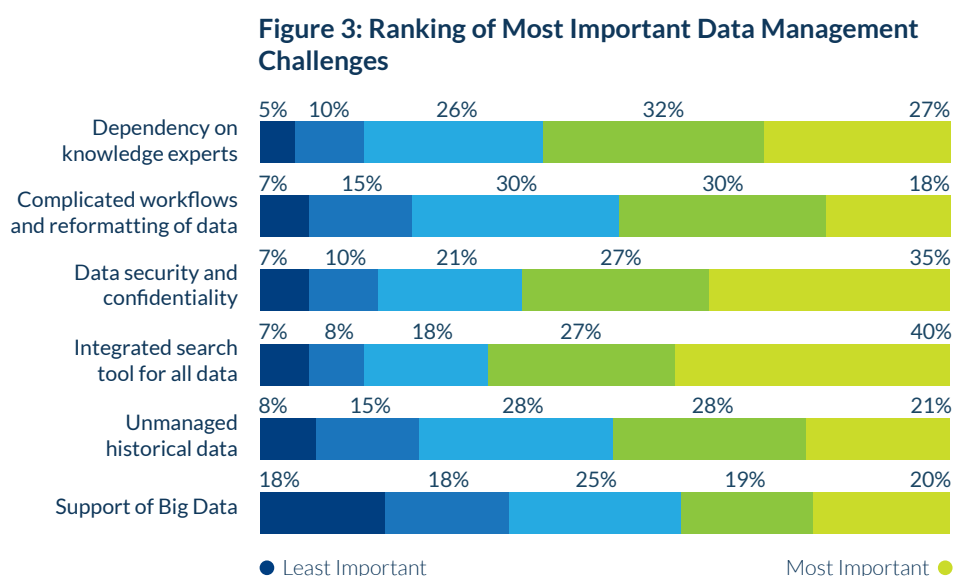
The findings could also indicate that organizations may be finding it difficult to make progress given that the volume and nature of the data continues to grow, and so does the number of challenges it presents. Either way, there is much opportunity for improvement in terms of the various solutions to overcoming these challenges.

## Part 2: Key Geoscience Data Management Challenges

The 2017 survey gathered insight into the key challenges faced by geoscience organizations in regards to data management and accessibility. Respondents were asked to rank top challenges and their level of confidence in their organizations' handling of these challenges. Questions focusing specifically on time management and collaboration challenges were also included.

### Ranking the comparative importance of geoscience data management challenges.

This question laid out fundamental geoscience data management challenges, giving respondents the opportunity to rank each challenge in terms of the level of importance to their organization. For 2017 the format of this question was changed to a ranking question. This was in response to feedback from past respondents and provides further insight into the challenges faced. The inability to find all data through an integrated search tool was heavily ranked as the most important challenge with data security and confidentiality a close second (see figure 3). The level of importance given to each key challenge was consistent across all industries with government and energy organizations clearly ranking "integrated search tool" as the most critical challenge. "Support for Big Data" ranked on the lower end of importance for all industries.



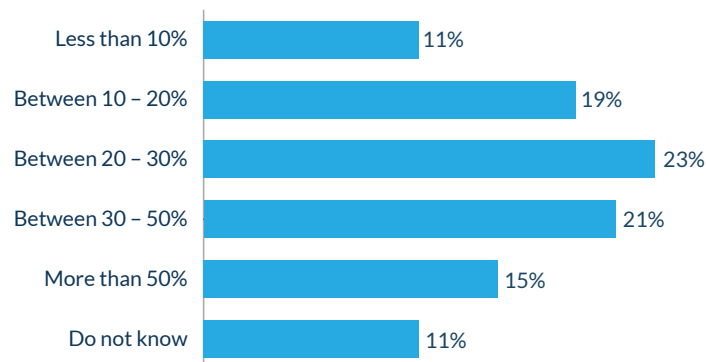
When we review responses by job role, we see certain roles order the importance differently, for example data administrators see getting access to knowledge experts to help in data management tasks as the biggest issue. Roles we would deem to be end users of data are most concerned with ensuring the availability of an integrated search tool for all data, while executives and managers place a higher need on data security and confidentiality than other roles.

### What percentage of geoscientists' time is spent on data management tasks?

A key challenge in the management of geoscience data is the large amount of time that organizations invest in related tasks. As a result, data management is often seen as inefficient and time consuming.

The survey aimed to gauge how much time organizations are dedicating to geoscience data management. Results show that 36% of respondents believe that geoscientists in their organizations are spending at least 30% of their time on data management tasks (see figure 4). These results were consistent with the 2015 survey.

**Figure 4: Time Spent on Data Management Tasks**



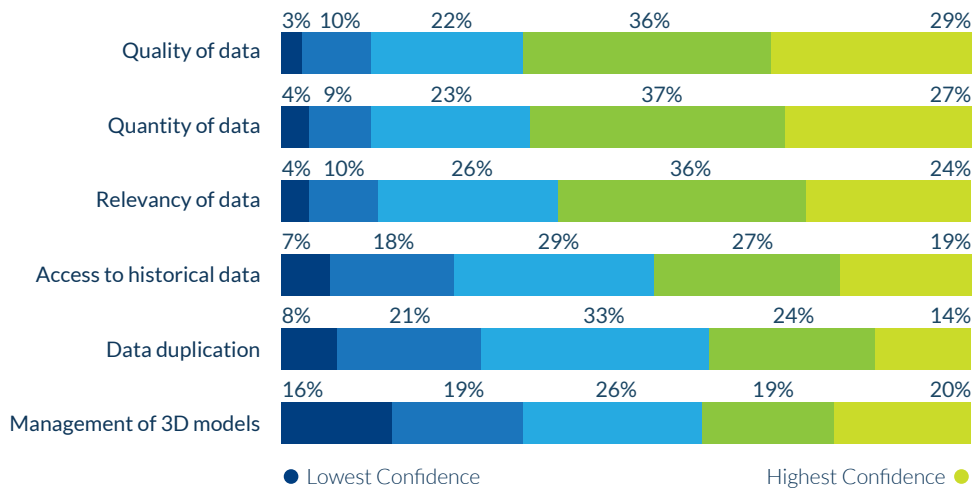
With such a significant amount of time being invested in these activities, there is clearly an opportunity cost here for these organizations. If they were able to shift even 10% of their geoscientists' time away from data management tasks they would be able to free up time and resources for interpretation and analysis.

It is interesting to note that the number of "we do not know how much time is spent" responses decreased 12% from 23% in 2015. As geoscience data management continues to be a critical issue for 80% of respondents, it could be that it is out of necessity that organizations are doing a better job understanding where and how time is spent when managing geoscience data.

### Ranking confidence levels in the handling of data management challenges.

This question probed how confident respondents feel their organization is in the handling of different data management challenges. Confidence around the "quality" and the "quantity" of geoscience data remains high and consistent with the 2015 survey, with over 64% of respondents quite confident in the handling of these areas. These observations hold true for all industries and job roles (see figure 5).

**Figure 5: Level of Confidence in the Handling of Data Management Challenges**



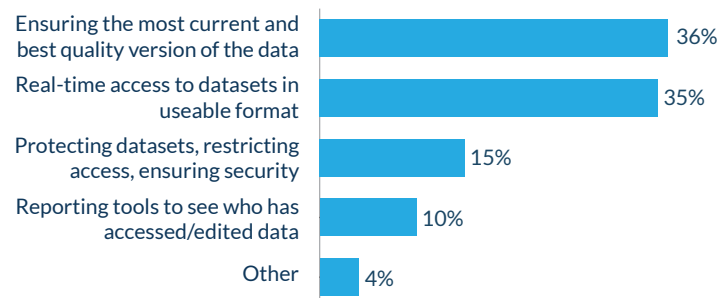
Management of 3D data stood out as an area where respondents have the lowest level of confidence. These concerns were felt by all industries and all roles, indicating that this challenge is top of mind for those managing geoscience data and may be of interest for further analysis.

Respondents were also less confident in their organization's handling of data duplication and access to historical data. Those within government organizations continue to have the most concerns around historical data, a similar finding to the 2015 survey.

### What are the biggest challenges when collaborating on project data?

Two key challenges stand out when considering collaborating on project data with consultants, contractors, team members, joint ventures etc. These are ensuring the most current and best quality version of data is being used, and providing this in real time in a usable format (see figure 6).

**Figure 6: Challenges Collaborating on Active Project Data**



Energy and mineral resources organizations put more emphasis on real-time access to data when collaborating, while government and other organizations are concerned about having the most current and best quality version of the data when collaborating.

In terms of job roles, having the most current version of the data when collaborating was consistently selected as the biggest challenge across all job roles. Geophysicists and geologists also felt that real-time access was a notable challenge and a significant group of geochemists reported that developing reporting tools is a challenge.

The free-text "other" comments highlight real-time integration and interoperability as a challenge when looking at collaboration.



## Part 3: Barriers to Geoscience Data Management Success

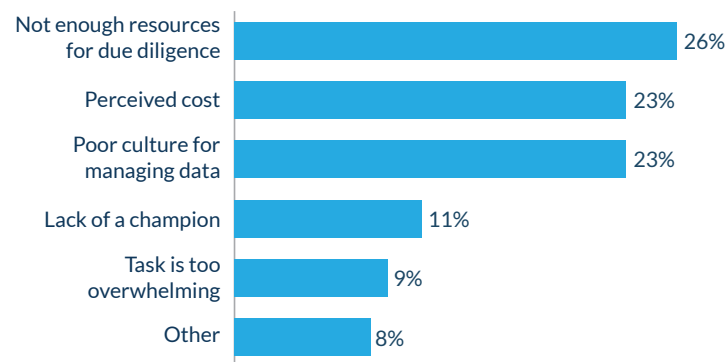
Given how critical and complex the issue of data management is, geoscience organizations face various obstacles when trying to overcome data management and accessibility challenges. In past surveys respondents have been asked which obstacles concern them specifically when working to maintain and populate a data management solution. Based on feedback from the 2015 survey, a new question was added, which takes a step back to address the obstacles geoscience organizations face when making the initial decision to select and implement a solution.

### What are the main challenges when selecting and implementing a geoscience data management solution?

This is a new question for the 2017 survey, aiming to gain an understanding of the obstacles faced by geoscience organizations when implementing a data management solution. The lack of dedicated resources to complete thorough due diligence, perceived cost, and poor culture for managing data were top concerns, all similarly ranked.

“Lack of a champion to sell the importance or secure budget” accounted for a low percentage (only 11%), which may indicate that this is not a major obstacle to success (see figure 7). This is aligned with the data, which shows that geoscience organizations, including their internal champions across various job roles, are placing critical importance on data management. It could also be noted that often key challenges such as cost, lack of resources, and poor culture could all be a result of the lack of a champion.

**Figure 7: Biggest Challenge When Implementing a Solution**



In terms of industry groups, the lack of resources to complete due diligence is the main obstacle for government and energy organizations. For those identifying with the mineral resources industry, a poor (and hard to change) culture for managing data appeared to be much less of a concern than it does for the other industry groups. Respondents in the government group ranked perceived cost of implementing a data management solution significantly lower than all other industries.

Analysis by job role shows that the IT administrators group placed an extremely high level of importance on access to dedicated resources to complete due diligence, which may speak directly to the role they play in sourcing, selecting, and implementing a data management solution.

Across all industries and job roles, when looking at only those respondents who feel that data management is most critical (see figure 1 and figure 2), the survey results show that cost is not as much of an issue. For these respondents, the critical need to improve their organization's data management clearly outweighs the perceived cost of the solutions.

It should be noted that the mineral resources group had a significant number of “other” challenge responses for this question, which included free-text entries such as perceived lack of need, a high volume of data, and differing priorities.

### What is most important when thinking about maintaining and populating a data management solution?

Participants in the 2017 survey responded that the “complexity of integrating existing data silos” and the ability to secure “time and resources to fully populate the data management solution” were the main obstacles they are concerned with (see figure 8).

**Figure 8: Most Important When Maintaining a Data Solution**



When looking at industry responses, those in energy organizations placed a significantly high level of importance on looking at the complexity of integrating existing data silos while the educational institutions placed the highest amount of importance on finding data managers to oversee the solution, which is likely reflecting their limited resources. It can be noted those identifying as IT administrators also placed a high level of importance finding data managers. The cost of maintaining and populating the solution also continues to be an important issue across all industries and job roles.

In the 2017 survey “adherence to your standards, policies, or best practices” was introduced as a new survey response option. This new option received 15% of the total number of responses with all industries showing similar percentages. It was found that data administrator roles place a higher level of importance on this option than any other job role group, which is consistent with their priorities.

Approximately half the geochemist and petrophysicist roles within mineral resources and energy organizations see the biggest concern as a lack of time and resources. This likely reflects the limited number of these resources within organizations, the critical importance of these data types, and the pressure they feel to maintain their data management practices for this data.

## Part 4: Overcoming Geoscience Data Management Challenges

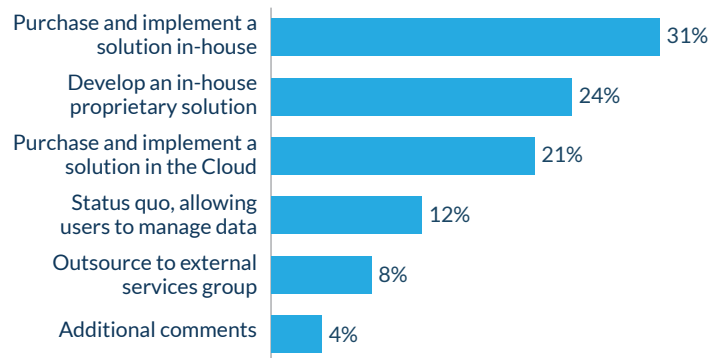
The 2017 survey included a number of questions around how geoscience organizations are currently overcoming or working to overcome various data management challenges. Respondents were asked about their preferred approach to addressing data management and accessibility challenges as well as what they deemed to be the most important outcome in resolving the key challenges.

Based on feedback from the 2015 survey two new questions have been added to this section on the topic of leveraging the Cloud to address data management challenges. Respondents were asked about their level of readiness to leverage the Cloud as well as the main obstacles perceived or faced when choosing this approach.

### What are the preferred approaches to addressing key data management challenges?

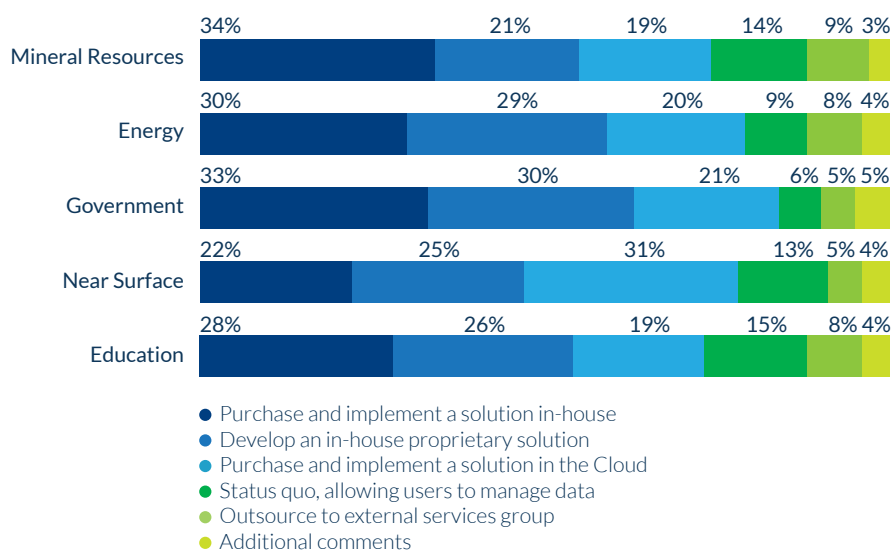
In terms of preferred approaches to addressing data management challenges, most respondents prefer to purchase commercial solutions (31%) versus developing in-house proprietary solutions or outsourcing the service (see figure 9).

**Figure 9: Approaches to Solving Data Management Challenges**



All industry groups are similar in terms of their likelihood to purchase commercial solutions with educational institutions responding slightly lower (see figure 10). Government and energy organizations were the most likely to develop solutions in-house and the least likely to continue with the current status quo.

**Figure 10: Approaches to Solving Data Management Challenges by Industry**



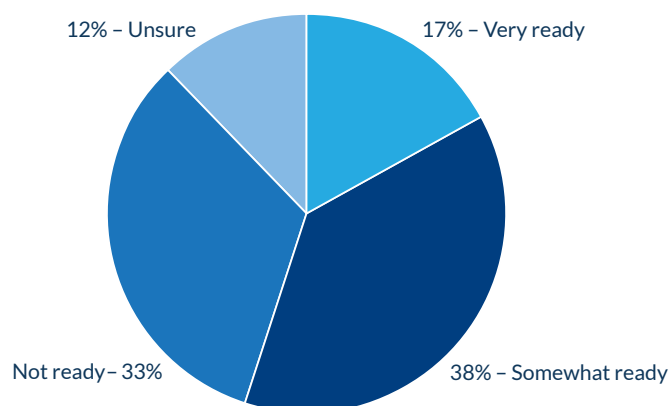
In terms of outsourcing to external service groups or solutions, all industries are similar in terms of their low likelihood to choose this option (5-9%). That being said, the percentage of respondents that selected outsourcing as their preferred approach to solving data management challenges doubled from the 2015 survey.

A number of free-text “other” response options noted the preferred approach being a combination of commercial and in-house solutions as well as various forms of open-source tools. As the use of “open-source” appears within the other category of this question more than in our previous surveys, it seems this is a topic of interest for the 2017 survey respondent group.

### How ready are geoscience organizations to leverage the Cloud for data management and access?

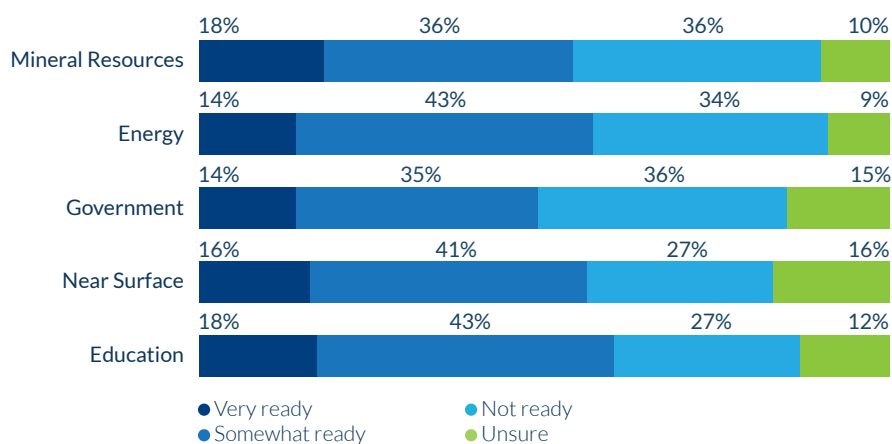
The 2017 survey included a new question around geoscience organizations’ level of readiness to leverage the Cloud for data management and access. The survey showed that 55% of respondents feel they are “very ready” or “somewhat ready” to leverage the Cloud for geoscience data management, while a significant percentage of respondents (33%) responded that they are “not ready” (see figure 11).

**Figure 11: Readiness to Leverage the Cloud**



All industry groups responded fairly similarly in terms of being very ready or somewhat ready to leverage the Cloud (see figure 12) with government groups (49%) being the least ready and educational institutions being the most ready (61%). Both government and near surface organizations had high percentages of “unsure” responses.

**Figure 12: Readiness to Leverage the Cloud by Industry**



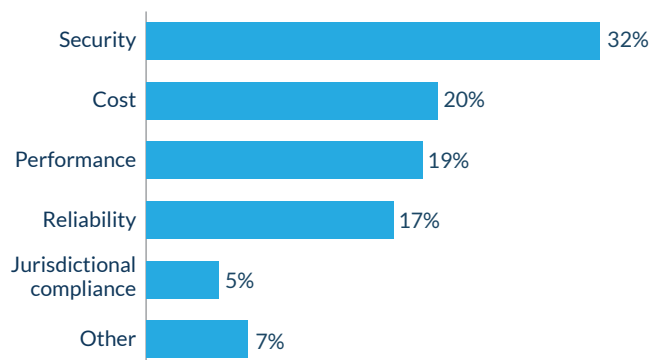
It is interesting to note that the size of the groups of organizations within government and mineral resources that responded as “somewhat ready” and “not ready” are almost exactly the same, showing an almost even split in opinions on this matter.

When looking at job roles, executives and managers are more likely to be ready to leverage the Cloud than data and IT administrators, with 48% of data and IT administrators responding that they are not ready.

### What is the main challenge in leveraging the Cloud for geoscience data management?

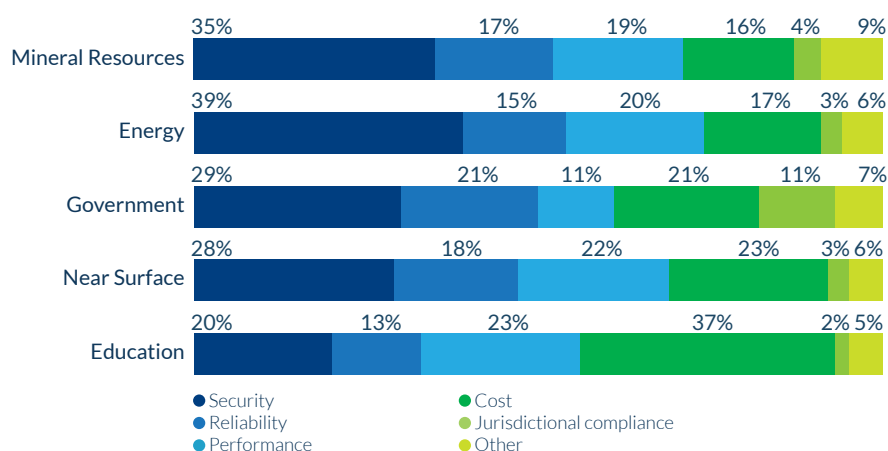
For the 2017 survey a new follow-up question was added which asked respondents what their biggest challenges are when leveraging (or considering) the Cloud for geoscience data management and access. Security was by far the most common challenge selected with cost, performance and reliability all having similar response rates (see figure 13).

**Figure 13: Biggest Challenge When Leveraging the Cloud**



For mineral resources and energy organizations security was the biggest challenge, while educational institutions responded that cost was by far the biggest challenge faced when looking to the Cloud for data management (see figure 14). Government industry groups and executive/manager/owner job roles found jurisdiction compliance to be the biggest concern while IT administrators were dominantly worried about cost. Predictably, roles we associate with being end users working with the data were concerned about the performance of cloud solutions.

**Figure 14: Biggest Challenge When Leveraging the Cloud by Industry**



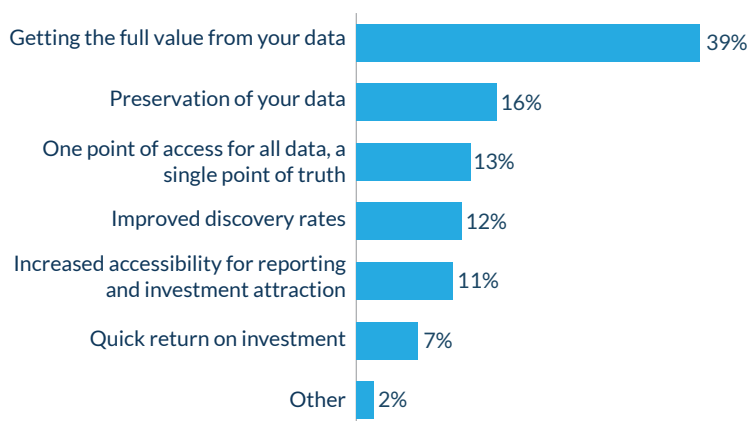
This question resulted in many comments with respondents indicating additional challenges in their free-text comments including lack of access to sufficient internet connectivity, lack of buy-in from decision makers, inability to satisfy internal regulations, as well as a combination of the challenges provided.

## What are the most important outcomes expected from resolving geoscience data management and accessibility issues?

The survey closed by asking respondents what they feel is the most important outcome they would expect from resolving data management and accessibility issues. New answer options were added for 2017 based on feedback and comments from past surveys. The new options included “getting the full value from data”, “data preservation”, and “one point of access for all data”.

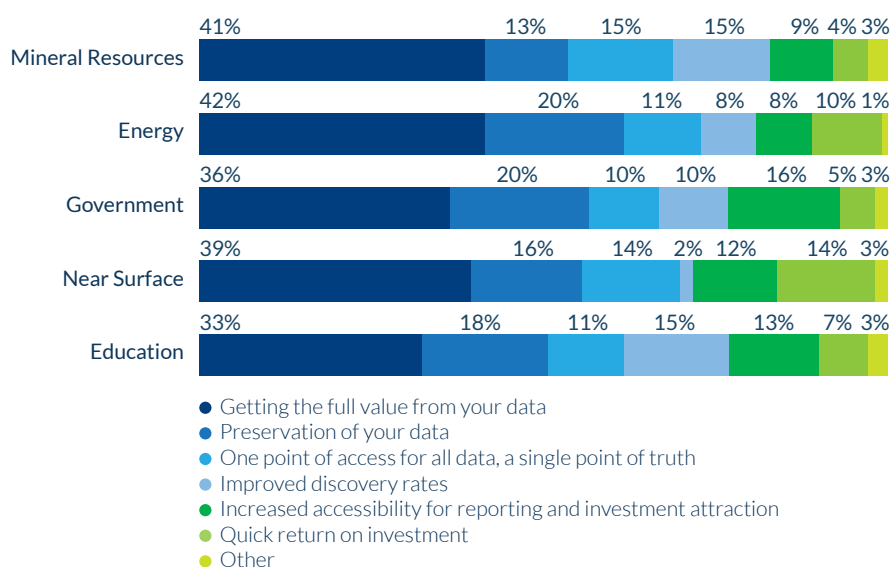
“Getting the full value from your data” was overwhelmingly the most popular desired outcome in 2017 with almost 40% of all respondents choosing this option (see figure 15). This holds true across all industry and job role categories.

**Figure 15: Desired Outcome From Resolving Data Management Issues**



The next most popular outcome “preservation of data” was selected fairly consistently across all industry groups with government and energy organizations the most likely to select this outcome (see figure 16).

**Figure 16: Desired Outcome From Resolving Data Management Issues by Industry**



The near surface organizations had a very low percentage of respondent selecting “improved discovery rates” as an important desired outcome. This is expected given that these industry groups are not typically using geoscience data for “discovery/extraction” in the traditional sense.

Data and IT administrators as well as GIS specialist job roles also had low response rates for the “improved discovery rates” answer option which is self-explanatory given the nature of their role in the geoscience organization. Exploration managers proved to be twice as likely to select “improved discovery rates” than other roles such as geologists and geophysicists who were most concerned with the preservation of the data. IT administrators (22%) were significantly more likely to select “increased accessibility for reporting and investment attraction” as their most important desired outcome.

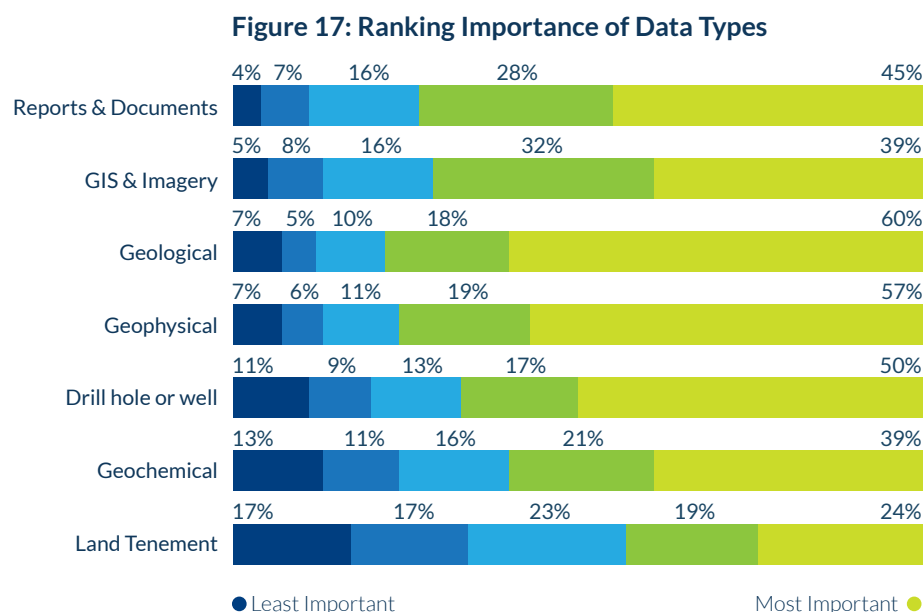
In terms of other desired outcomes, the free-text comments for this question included a number of “all of the above” or “a combination of the above” responses. Other desired outcomes submitted in the free-text answer field include increased efficiency and ease of interpretation.

## Part 5: Managing a Breadth of Geoscience Data

Geoscience organizations manage a breadth of data, documents, and images across many domains. The 2017 survey aimed to gauge the level of importance placed on various data and document types within the respondents’ organizations as well as determining how these organizations are currently managing four specific key data types.

### Ranking the comparative importance of various data types.

The 2017 survey asked respondents to rank various data types in terms of importance for their organization. As with past surveys, the top three most important data types were geological, geophysical, and drill hole or well data (see figure 17). The importance of geological data increased by 7% in 2017 while drill hole and well data dropped by 5%.



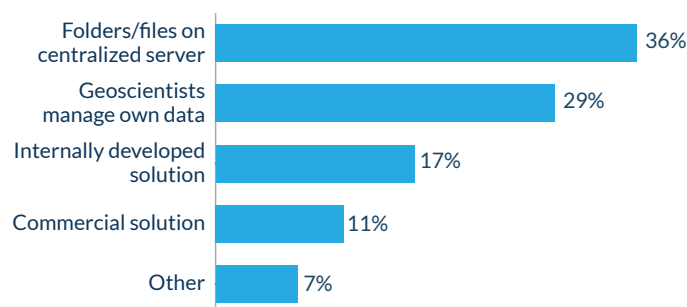
Land tenement data continues to have the least amount of importance placed on it as this user profile is an underrepresented survey respondent group. In support of this finding, it can be seen that executives and managers (typically non-users) place more significance on land tenement data than other job roles and they account for only 14% of the total response group.

### How are drill hole and geological data currently managed?

The majority of participants in the 2017 survey continue to manage their drill hole and geological data via a folder or file structure on a centralized server versus reporting the use of a commercial solution.

The number of organizations relying on their geoscientists to manage their own data grew a small amount in 2017 (as it did in 2015), while the use of commercial solutions and folder or file structures has decreased a small amount (see figure 18).

**Figure 18: Management of Drill Hole and Geological Data**



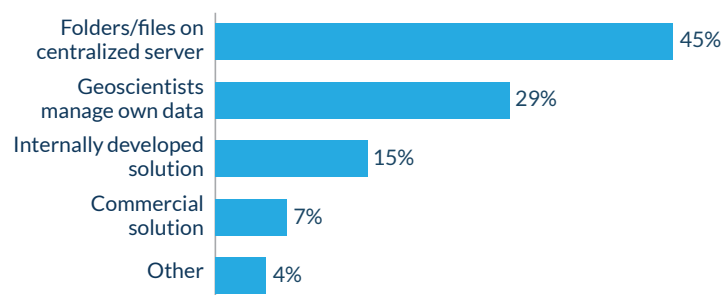
In terms of the different industry groups, government organizations are the most likely to use a solution developed in-house. The mineral resources groups tend to leverage commercial solutions the most, while none of the educational institutions responded that they currently use commercial solutions.

A large number of free-text responses were entered under “we use a commercially available solution” and “other”. These responses indicated the use of a combination of the available answer options, most of which included a commercial solution.

### How are geophysical and other geoscientific data currently managed?

Almost half of the participants in the 2017 survey are leveraging a folder or file structure on centralized servers to manage their geophysical and other geoscientific data, with a small percentage currently leveraging a commercial solution (see figure 19).

**Figure 19: Management of Geophysical and Other Geoscientific Data**

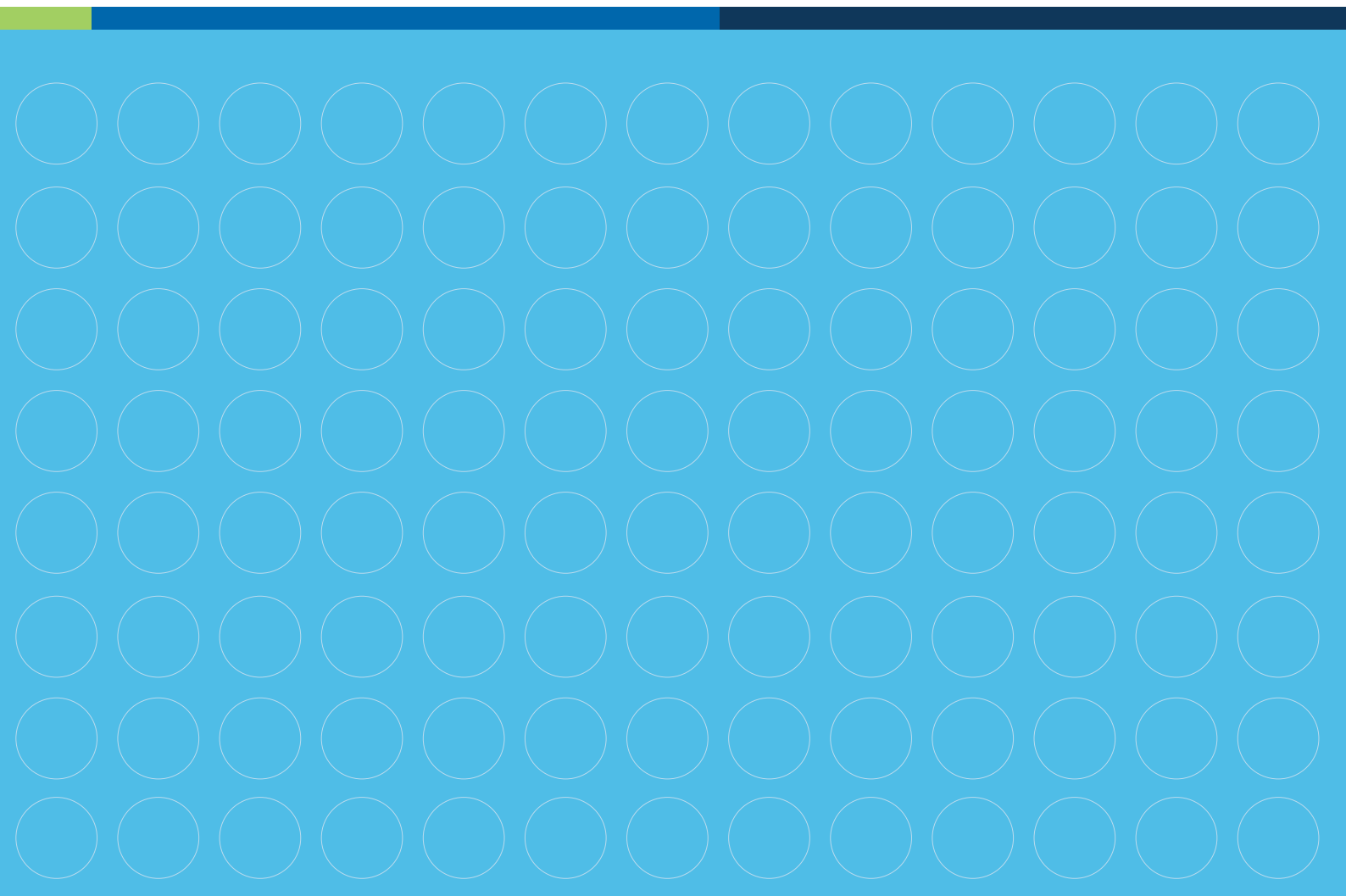




As in the previous question, a large number of free-text responses were entered under “we use a commercially available solution” and “other”. These responses indicated the use of a combination of the available answer options, most of which included a commercial solution, similar to the previous question around drill hole and geological data.

In terms of industry responses, ~25% of all organizations with the exception of educational institutions, reported that geoscientists are independently managing their own project data. The education groups rely much more heavily than the others on individual geoscientists managing their own data (73%).

It is interesting to note that 20% more government organizations are leveraging a folder or file structure for their geophysical data than for their geological data. It was also found that 10% more mineral resources groups are using commercial solutions for their drill hole and geological data than for their geophysical data.



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