2023 State of Science Communication Report

Insights from 162 industry and academic scientists on the importance, consequences, and business benefits of visual communication

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Ninety-six percent of scientists agree that visual communication is critical to communicating science effectively

Introduction

Visual communication is critical in life sciences research for accelerating research, improving knowledge transfer, gaining regulatory approvals, improving doctor and patient education, and securing grants and funding. Over the past decade, digital tools and online platforms have led to more sophisticated and interactive scientific visualizations, with greater accessibility and dissemination to a wider audience.

To help organizations better understand the impact of science communication, BioRender's inaugural "2023 State of Science Communication Report" explores how clear communication supported by effective visuals is critical for scientific research success, and highlights the benefits and challenges involved. From a survey of 162 scientists*, this report provides insights into the important role effective communication and scientific visuals have in advancing research in academia and industry.

Visuals are critical to effective science communication

94%
of **Industry** agree visual communication is critical to communicating science effectively

98%
of **Academia** agree visual communication is critical to communication science effectively

96% of scientists agree that visual communication is critical to communicating science effectively

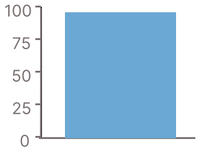
Consequences of science being misunderstood

72%
of **Industry** responded research projects are stalled or canceled

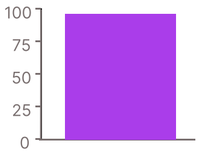
74%
of **Academia** responded lower likelihood of acceptance in journals

Poor scientific communication can lead to stalled or canceled research and publication rejection

Impact on publications and grants



97%
of **Industry** think strong scientific visualizations help with publication approval and/or receive grants



98%
of **Academia** think strong scientific visualizations help with publication approval and/or receive grants

Effective scientific visualizations can increase the success rate of receiving grants and publication approval

*excluding respondents indicating "not applicable"

Satisfaction with scientific illustration software BioRender

91%
of **Industry** are extremely satisfied or satisfied with BioRender

84%
of **Academia** are extremely satisfied or satisfied with BioRender

Scientific visuals are widely used by scientists yet time-consuming to create. BioRender leads software vendors in both quality and satisfaction.

*See the appendix for additional details about the survey and segmentation of survey data

Industry (n=82) Academia (n=80)

Section 1

The Importance of Effective Science Communication

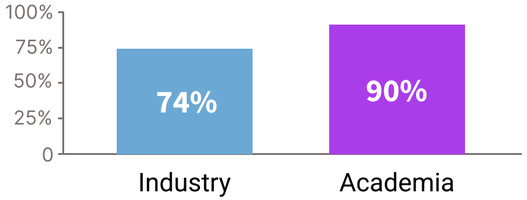
Driving Collaboration, Research Acceptance, and Funding Opportunities

Scientific communication is highly valued by organizations; 79% of scientists believe that it leads to improved collaboration and higher quality decision-making. Visual communication is particularly critical to effective scientific communication; 96% of respondents agree or strongly agree on this point. Clear scientific communication can also lead to greater acceptance from journals and additional funding opportunities. Effective communication is critical because it allows researchers to share their findings, receive feedback, and ultimately contribute to the advancement of knowledge in their field.

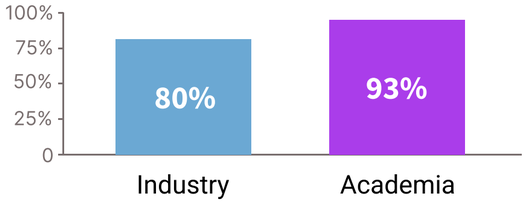
Perceptions of Scientific Communication

Question: To what extent do you agree or disagree with the following statements?

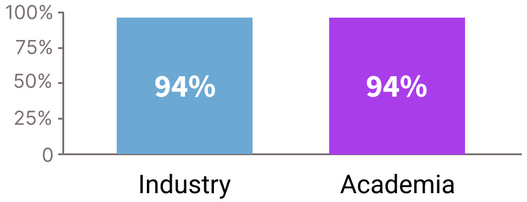
(Respondents that agree or strongly agree)



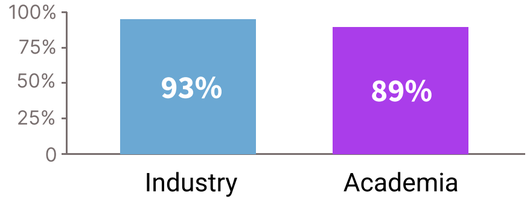
Great scientific communication can lead to more grants



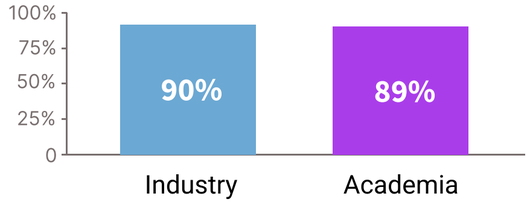
Great scientific communication can lead to higher acceptance from journals for publications



Great scientific communication improves cross-functional research



Improved scientific communication leads to improved decision-making and faster, higher quality decisions within research teams and departments



Improved scientific communication can improve productivity

> **The dissemination of research findings is essential to the validation and impact of research, and if the results are not communicated clearly and effectively, they may be misunderstood, ignored, or even dismissed.**
>
> — CRO Director of Research

Industry (n=82) Academia (n=80)

Section 2

The Implications of Poor Communication in Scientific Research

Consequences of Scientists' Work Being Misunderstood or Misinterpreted

Research findings indicate that poor communication in scientific research can lead to a range of negative implications including stalled or canceled research, reduced collaboration, and decreased publication acceptance. When research is misunderstood, it can be difficult to communicate key points, share research, and communicate with leadership and cross-functional teams.

Perceptions of Scientific Communication

What are the implications to you as an individual scientist if your work is misunderstood or not received well?

Industry Scientists

72%
research projects are stalled or canceled

76%
difficulty communicating with leadership

78%
difficulty communicating key finding

Academic Scientists

74%
lower likelihood of acceptance in journals

75%
lower likelihood of collaboration

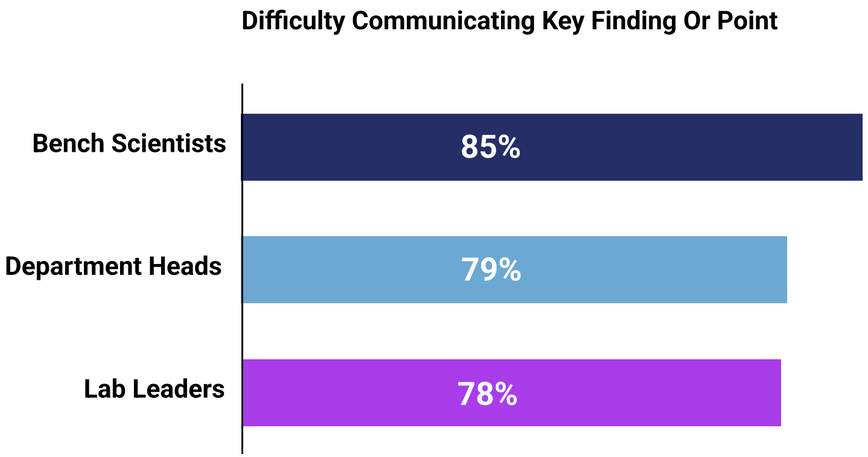
60%
research projects are stalled or cancelled

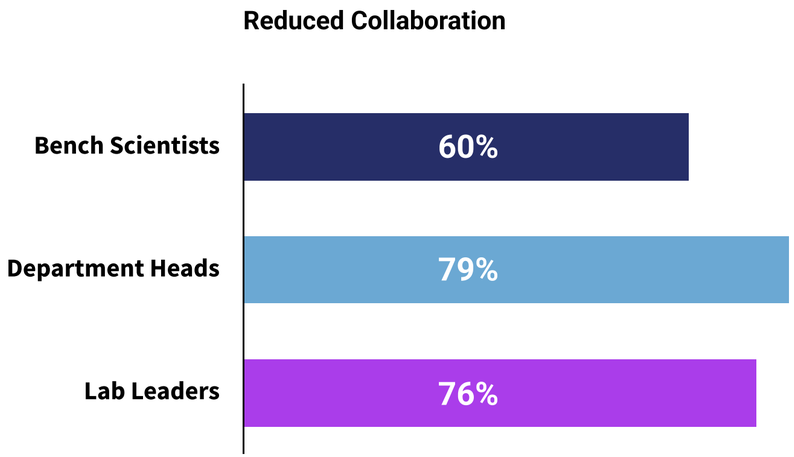
Industry (n=82) Academia (n=80)

Section 2

In total, 70% of industry respondents indicated a consequence of poor communication results in longer times to make decisions. As a result, disseminating research findings can be difficult and may require a tailored approach for different audiences.

There are also communication implications across different roles in the lab. Scientists face challenges collaborating with others and also have difficulty communicating key findings. The research indicates that effective communication is essential at every stage of the research process in order to avoid these negative implications and ensure the success of scientific research.





> If you can't communicate what you're doing there's no point in doing science. The research is funded by the government/ outside groups, so they deserve to know what the work product is — and understand it. — Academia, Principal Investigator

Bench Scientists (n=55) Department Heads (n=19) Lab Leaders (n=87)

Section 3

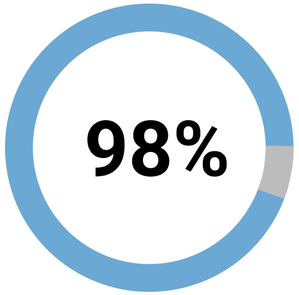
Business Benefits of Clear Scientific Visualizations

Visualizations are a Powerful Tool for Business Success in Research and Development

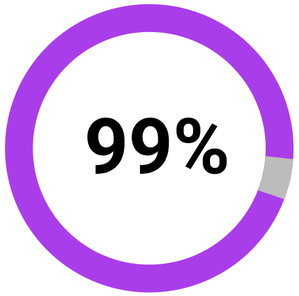
Survey participants responded that scientific visualizations offer numerous benefits to their business, lab, or department, including increased success rates in securing funding and grants, and stakeholder alignment and approvals. It is also clear that effective communication is very valuable for scientists; 98% of respondents indicated that it is essential for their work to be understood by their audience.

How VALUABLE to you as an individual scientist, is communicating your work so that it is understood by your audience?

(Ratings ≥ 6 on a 1-10 scale)

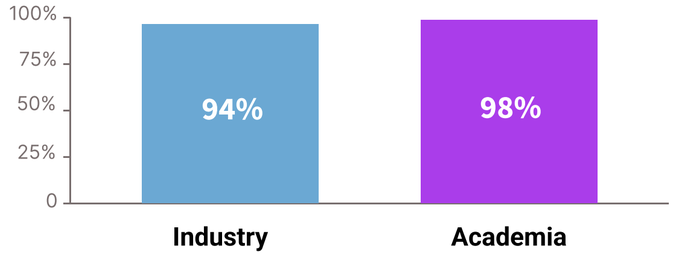


Industry

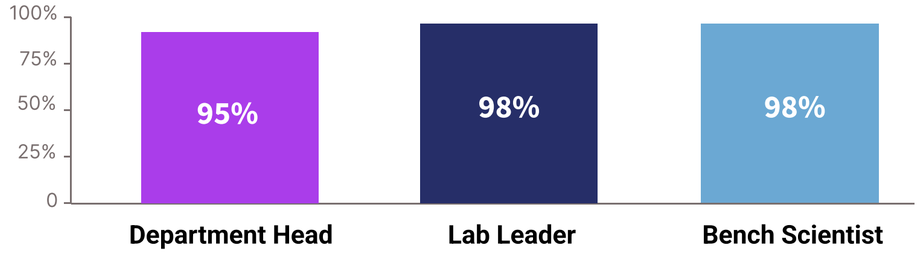


Academia

Agree that visuals are critical to effective science communication



Importance of scientific visualizations for effective communication



Industry (n=82) Academia (n=80) Bench Scientists (n=55) Department Heads (n=19) Lab Leaders (n=87)

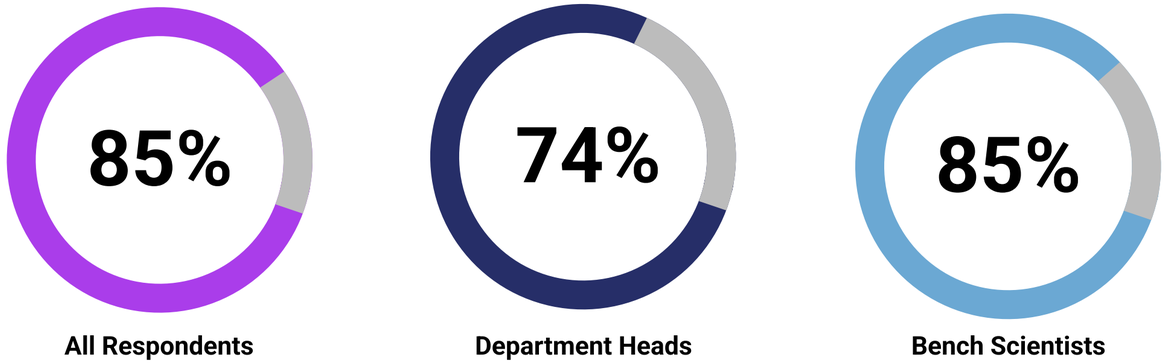
Section 3

Appealing figures can improve the marketability of research, while figures that are difficult to read or understand are likely to drive readers' interest away. As one respondent put it, "*seeing is believing*," underscoring the importance of visual representations in conveying scientific information effectively.

> **The benefits include an easier acceptance and understanding of the data and easier to obtain positive support, including increased resource allocation to the project. This will lead to greater chance of project becoming commercially viable.**
> — Industry, Principal Investigator

Responses clearly show that scientific visualizations can have demonstrable business benefits. Visuals help align stakeholders, secure additional support, and obtain funding. By presenting scientific information in a clear and engaging manner, visualizations increase the chances of publication and grant approval, leading to greater success in the commercialization of scientific research.

Respondents who think that strong scientific visualizations can help get publication approval or receive grants:



In an open-ended survey question, there was one clear theme from industry respondents; effective visual communication leads to increased likelihood of commercial viability.

What do you think are the commercial benefits of scientific visualizations?

> **From a drug discovery company perspective, (visual communication) is how we can raise money and build investor and scientist confidence in our products.**
> — Industry, Principal Investigator

> **Scientific visualizations can be used to create training materials and educational resources that can help employees and customers to learn about complex topics in a more engaging and memorable way.**
> — Industry, Director of Research

> **Improved alignment with stakeholders and increased success rate of outcomes e.g. regulatory approval of investigational drugs, increased uptake of marketed drug by medical practitioners.**
> — Industry, Staff Scientist

All (n=162) Bench Scientists (n=55) Department Heads (n=19)

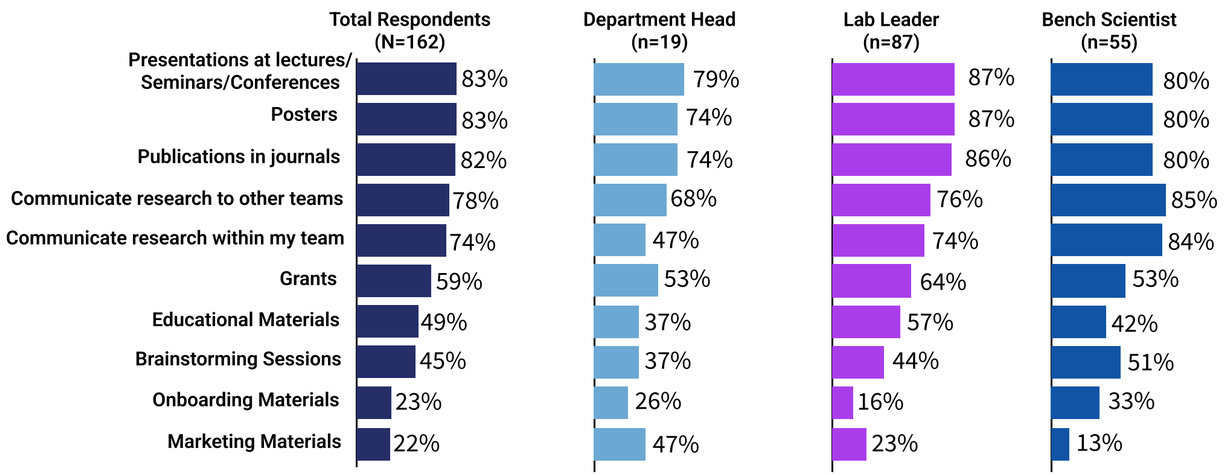
Section 4

The Use of Scientific Illustrations

The Role of Scientific Illustrations in Conveying Complex Concepts to Diverse Audiences

Scientific illustrations are widely used by respondents for various purposes, including presentations, posters, publications, grants, and team communication. The research also shows that lab leaders reported the highest use of scientific illustrations across most categories, followed by bench scientists and department heads.

Use of scientific illustrations by job function

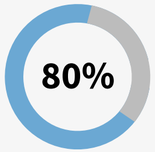


> **Appealing figures are likely to result in an improvement of the marketability of the research. Figures that are hard to read/understand are likely to drive readers' interest away.** — Academia, Professor

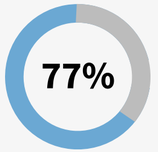
Industry respondents indicated a concentration of illustration usage at lectures, seminars, conferences, journals, and when communicating with other teams. Visuals are invaluable to researchers because they make their work apprehensible and noteworthy to a broader audience.

It is clear that visualizations play a significant role in scientific communication and are widely utilized by researchers in various functions for a range of purposes. By using illustrations, researchers can enhance the clarity and impact of their work, reduce unnecessary rework, and make their science more accessible and understandable to a broader audience.

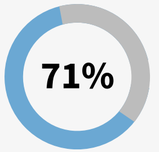
Industry:



communicate to other teams

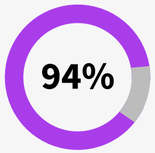


presentations at lectures, seminars, and conferences

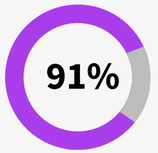


publications

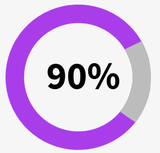
Academia:



publication in journals



posters



presentations at lectures, seminars, conferences

Section 5

Creating Scientific Visuals

Time-Consuming and Challenging, with Majority of Scientists Opting to DIY

As respondents from the survey indicated, visuals play a crucial role in scientific communication to ensure research is communicated clearly and effectively. While challenges exist in creating these visuals, user-friendly software can help mitigate these issues, leading to more effective scientific communication.

When it comes to creating scientific visuals, 68% of respondents typically take 30-120 minutes to create a single illustration. The amount of time it takes to create visuals is the most commonly experienced challenge in creating scientific illustrations, with 90% of respondents facing this issue.

Challenges when creating visuals for industry:

89%
illustration takes too much time

73%
illustration software is too difficult to use

71%
illustration creation is too complicated

Challenges when creating visuals for academia:

90%
illustration takes too much time

76%
illustration software is too difficult to use

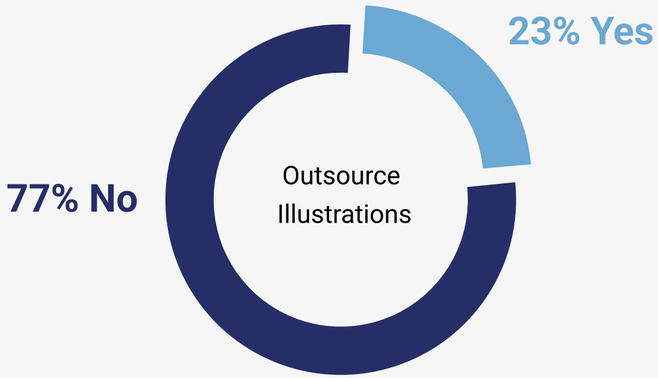
74%
illustration creation is too complicated

respondents indicating either “sometimes” or “always”

Industry (n=82) Academia (n=80)

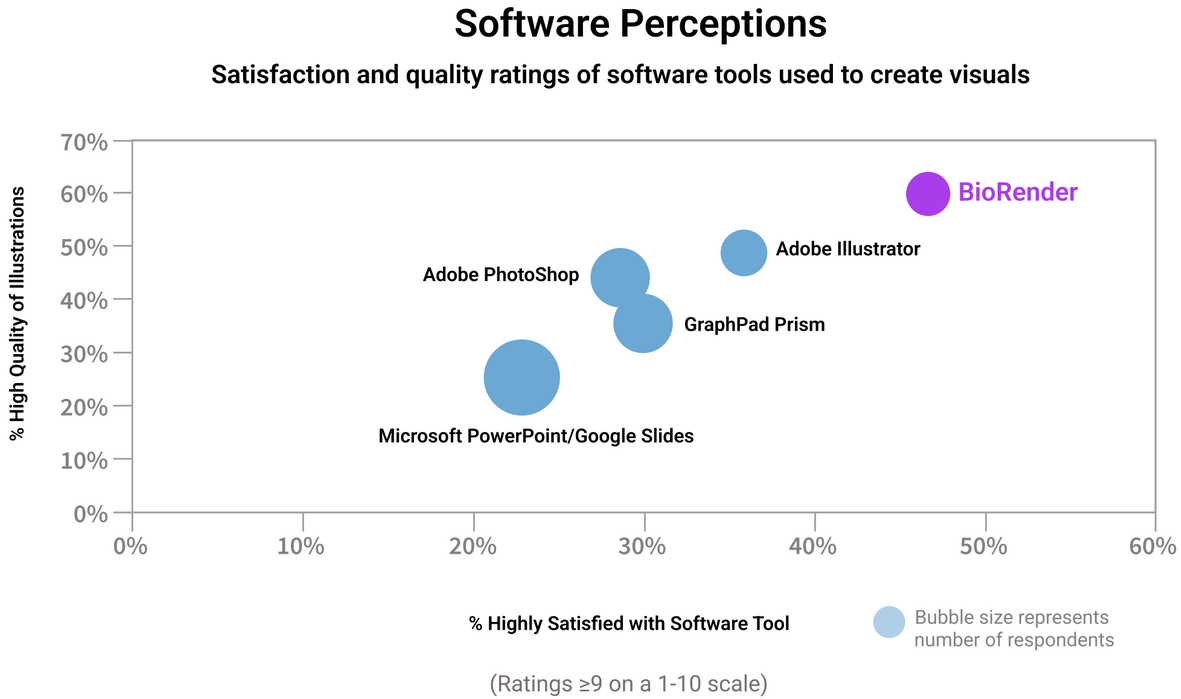
Section 5

Outsourcing the creation of illustrations is not a viable option as only 23% of respondents indicate working with a creative department or contractor for visuals. It is noteworthy that 76% of scientists who have outsourced illustrations indicate a range from $50 to $500 per illustration.



Due to resource constraints internally and the high cost of outsourcing to professional illustrators, the majority of scientists create their own visuals. When it comes to software available to assist in the creation of visuals, BioRender leads all software vendors in quality and satisfaction, while Adobe Photoshop and PowerPoint/Google Slides trail in both.

> **The consequence (of not using an illustration) being that we spent more time discussing data than otherwise would have been needed.**
>
> **— Industry, Staff Scientist**

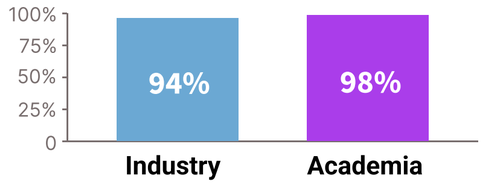


Respondents (n=162) See appendix for software details

Conclusion

Effective scientific communication is vital; 96% of scientists surveyed acknowledged the importance of visual communication. It enhances business outcomes by increasing funding success rates, stakeholder alignment, collaboration, and publication approvals. Poor communication, on the other hand, results in stalled or canceled research, limited collaboration, publication rejections, and difficulties in conveying key findings. Despite challenges in creating scientific visuals, BioRender helps overcome these obstacles, enabling more effective communication and reaping associated benefits.

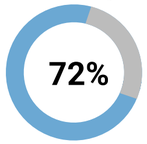
The Importance of Effective Science Communication



Agree that visuals are critical to effective science communication

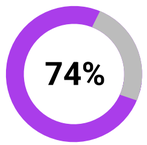
The Implications of Poor Communication in Scientific Research

Industry



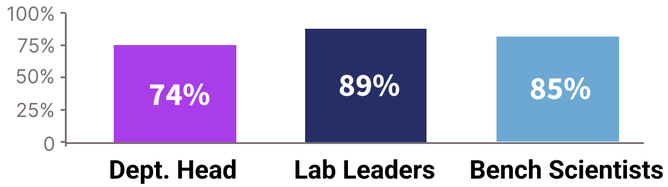
research projects are stalled or canceled

Academia



lower likelihood of acceptance in journals

Business Benefits of Clear Scientific Visualizations



Think that strong scientific visualizations can help get publication approval or receive grants

Challenges Creating Scientific Visuals

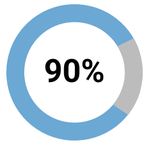
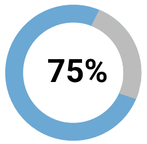


illustration takes too much time



software is difficult to use

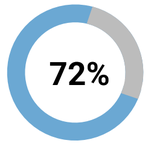
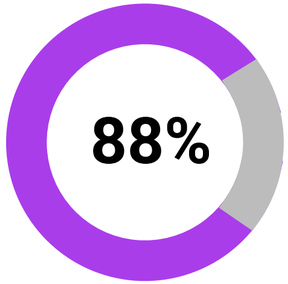


illustration creation is too complicated

BioRender helps overcome common obstacles, enabling more effective communication and reaping associated benefits



BioRender

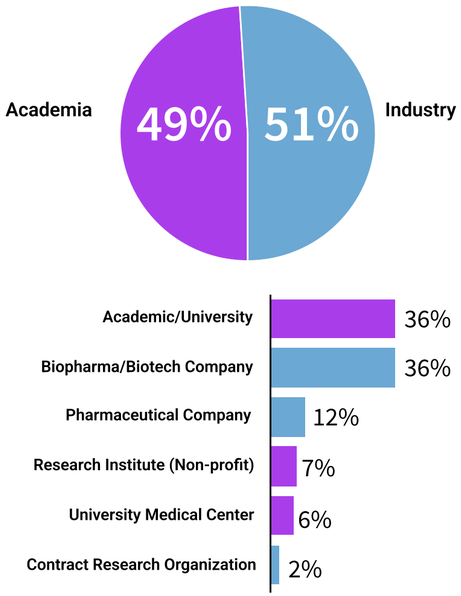
(Ratings ≥7 on a 1-10 satisfaction scale)

Appendix: About The Survey

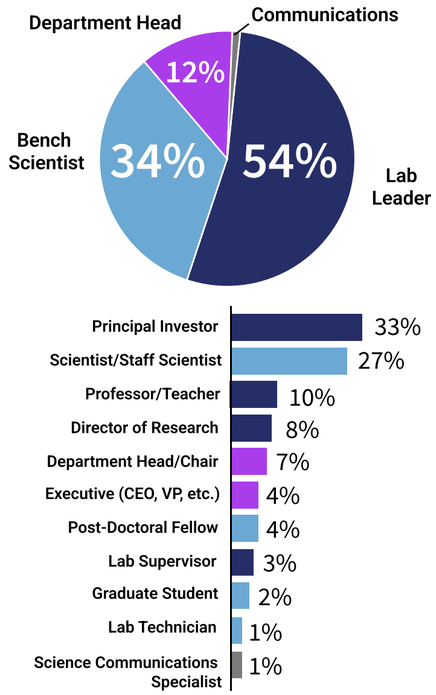
This report is based on responses to an online survey conducted by BioInformatics, part of Science and Medicine Group Inc. and commissioned by BioRender in 2023. This survey was made available to respondents in English. Qualification criteria for this report include North American, European life science respondents meeting the following criteria: must work in academia or industry and must be familiar with software tools for scientific visualizations.

Respondent Profile (N=162)

Market Segment

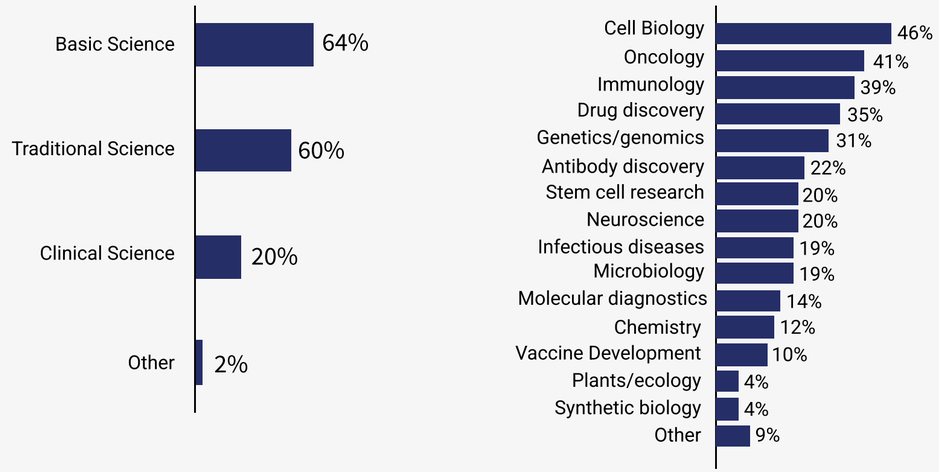


Job Function

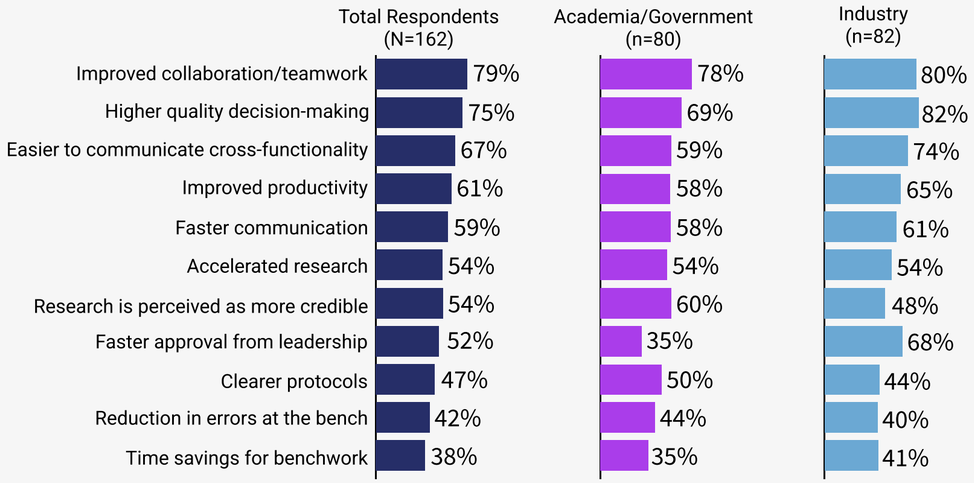


Appendix

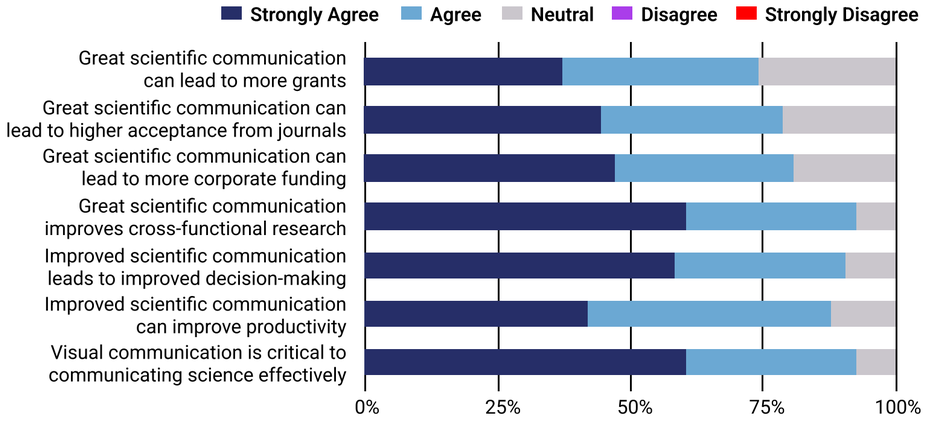
Research Type(s) and Area(s) (N=162)



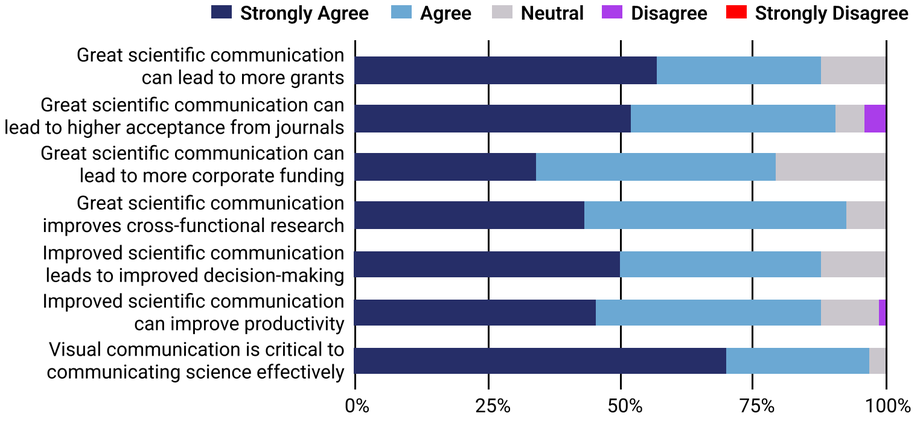
What do you think are the BENEFITS of clear scientific communication?



To what extent do you AGREE or DISAGREE with the following statements? (choose only one for each) Industry n=82

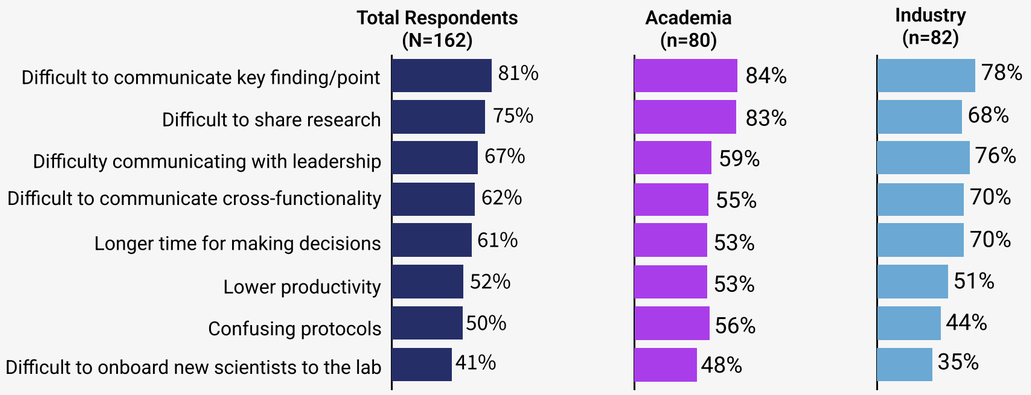


To what extent do you AGREE or DISAGREE with the following statements? (choose only one for each) Academia n=80

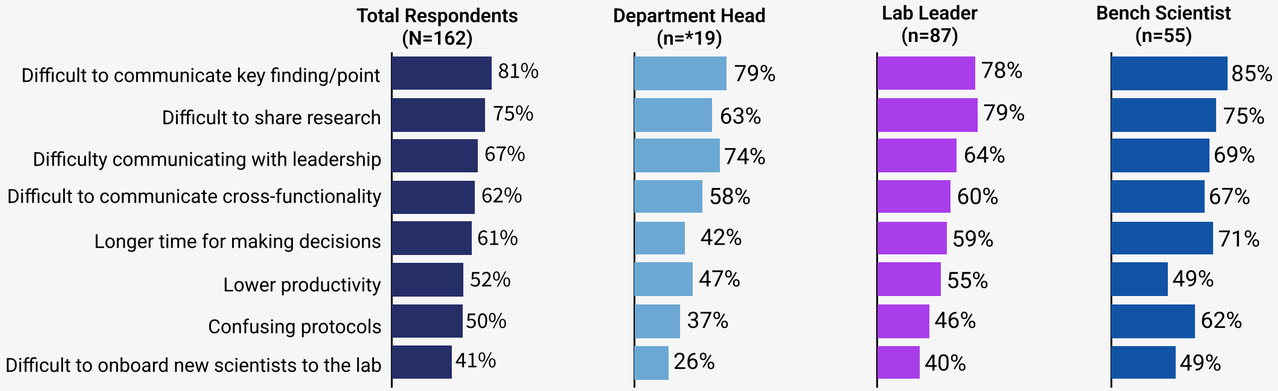


Appendix

What do you think are the consequences of poor scientific communication?



What do you think are the consequences of poor scientific communication?



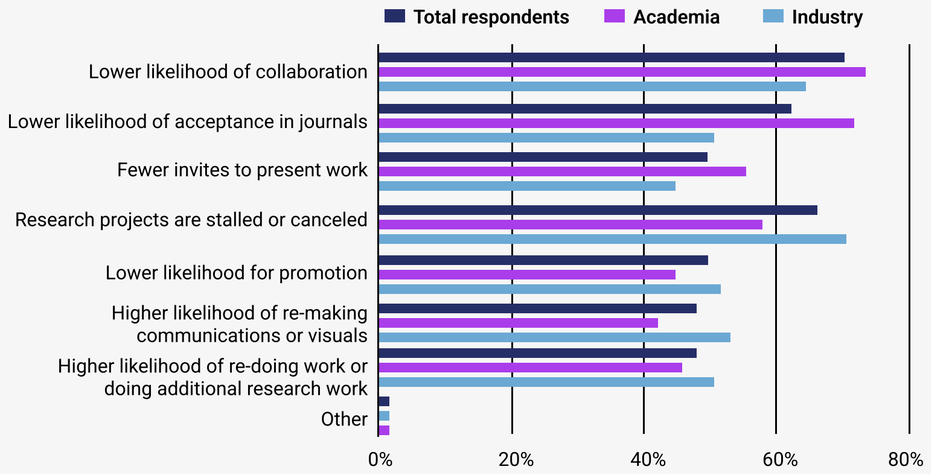
How VALUABLE to you as an individual scientist, is communicating your work so that it is understood by your audience?

	Total Respondents n=162	Academia n=80	Industry n=82
10 Extremely Important	58%	63%	54%
9	22%	18%	27%
8	14%	15%	12%
7	4%	4%	5%
6	1%	0%	2%
5	1%	1%	0%
4	0%	0%	0%
3	0%	0%	0%
2	0%	0%	0%
1	0%	0%	0%
0 Not At All Important	0%	0%	0%

How VALUABLE to you as an individual scientist, is communicating your work so that it is understood by your audience?

	Total Respondents n=162	Academia n=80	Industry n=82
10 Extremely Important	58%	59%	58%
9	21%	25%	16%
8	5%	10%	22%
7	11%	3%	4%
6	5%	1%	0%
5	0%	1%	0%
4	0%	0%	0%
3	0%	0%	0%
2	0%	0%	0%
1	0%	0%	0%
0 Not At All Important	0%	0%	0%

What are the implications to you as an individual scientist if your work is misunderstood or not received well?



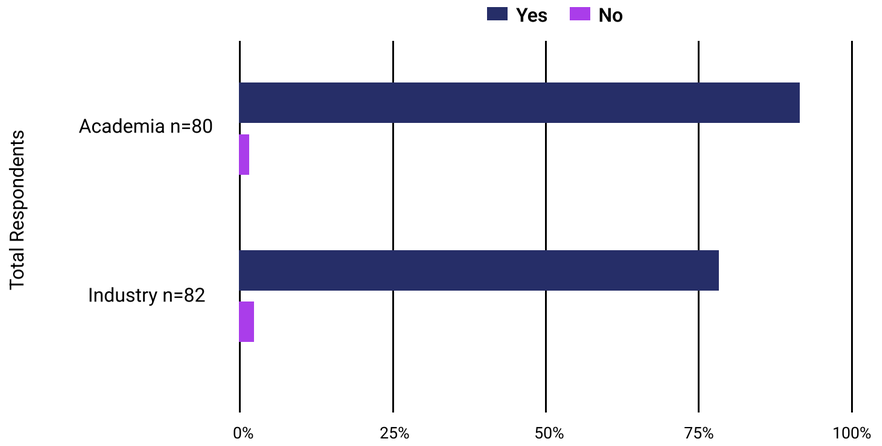
How IMPORTANT are scientific visualizations (figures and illustrations) for effective scientific communication? (choose only one)

	Total Respondents n=162	Academia n=80	Industry n=82
10 Extremely Important	50%	55%	45%
9	30%	30%	30%
8	13%	8%	18%
7	4%	5%	4%
6	2%	1%	2%
5	1%	1%	0%
4	0%	0%	0%
3	0%	0%	0%
2	0%	0%	0%
1	0%	0%	0%
0 Not At All Important	0%	0%	0%

How IMPORTANT are scientific visualizations (figures and illustrations) for effective scientific communication? (choose only one)

	Total Respondents n=162	Academia n=80	Industry n=82
10 Extremely Important	47%	52%	49%
9	26%	32%	29%
8	11%	10%	16%
7	11%	3%	4%
6	5%	1%	2%
5	0%	1%	0%
4	0%	0%	0%
3	0%	0%	0%
2	0%	0%	0%
1	0%	0%	0%
0 Not At All Important	0%	0%	0%

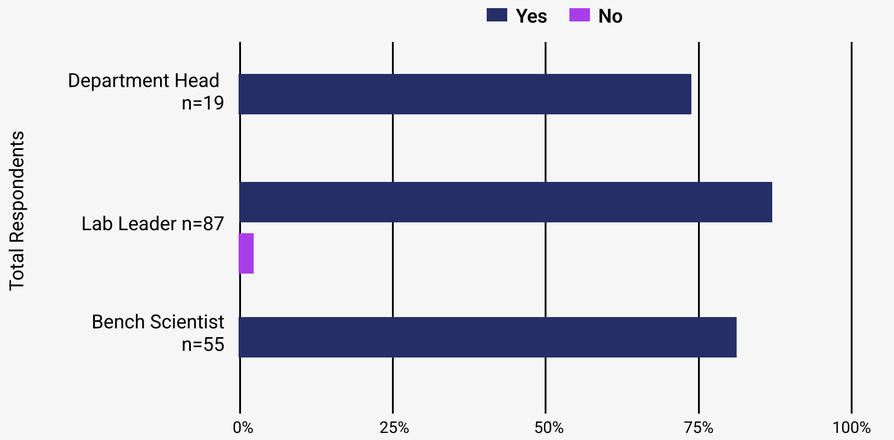
In general, do you think strong scientific visualizations (figures and illustrations) can help you get publication approval and/or receive grants? (choose only one)



NOTE: Respondents who selected “Not Applicable / Not sure” were excluded from analysis.

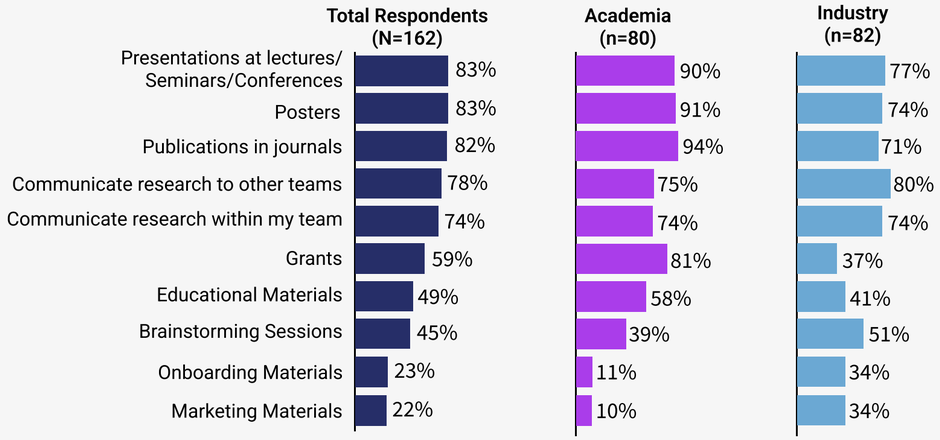
Appendix

In general, do you think strong scientific visualizations (figures and illustrations) can help you get publication approval and/or receive grants? (choose only one)



NOTE: Respondents who selected "Not Applicable / Not sure" were excluded from analysis.

How do you currently use the scientific illustrations that you / your lab creates?



From start to finish, what is the average amount of time it takes you to create a single scientific illustration? (choose only one)

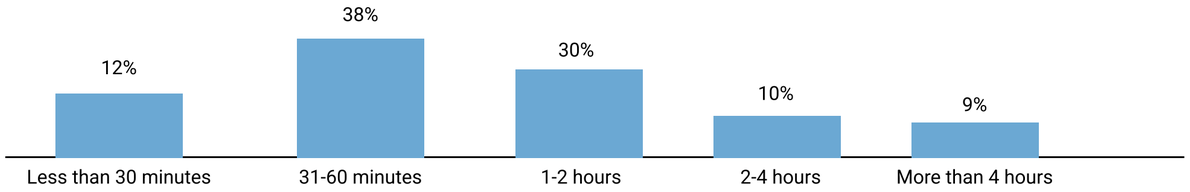
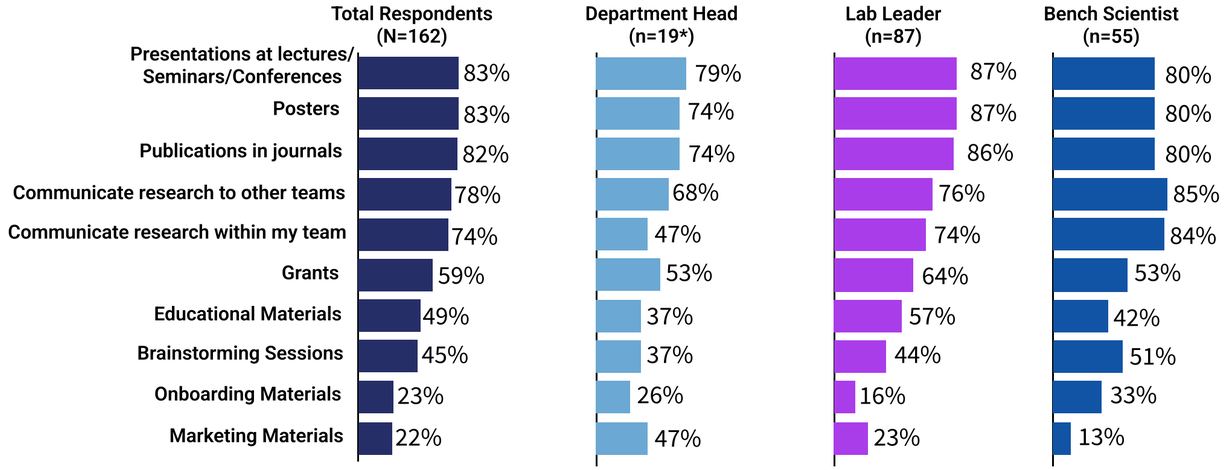
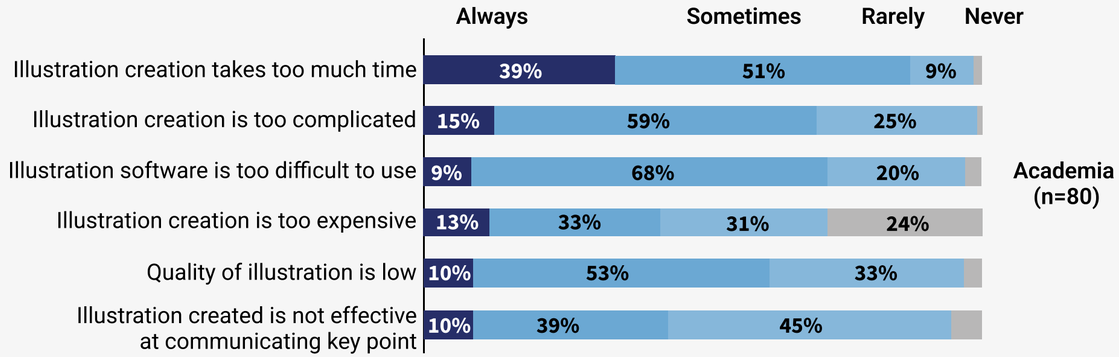


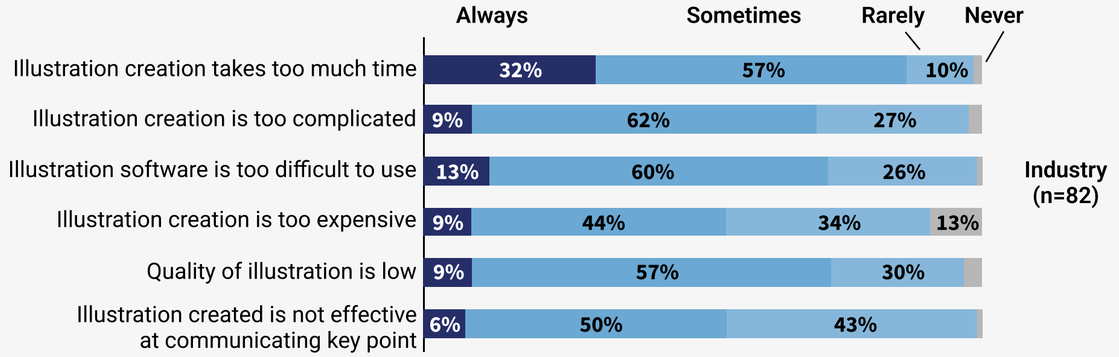
Illustration Usage by Job Function



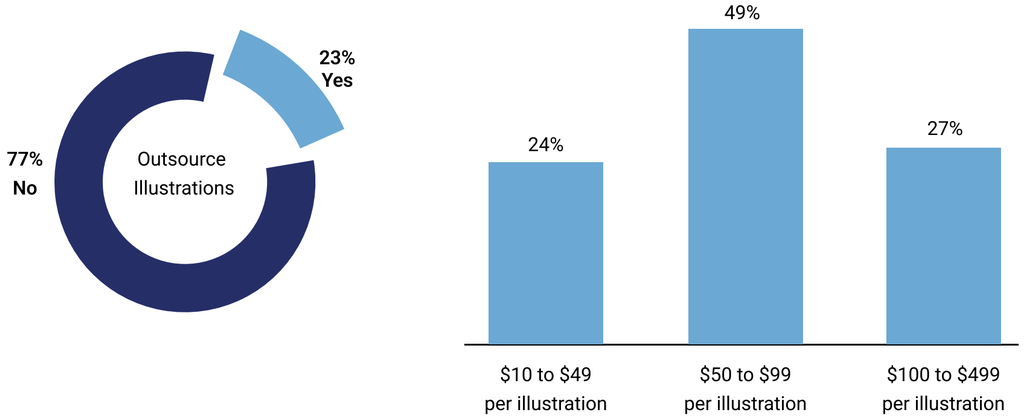
Appendix

How FREQUENTLY do you experience the following challenges when creating scientific illustrations?
(choose only one for each row)





How much do you budget for a single scientific illustrations?
(choose only one)



How SATISFIED are you with the following software tools for creating scientific illustrations? (choose only one for each)

	Adobe Illustrator n=75	Adobe Photoshop n=98	BioRender n=48	GraphPad Prism n=101	Microsoft PowerPoint/ Google Slides n=157	Mind the Graph n=8	Other tool n=15
10 Extremely	**17%**	**13%**	**17%**	**7%**	**10%**	**0%**	**27%**
9	**19%**	**15%**	**29%**	**23%**	**13%**	**0%**	**33%**
8	**27%**	**26%**	**25%**	**34%**	**28%**	**50%**	**27%**
7	**21%**	**22%**	**17%**	**21%**	**24%**	**13%**	**7%**
6	7%	6%	8%	9%	14%	0%	0%
5	5%	10%	4%	3%	7%	25%	7%
4	1%	3%	0%	3%	2%	13%	0%
3	1%	1%	0%	1%	1%	0%	0%
2	0%	1%	0%	0%	1%	0%	0%
1	1%	1%	0%	0%	0%	0%	0%
0 Not At All	0%	1%	0%	0%	0%	0%	0%