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Co-developing eResearch infrastructure:

Technology-enhanced research practices, attitudes and requirements

Full Technical Report

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2009-11-26 V1.0

Summary

This technical report presents descriptive results from the first stage of the survey that investigates existing technology-enhanced research practices, researchers' readiness to adopt eResearch, their needs and major barriers. This survey was conducted as a part of a larger project which aims to establish researchers' requirements for eResearch infrastructures and support, build researchers' awareness about eResearch potential, and engage with them to co-develop eResearch services.

The survey was conducted at various intervals between 4 May–2 July 2009 at four NSW universities: The University of Sydney, The University of Newcastle, The University of New England and The University of New South Wales.

It covered three main eResearch areas: a) data management, retention and sharing; b) technology enhanced research methods, tools and services; and c) research collaboration and dissemination.

The questions focused on several aspects, including researchers' present ICT use for research practices; their attitudes to, and awareness about, eResearch; barriers for broader use of eResearch; researchers needs for support and willingness to be involved in co-development of eResearch infrastructure. This technical report presents descriptive results and participants answers to all survey questions.

Acknowledgement

This study reported in this report was initiated and part-funded by University of Sydney ICT (Tools and Frameworks for Research Collaboration project) and Intersect Australia Ltd. The project is based at the University of Sydney, Faculty of Education and Social Work, Research Centre for Computer Supported Learning and Cognition (CoCo). We would like to thank DVCs/PVCs for Research of all four participating universities for their cooperation, and all participants of this survey for their time. The survey is running at four other NSW universities currently. Further universities interested in doing this survey are also very welcome. Contact: Lina Markauskaite (University of Sydney, CoCo Research Centre, l.markauskaite@edfac.usyd.edu.au) or Leonie Hellmers (Intersect, leonie.hellmers@intersect.org.au)

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Study background and rationale

Over the last decade, individual universities and governments in various countries, including Australia, have made significant commitments and investments in developing advanced technological infrastructures to support research – in short, eResearch¹. These investments have been fuelled by an explicit expectation that eResearch infrastructures will be taken up by broader research communities and will enhance the nature, quality and efficiency of research. Nevertheless, users and developers of eResearch infrastructures and services face numerous challenges embracing and scaling up eResearch.² What motivates researchers to embrace ICT-enhanced research approaches? What prevents them from adopting eResearch? What kinds of support do they need? The answers to these questions are central for making informed decisions about how one could improve eResearch uptake and maximise the benefits of research infrastructures. As a first step, this study aimed to investigate the role of technologies in current research practices; what kinds of challenges researchers typically face; and what kinds of eResearch solutions and support could be most beneficial for them.

Approach and procedure

This study was conducted using an online survey, which covered three main eResearch areas:

- 1) Data management, retention and sharing;
- 2) Technology-enhanced research methods, tools and services;
- 3) Research collaboration and dissemination.

The questions focused on four aspects:

- 1) Present practices and barriers for eResearch;
- 2) Priorities and requirements for new infrastructures, services and support;
- 3) Attitudes and awareness about eResearch; and
- 4) Willingness to be involved in future elicitation of needs and specification of requirements.

¹ DEST/DCITA, *An Australian eResearch strategy and implementation framework: Final report of the eResearch coordinating committee*. 2006, Australian Government, DEST/DCITA. [URL](#)
NCRIS Committee, *Review of the National Collaborative Research Infrastructure Strategy's Roadmap*. 2008, Australian Government: DIISR. [URL](#)

² Ribes, D. & Finholt, T.A., Tensions across the scales: planning infrastructure for the long-term. In Proceedings of the 2007 international ACM conference on supporting group work. 2007, ACM: Sanibel Island, Florida, USA. [URL](#)
Edwards, P.N., Jackson, S.J., Bowker, G.C., & Knobel, C.P., Understanding infrastructure: Dynamics, tensions and design. Report of a workshop on "History & theory of infrastructure: Lessons for new scientific cyberinfrastructures", 2007, NSF Grant 0630263, Office of Cyberinfrastructure. [URL](#)

In total, participants were asked to respond to 40 questions, most of which required them to choose from a range of options, and allowed a short comment. Eight questions asked participants to provide open narrative answers. The survey instrument included the following sections³:

1. Background information
2. Research tools and methods
3. Research collaboration and dissemination
4. Research data
5. Data sharing practices
6. Data management and preservation
7. eResearch support, training, and services
8. Attitudes towards digital technologies in research
9. Further information and willingness to be involved in elicitation of eResearch requirements

The online survey was conducted in 4 May–2 July 2009 at four NSW universities:

- The University of Sydney
- The University of Newcastle
- The University of New England
- The University of New South Wales

Email invitations were initially distributed via Deputy Vice-Chancellors Research inviting all academic staff, research students and research support staff to participate. Further invitations and reminders were sent directly to some interest groups, centres and faculties within universities. None of the invitations targeted other institutions, however researchers from other institutions were allowed to access and complete the survey. After the survey closed, the data was downloaded, anonymised and imported in SPSS. Multiple-choice answers were analysed using descriptive statistical analysis. Total and valid percentages are reported in this report. Percentages reported in the summary are based on valid answers. Anonymous answers were sorted in the alphabetical order and presented in this technical report in original format. Summaries of the answers to these questions are based on preliminary interpretative reading of responses.⁴

Summary of findings

1. Participants' background

1. Sample size. In total 658 participants took the survey and 537 (82%) of them completed it to the end. Percentages reported in this summary are based on valid answers, ie those participants who completed most of the survey.

³ Research instrument was developed in close collaboration between the University of Sydney ICT unit (and members of the Tools and Frameworks for Research Collaboration project) and Intersect staff.

⁴ More detail analysis of qualitative responses is planned in the next stage of the analysis and will be reported separately.

2. Affiliations. Survey respondents were from the following institutions: 29% from UNSW, 26% from the University of Sydney, 17% from the University of New England; 16% from the University of Newcastle, and 12% from other institutions or did not indicate their affiliation.
3. Disciplines (RFCD codes). About 24% of respondents indicated that their major disciplinary area is medical and health sciences, and between 10%-12% indicated one or several of the following disciplinary areas: social science, humanities, arts; biological sciences; information computing and communication sciences; and education. All other disciplines (RFCD codes) were indicated less often.
4. Disciplinary clusters. Overall, about 24% of respondents indicated RFCD codes that belonged to two or more disciplinary clusters. Of the rest respondents about 22% of participants represented social, behavioural and economic sciences; 20% medicine, biology sciences and biotechnology; 11% engineering and environmental sciences; 7% physics, chemistry and geosciences; 7%- mathematic and information and communication sciences; 5% humanities and creative arts; and 3% other disciplines.
5. Primary role. Respondents quite evenly represented different levels of research experience: 23% were graduate students; 24% early career researchers; 21% middle career researchers and 22% senior long experience researchers. The remaining 8% of respondents were other university staff (mainly general staff, librarians, research assistants, IT and research support) and 2% of respondents held emeritus, honorary, visiting or adjunct appointments.
6. Awareness about eResearch. About 57% of respondents answered that they had not heard the term eResearch before the survey. This indicated that respondents have different levels of awareness about eResearch.

2. Research tools and methods

7. Software use for data handling and analysis. Only 13-17% indicated that they don't use spreadsheets or databases for data handling and analysis, while about 83-87% of respondents indicated that they use these two softwares often or occasionally. In contrast 78-84% of respondents indicated that they do not use the following four types of software: data mining; GIS or other special software; digital voice recognition and transcription; special visual or audio analysis software.
8. Digital research methods: needs for support. Asked to list digital research methods and tools they don't use, but would use if supported, respondents indicated a wide range of research tools. Frequently mentioned software tools included data mining software, digital voice recognition and transcription, modelling and simulation software and qualitative data analysis.
9. High performance computers. About 13% of respondents indicated that they use HPC facilities for their research. APAC – was the most often mentioned HPC facility.

3. Research collaboration and dissemination

10. Extent of research collaboration. Less than 23% answered that nearly all their research is individual, while the remaining majority of respondents were involved in collaborative research. About 44% of respondents indicated that nearly all their research is collaborative and about 33% indicated that about half of their research is collaborative.

11. Loci of research collaboration. Most research collaboration occurs within research groups (70%) and with other universities outside Australia (52%) and within Australia (50%). The extent of collaboration outside the research group, but within the same faculty or other faculties within the same university is smaller, 35% and 31% respectively. Only about 30% of collaboration is beyond academia and about 22% with non-university research agencies.

12. Collaboration media. The most common media for research collaboration used by more than 91% of respondents were email, face-to-face meetings and telephone (Only 1-2% of respondents indicated that they don't use email and face-to-face meetings for collaboration). In contrast, about 94% of respondents indicated that they don't use virtual research environments and about 88% indicated that they don't use special project/task management tools. Less than 27% of respondents indicated that they occasionally use collaborative document writing and social networking tools.

13. Dissemination of research findings. Conventional publishing (e.g. journals, books) was the main form of research dissemination - used often or occasionally by more than 96% of respondents. About 67% of respondents indicated that they often or occasionally publish in online proceedings; 60% said that they publish in e-journals; and 46% publish in open access e-journals. 36%-45% of respondents indicated that they use institutional, project or personal websites, blogs or wikis or institutional repositories to disseminate research findings. Less than 20% of respondents indicated that they use digital disciplinary repositories or publish in open access, commercial or scientific societies' ebooks.

14. Dissemination and collaboration: needs for support. Asked to list main areas of research collaboration and dissemination that would most benefit from ICT support, respondents among many other areas often identified videoconferencing, research repositories and websites.

4. Research data

15. Nature of research data. Asked to describe the nature of digital and non-digital research data, among many other data types, respondents most often listed laboratory measurements, survey data and interview transcripts.

16. Data collection methods. More than 87% of respondents often or occasionally collect/create data themselves or as a part of a team. More than 71% of respondents obtain data directly from other respondents (often or occasionally); about 57% of respondents obtain data from the third party organisations or data archives and repositories, and 24% from commercial online sources. Most

respondents use data obtained from somebody else only occasionally, and most often collect or create data themselves.

17. Data digitisation. Respondents have a significant proportion of their research data and materials in digital format: more than 50% of respondents indicated that about 81-100% of their data and material is in digital format and further 23% of respondents indicated that 61%-80% of their data and material is in digital format. 9% of respondents indicated that 0-20% of their data is digital.

18. Volume of digital data. Most respondents store quite small amounts of digital data: about 47% of respondents indicated that they currently store less than 10GB and further 36% indicated that they store less than 1TB of digital research data. Nevertheless, some respondents indicated that they store quite large amounts of data: 12% between 1 and 10TB and 3% more than 10TB.

19. Data storage needs. About 33% of respondents indicated that they need more storage for research data. Asked to indicate how much storage they need in total, many respondents indicated 10TB or less.

5. Data sharing practices

20. Access to data. About 48% of respondents do not allow researchers from outside their research project or team to access their research data, while 43% allow some access and only 9% allow access to all their research data.

21. Data sharing methods. Of those, who allow access to their data, 73% indicated that they typically provide access via privately negotiated access. About 37% of respondents also publish data online; 29% submit data when they publish in e-journals; 24% deposit to repositories and only 13% provide access via third party.

22. Reasons for restrictions. The most often indicated reasons for restrictions on accessing data were privacy and confidentiality issues (57%) and competitive research advantage (44%). About 18-24% of respondents indicated other reasons, such as: commercialisation potential, ethical issues, technical difficulties and lack of incentive; and about 15% of respondents indicated licensing issues and lack of usefulness of data for others. Only 7% of respondents indicated that there is no reason for such restrictions.

6. Data management and preservation

23. Data management and preservation issues. About 43% of respondents indicated that they face data management and preservation issues and further 20% were not sure. Among many other issues, concerns associated with data storage, backup, archiving, preservation, security, confidentiality and other ethical issues were mentioned quite often.

24. Data management plan. About 54% of respondents indicated that they or their research team do not have an explicit data management plan and further 15% were not sure or didn't know.

25. Data storage during the project. More than 81% of respondents indicated that they store their data during their project on internal hard drives. More than half (53-55%) also indicated that they store their data on USB drives and external hard drives and about 40% indicated that they store data on a local area network and CDs/DVDs. Only 17-18% of respondents use departmental or central IT/university computing centres for data storage. Very few respondents (2-3%) indicated that they store their data during their projects in disciplinary, state/national data centres /repositories or commercial storage facilities.

26. Data storage after the project. About 79% of respondents indicated that they themselves typically store and care for their data after the end of a project. Less than 6% of respondents said that this is carried out by university or faculty services and less than 1% said that their data after the project is stored in national, state or disciplinary repositories. 4% indicated that nobody stores or take care after their data after the end of a project.

7. eResearch support, training, and services

27. ICT support for research. More than half (56%) of respondents indicated that ICT-related support for their research is typically provided by IT staff in their faculty or school and 40% indicated that this is done by central university IT. About 14-23% of respondents indicated that they typically receive IT support from colleagues, research personnel, IT staff in their research group, PhD or graduate students. About 11% respondents said that nobody provides them with such support.

28. Need for IT support. About 29% of respondents said that present ICT support minimally or not at all matches their research needs; 31% answered that it matches needs only moderately and 36% indicated that it matches need quite well or very well. About 5% of respondents indicated that they don't need IT support.

29. eResearch related bodies. Asked about their familiarity and use of services provided by five different Australian eResearch bodies, more than 93% indicated that they had never heard about Australian Access Federation (AAF). More than 81% also had never heard about Australian National Data Service (ANDS), Australian Research Collaboration Service (ARCS), and National Computational Service (NCI). 74-75% respondents had never heard about Intersect and National Collaborative infrastructure Strategy (NCRIS). Only 3-4% of respondents indicated that they use the services of Intersect, NCI and NCRIS.

30. Areas for ICT support. Asked to list specific areas of ICT technical or human support that would enhance their research capacities, the respondents indicated a broad range of services. Often mentioned areas were data management, expertise in data analysis, collaboration platforms, data management and storage, access to research software, and need for more IT personnel.

8. Attitudes towards digital technologies in research

31. Importance of eResearch. More than 70% of the respondents indicated that eResearch is very important or important for the future progress of their research field with further 21% indicating that

it is only moderately important. Only 7% of respondents said that eResearch is of little importance or unimportant and 2% that ICT is not relevant to their research. Asked to explain their answers, respondents often mentioned the importance of computational tools, digital data, access to ejournals and other online resources and collaboration for their research fields.

32. Future applications of ICT. Asked to describe the most important applications of ICT in their research fields, respondents often mentioned research collaboration, data integration and sharing, and various, often computationally intensive, software applications.

33. Future challenges. Asked to describe the most important challenges for the application of ICT in their research field, the respondents often indicated access and security issues, funding, ICT support, expertise, and access to infrastructure.

9. Further information and willingness to be involved in elicitation of eResearch requirements

34-35. Willingness to participate in eResearch focus groups and discussions. More than 30% expressed their willingness to participate in follow up discussions aimed at developing eResearch support and services in NSW.

36-38. Information about the survey and eResearch. About 59% of respondents indicated that they would like to receive a brief report of the survey, 52% answered that they would like to receive announcements about other eResearch activities from Intersect and 60% indicated that they would like to receive such announcements from their own university.

40. Final comments. About 10% of respondents wrote some final comments. Among positive and negative comments, a number of respondents expressed concerns about their low familiarity with eResearch terminology and ICT.

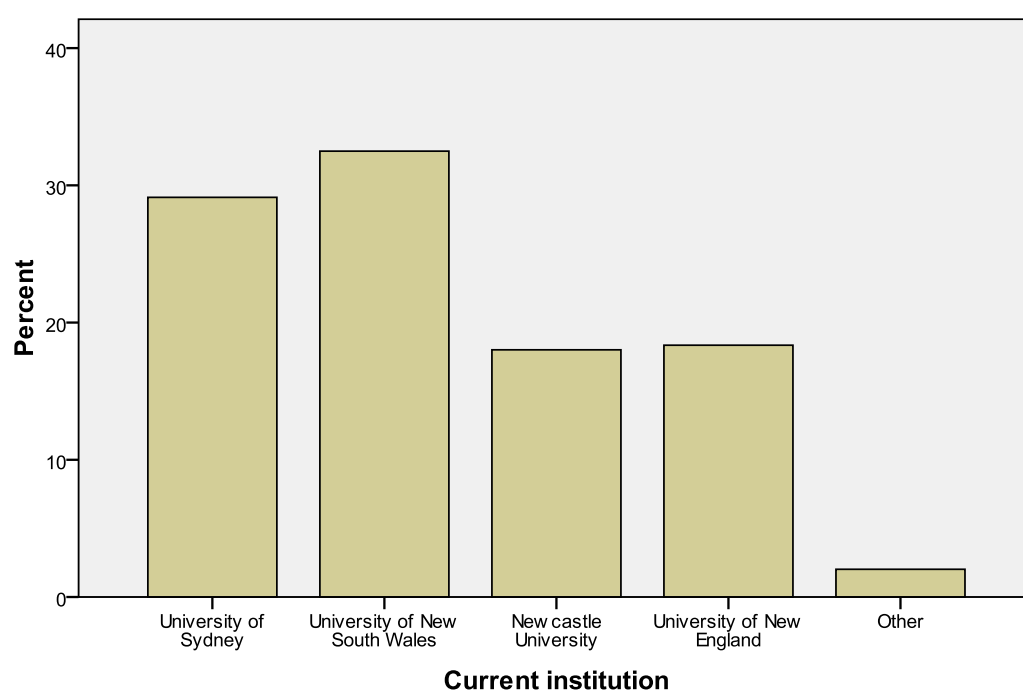
STATISTICAL RESULTS

1. Participants' background

Q02. Institutions

		Frequency	Percent	Valid Percent
Valid	University of Sydney	173	26.3	29.1
	University of New South Wales	193	29.3	32.5
	Newcastle University	107	16.3	18.0

University of New England	109	16.6	18.4
Other	12	1.8	2.0
Total	594	90.3	100.0
Missing	64	9.7	
Total	658	100.0	



Q03. Primary disciplines

Please identify your major disciplinary areas.

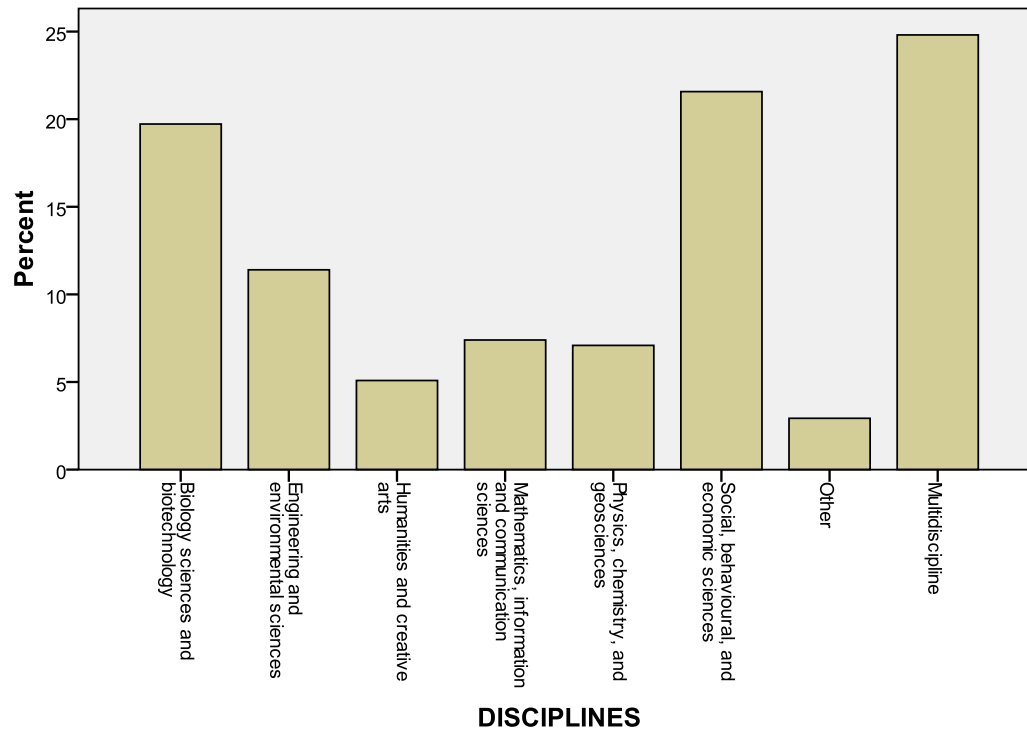
Disciplinary area	Frequency	Percent	Valid Percent
Sciences (general)	57	8.66%	8.78%
Social sciences, humanities, arts (general)	68	10.33%	10.48%
Mathematical sciences	32	4.86%	4.93%
Physical Sciences	51	7.75%	7.86%
Chemical Sciences	14	2.13%	2.16%
Earth Sciences	38	5.78%	5.86%

Biological Sciences	62	9.42%	9.55%
Information, Computing and Communication Sciences	75	11.40%	11.56%
Engineering and Technology	61	9.27%	9.40%
Agricultural, Veterinary and Environmental Sciences	51	7.75%	7.86%
Architecture, Urban Environment and Building	19	2.89%	2.93%
Medical and Health Sciences	155	23.56%	23.88%
Education	70	10.64%	10.79%
Economics	17	2.58%	2.62%
Commerce, Management, Tourism and Services	17	2.58%	2.62%
Policy and Political Sciences	13	1.98%	2.00%
Studies in Human Society	17	2.58%	2.62%
Behavioural and Cognitive Sciences	40	6.08%	6.16%
Law, Justice and Law Enforcement	23	3.50%	3.54%
Journalism, Librarianship and Curatorial Studies	9	1.37%	1.39%
The Arts	22	3.34%	3.39%
Language and Culture	19	2.89%	2.93%
History and Archaeology	17	2.58%	2.62%
Philosophy and Religion	6	0.91%	0.92%
Other disciplines	16	2.43%	2.47%
<i>Valid total (multiple responses possible)</i>	<i>649</i>	<i>98.63%</i>	<i>100.00%</i>
<i>Missing</i>	<i>9</i>	<i>1.37%</i>	
<i>Total</i>	<i>658</i>		

Major disciplinary areas (regrouped).

	Frequency	Percent	Valid Percent
Valid			
Medicine, biology sciences and biotechnology	128	19.5	19.7
Engineering and environmental sciences	74	11.2	11.4
Humanities and creative arts	33	5.0	5.1
Mathematics, information and communication sciences	48	7.3	7.4
Physics, chemistry, and geosciences	46	7.0	7.1
Social, behavioral, and economic sciences	140	21.3	21.6
Other	19	2.9	2.9
Multidiscipline	161	24.5	24.8

Total	649	98.6	100.0
Missing	9	1.4	
Total	658	100.0	



Q04. Specialisation

Write up to 3 key words that best characterise your specialisation.

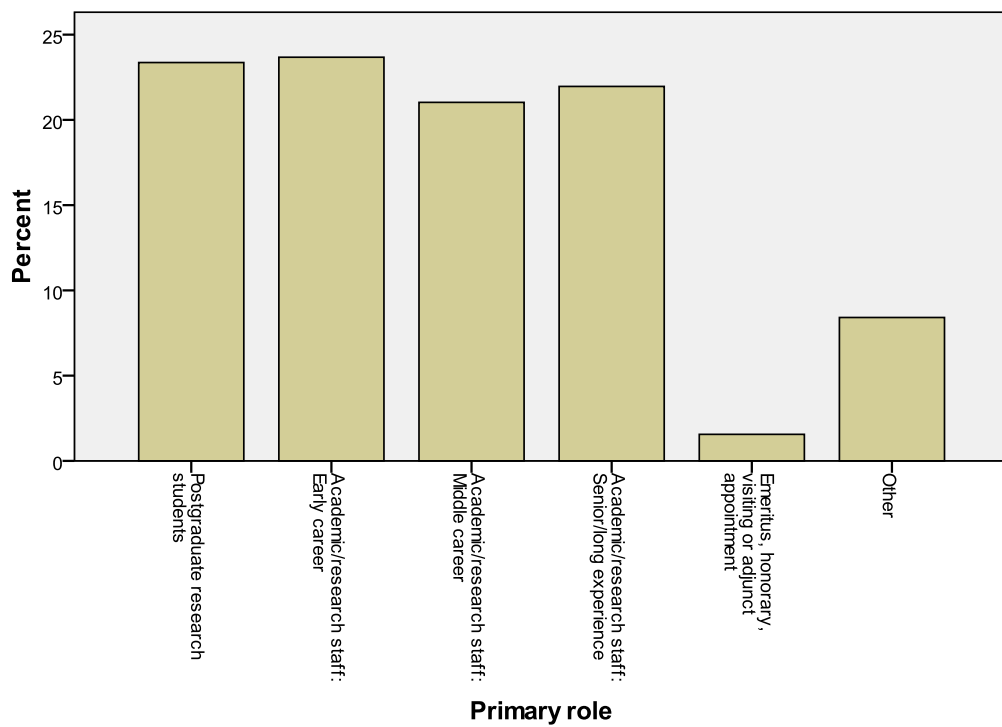
The analysis of these responses will be released shortly.

5. Primary role

Please indicate your primary role.

	Frequency	Percent	Valid Percent
Valid Postgraduate research students	150	22.8	23.4
Academic/research staff: Early career	152	23.1	23.7

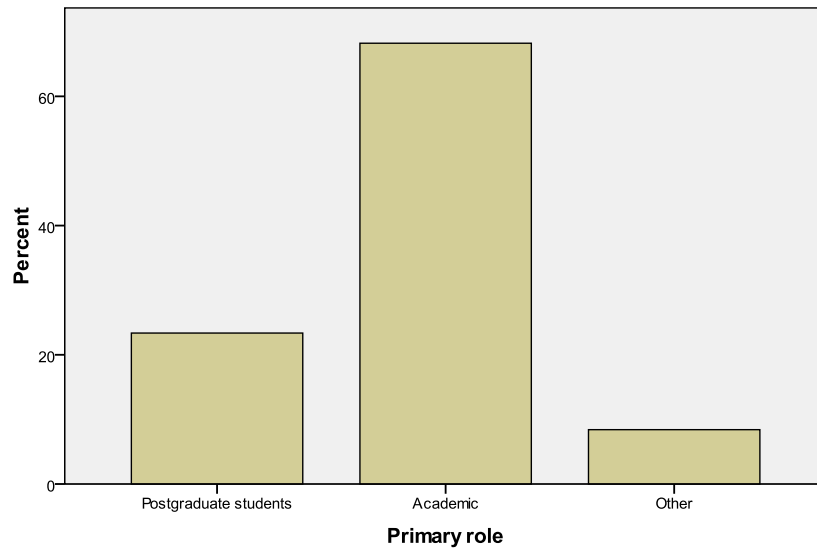
Academic/research staff:	135	20.5	21.0
Middle career			
Academic/research staff:	141	21.4	22.0
Senior/long experience			
Emeritus, honorary, visiting or adjunct appointment	10	1.5	1.6
Other	54	8.2	8.4
Total	642	97.6	100.0
Missing	16	2.4	
Total	658	100.0	



Primary role (regrouped).

		Frequency	Percent	Valid Percent
Valid	Postgraduate students	150	22.8	23.4
	Academic	438	66.6	68.2
	Other	54	8.2	8.4

Total	642	97.6	100.0
Missing	16	2.4	
Total	658	100.0	



Q06. "eResearch" term

Prior to this survey, had you heard of the term "eResearch" before?

	Frequency	Percent	Valid Percent
Valid Yes	284	43.2	43.4
No	371	56.4	56.6
Total	655	99.5	100.0
Missing	3	.5	
Total	658	100.0	

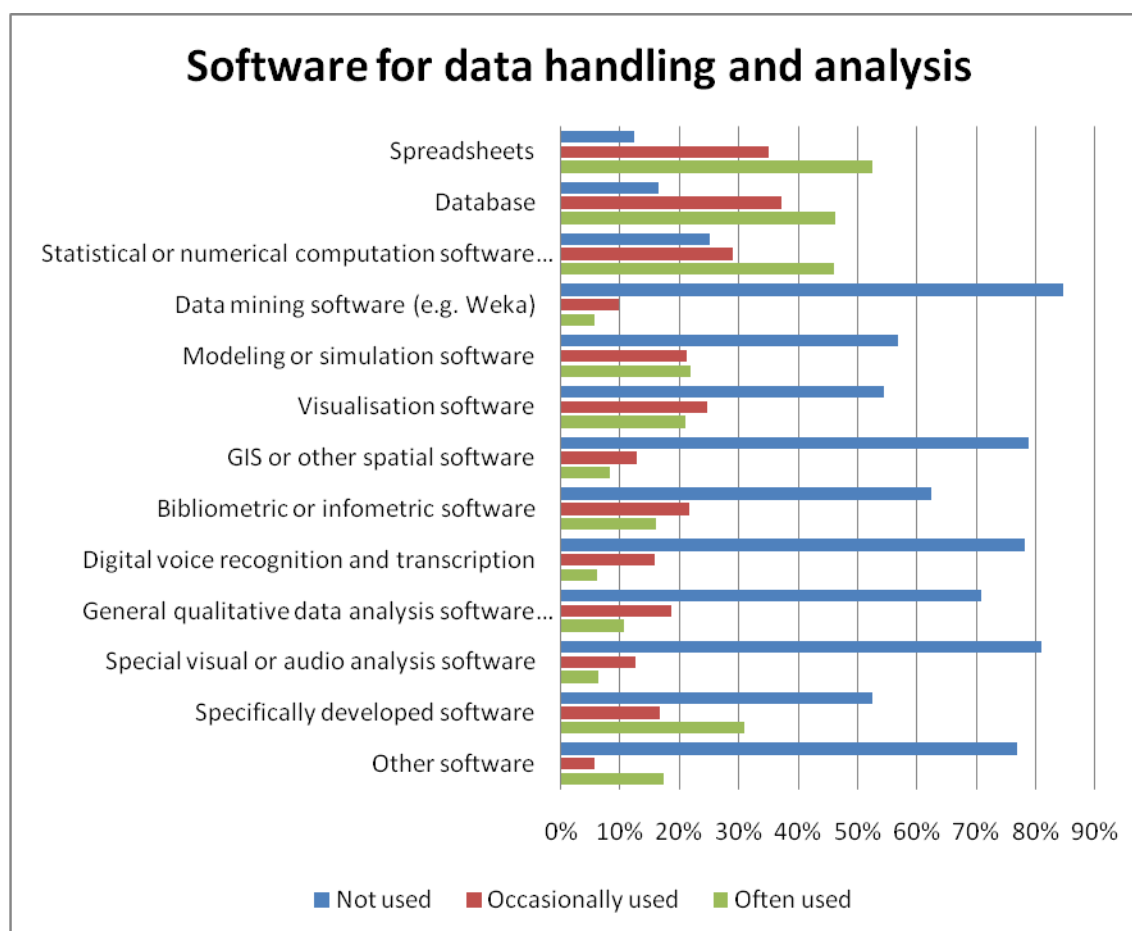
2. Research Tools and Methods

Q07. Software for data handling and analysis

Which of the following types of software do you use for data handling and analysis?

Software	Don't use		Use occasionally		Use often		Total
	Count	%	Count	%	Count	%	
Spreadsheets	73	12.4%	207	35.1%	309	52.5%	589
Database	96	16.5%	216	37.2%	269	46.3%	581
Statistical or numerical computation software (e.g. SPSS, MatLab)	144	25.0%	166	28.9%	265	46.1%	575
Data mining software (e.g. Weka)	460	84.6%	53	9.7%	31	5.7%	544
Modelling or simulation software	314	56.8%	118	21.3%	121	21.9%	553
Visualisation software	303	54.5%	137	24.6%	116	20.9%	556
GIS or other spatial software	423	78.9%	69	12.9%	44	8.2%	536
Bibliometric or infometric software	340	62.3%	118	21.6%	88	16.1%	546
Digital voice recognition and transcription	420	78.1%	85	15.8%	33	6.1%	538
General qualitative data analysis software (e.g. NVivo)	385	70.8%	101	18.6%	58	10.7%	544
Special visual or audio analysis software	436	81.0%	68	12.6%	34	6.3%	538
Specifically developed software	285	52.4%	91	16.7%	168	30.9%	544
Other software	173	76.9%	13	5.8%	39	17.3%	225

Total answered question = 607



Q08. Digital research methods: support needs

List up to 3 main digital research methods or tools you don't use, but would use, if you had support.

All open-ended responses to this question have been analysed and summarised in the table below. Complete tables of these responses are reproduced in Appendix 1.

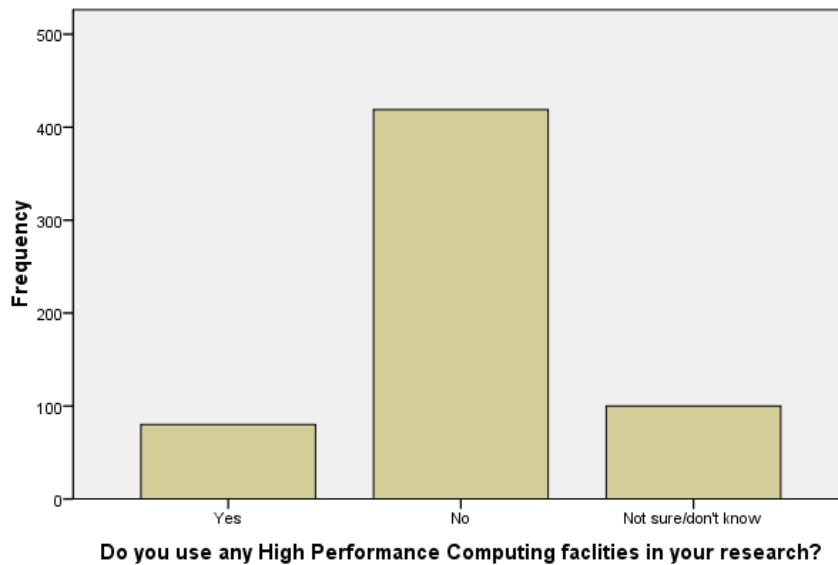
Q08	Digital research methods/tools	Frequency	Percent
1.1	Data collection from human participants	14	4.6%
1.2	Digital voice recognition and transcription	54	17.6%
1.3	Other data collection or digitisation	8	2.6%
2	Internet tools for research processes and/or management	15	4.9%
3.1	Programming	10	3.3%
3.2	High speed and parallel computing	12	3.9%
3.3	Databases and spreadsheets	25	8.2%

4.1	Statistical, mathematical, and financial analysis	63	20.6%
4.2	Data and text mining	48	15.7%
4.3	Qualitative textual and linguistic analysis	48	15.7%
4.4	Bibliometric analysis	6	2.0%
4.5	GIS and spatial data analysis	28	9.2%
4.6	Modelling and simulation	65	21.2%
4.7	Visualisation and visual data analysis	59	19.3%
4.8	Engineering, architecture, and design graphics	8	2.6%
4.9	Other specific data analysis needs	36	11.8%
5	General and specialised databases and resources	10	3.3%
6	Other	27	8.8%
	TOTAL	306	100.0%

Q09. High Performance Computers

Do you use any High Performance Computing facilities in your research?

		Frequency	Percent	Valid Percent
Valid	Yes	80	12.2	13.4
	No	419	63.7	69.9
	Not sure/don't know	100	15.2	16.7
	Total	599	91.0	100.0
Missing		59	9.0	
Total		658	100.0	

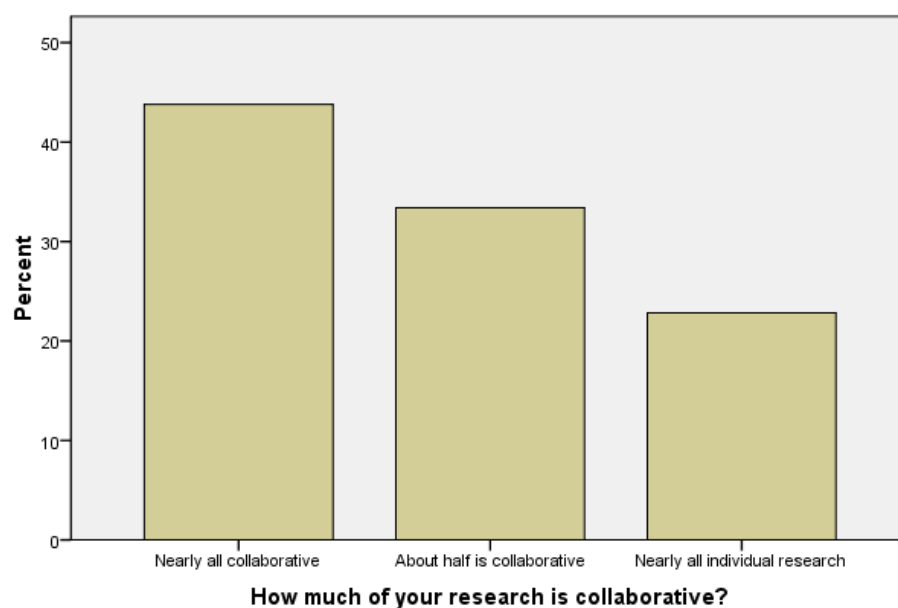


3. Research Collaboration and Dissemination

Q10. Collaborative research

How much of your research is collaborative?

	Frequency	Percent	Valid Percent
Valid			
Nearly all collaborative	257	39.1	43.8
About half is collaborative	196	29.8	33.4
Nearly all individual research	134	20.4	22.8
Total	587	89.2	100.0
Missing	71	10.8	
Total	658	100.0	

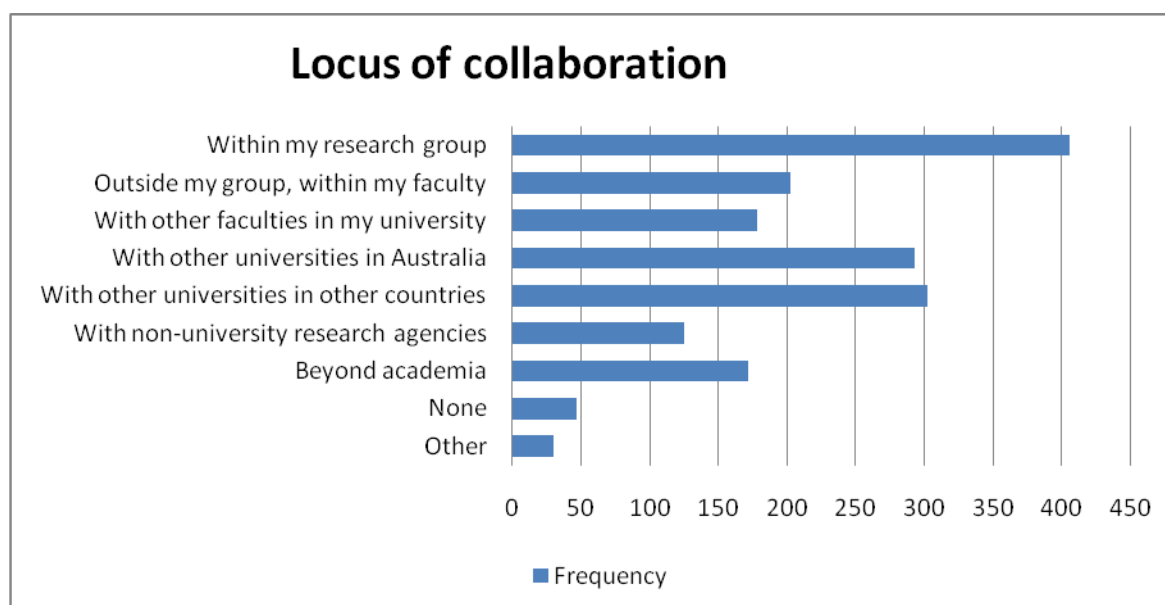


Q11. Loci of research collaboration

Indicate where your research collaboration occurs.

Locus of collaboration	Count	%
Within my research group	406	69.88%
Outside my group, within my faculty	202	34.77%
With other faculties in my university	178	30.64%
With other universities in Australia	293	50.43%
With other universities in other countries	302	51.98%
With non-university research agencies	125	21.51%
Beyond academia	172	29.60%
None	47	8.09%
Other	30	5.16%
Total valid	581	100.00%

* Total = 658, missing = 77



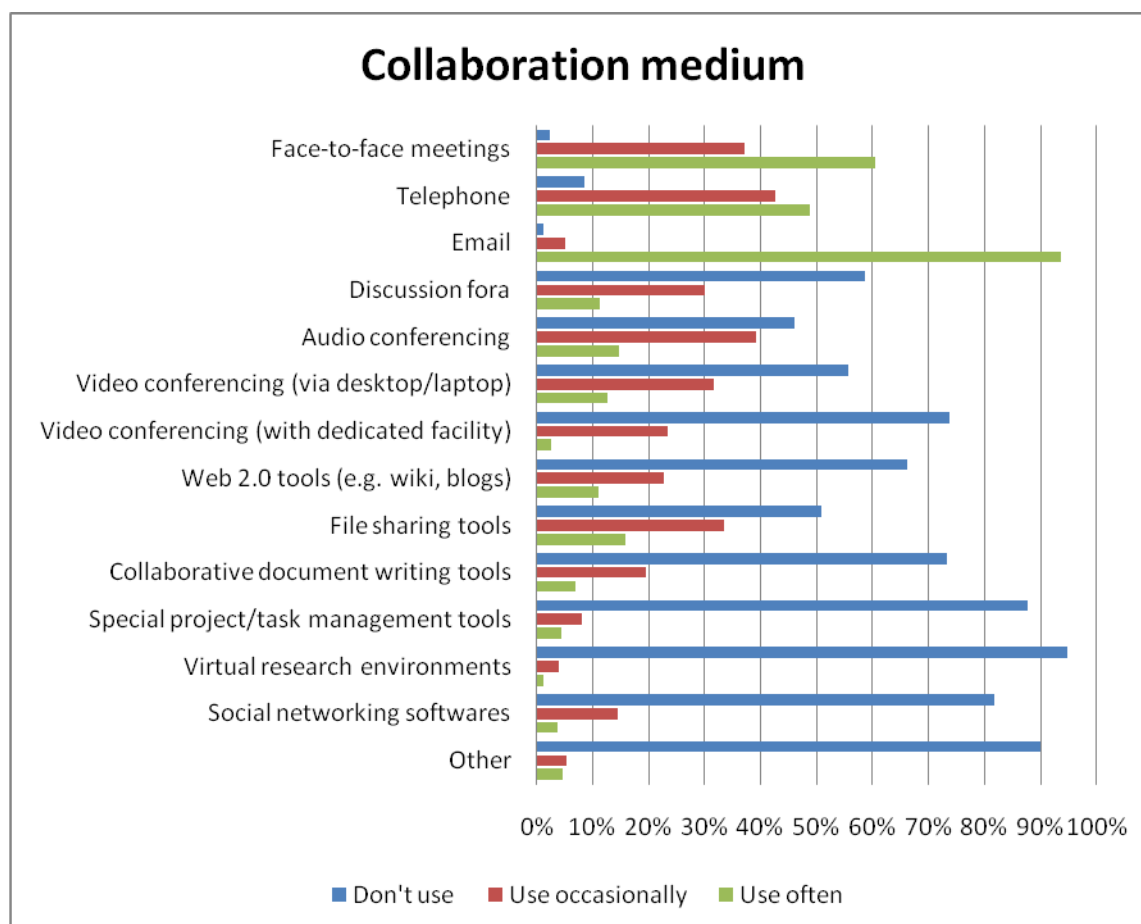
Q12. Research collaboration medium

When you collaborate, how often do you use the following technologies for communication and project management?

Tools/medium	Don't use		Use occasionally		Use often		Total
	Count	%	Count	%	Count	%	
Face-to-face meetings	13	2.3%	208	37.1%	339	60.5%	560
Telephone	48	8.6%	238	42.6%	273	48.8%	559
Email	7	1.2%	29	5.2%	525	93.6%	561
Discussion fora	303	58.7%	155	30.0%	58	11.2%	516
Audio conferencing	239	46.0%	204	39.2%	77	14.8%	520
Video conferencing (via desktop/laptop)	292	55.7%	166	31.7%	66	12.6%	524
Video conferencing (with dedicated facility)	376	73.7%	120	23.5%	14	2.7%	510
Web 2.0 tools (e.g. wiki, blogs)	337	66.2%	116	22.8%	56	11.0%	509
File sharing tools	264	50.8%	174	33.5%	82	15.8%	520
Collaborative document writing tools	377	73.3%	101	19.6%	36	7.0%	514
Special project/task management tools	437	87.6%	40	8.0%	22	4.4%	499
Virtual research environments	476	94.8%	20	4.0%	6	1.2%	502
Social networking softwares	414	81.8%	73	14.4%	19	3.8%	506

Other	153	90.0%	9	5.3%	8	4.7%	170
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Total answered question = 568



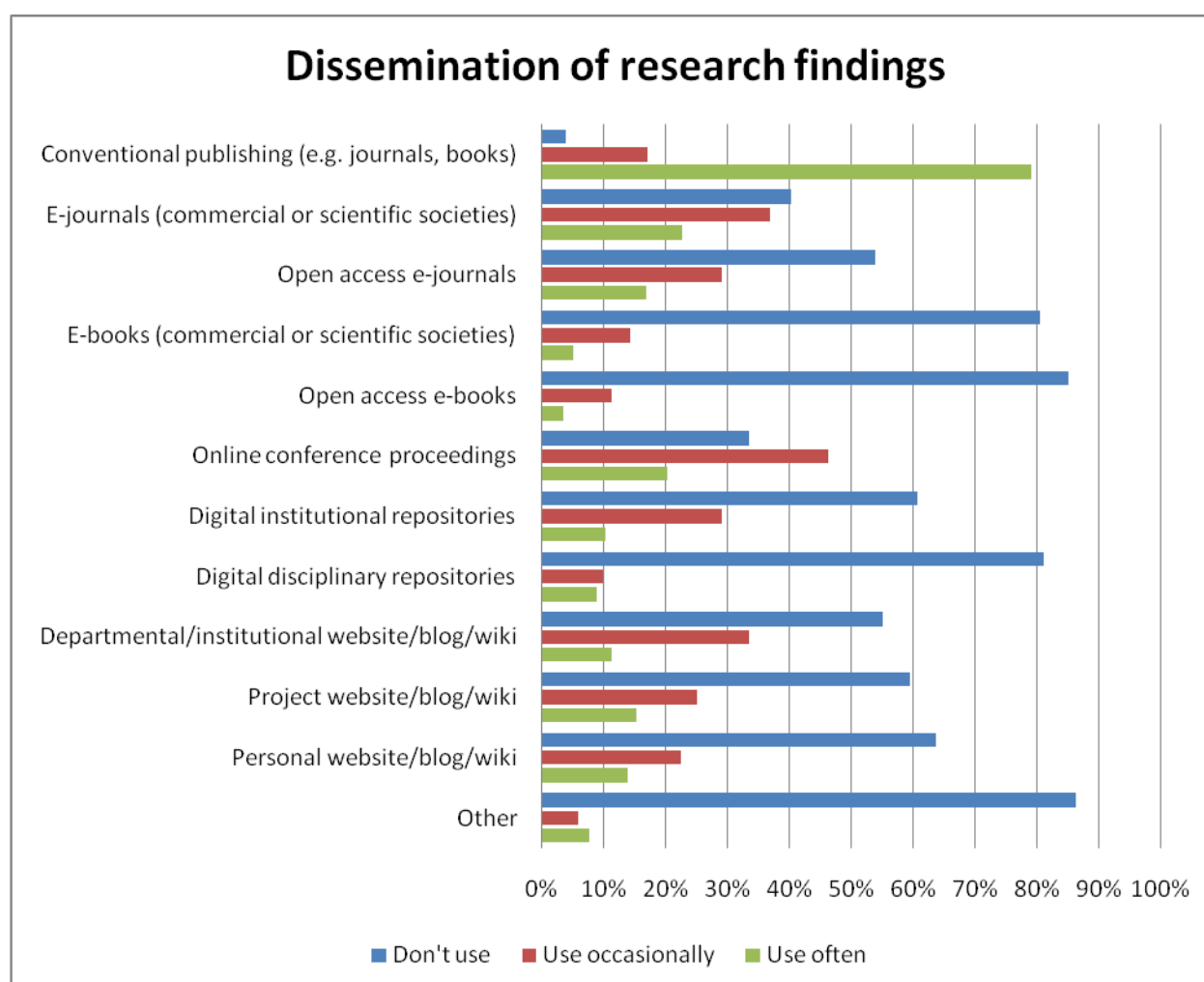
Q13. Dissemination of research findings

Which of the following methods and technologies do you use to disseminate research findings?

Methods & technology	Don't use		Use occasionally		Use often		Total
	Count	%	Count	%	Count	%	
Conventional publishing (e.g. journals, books)	22	3.9%	97	17.1%	447	79.0%	566
ejournals (commercial or scientific societies)	214	40.3%	196	36.9%	121	22.8%	531
Open access ejournals	276	53.8%	150	29.2%	87	17.0%	513
ebooks (commercial or scientific societies)	396	80.5%	71	14.4%	25	5.1%	492

Open access ebooks	420	85.0%	56	11.3%	18	3.6%	494
Online conference proceedings	175	33.5%	242	46.3%	106	20.3%	523
Digital institutional repositories	307	60.7%	147	29.1%	52	10.3%	506
Digital disciplinary repositories	405	81.0%	50	10.0%	45	9.0%	500
Departmental/institutional website/blog/wiki	281	55.1%	171	33.5%	58	11.4%	510
Project website/blog/wiki	297	59.4%	126	25.2%	77	15.4%	500
Personal website/blog/wiki	320	63.6%	113	22.5%	70	13.9%	503
Other	158	86.3%	11	6.0%	14	7.7%	183

Total answered question = 572



Q14. Research collaboration and dissemination areas

List up to 3 main areas of research collaboration and dissemination that would most benefit from ICT support.

All open-ended responses to this question have been analysed and summarised in the table below. Complete tables of these responses are reproduced in Appendix 1.

Q14	Collaboration and dissemination areas	Frequency	Percent
1	Synchronous communication	73	25.3%
2	Collaborative writing tools	30	10.4%
3	Internet related tools or needs	78	27.1%
4	Areas related to data handling:		
4.1	Data storage	9	3.1%
4.2	Data sharing	39	13.5%
4.3	Online repositories	54	18.8%
4.4	Data management	10	3.5%
5.	ePublications	58	20.1%
6.	Networking and partnership in research	14	4.9%
7.	Dissemination of research	19	6.6%
8.	Project management tools	55	19.1%
9.	Other	64	22.2%
	TOTAL	288	100.0%

4. Research Data

Q15. Nature of data

List up to 3 phrases that describe the nature of your main digital and non-digital data sets

All open-ended responses to this question have been analysed and summarised in the table below. Complete tables of these responses are reproduced in Appendix 1.

Q15	Nature of data	Frequency	Percent
1	Primarily visual data:		
1.1	Astronomical and satellite data	14	2.8%
1.2	Behavioural observation data	39	7.9%
1.3	Spatial, geographic and climatic data	36	7.3%
1.4	Medical and clinical images	35	7.1%

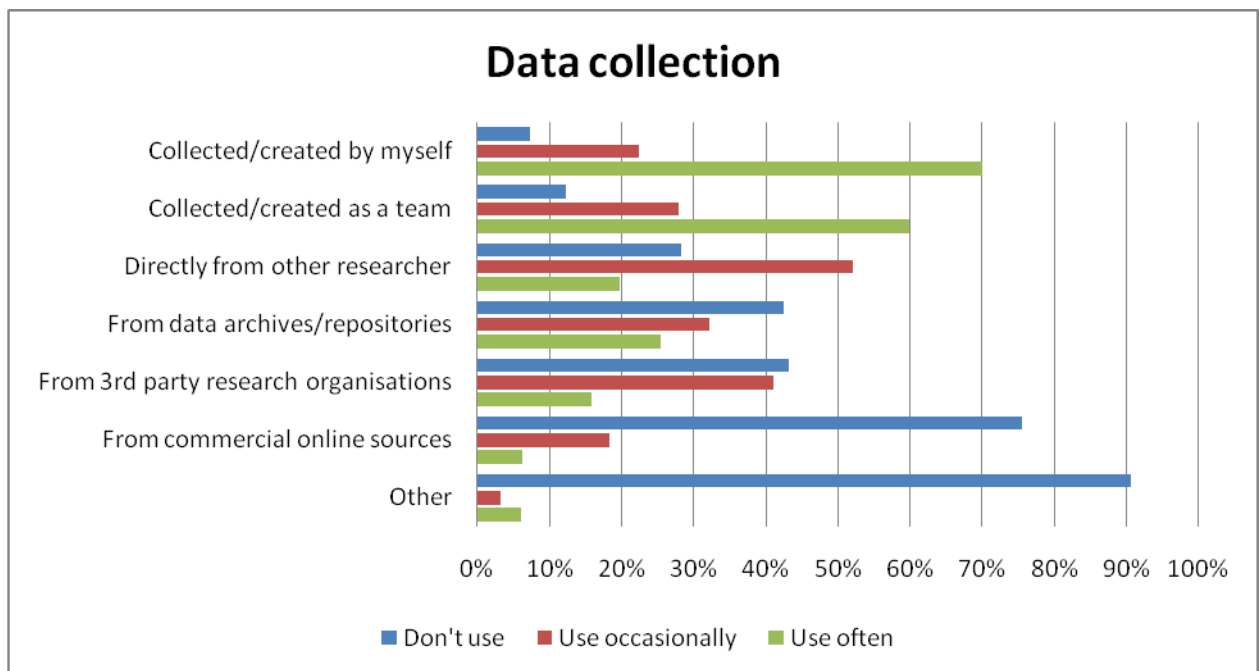
1.5	Other image and visual data	106	21.5%
2	Primarily textual data:		
2.1	Interview and speech data	123	24.9%
2.2	Textual corpus and archives	75	15.2%
3	Primarily quantitative data:		
3.1	Survey data	172	34.9%
3.2	Laboratory measurements	120	24.3%
3.3	Medical and clinical measurements	33	6.7%
3.4	Genetic data	44	8.9%
3.5	Bibliometric data	11	2.2%
3.6	Other quantitative measurements	26	5.3%
4.	Other field data	41	8.3%
5.	General simulation and modelling data	31	6.3%
6.	Official and institutional records	65	13.2%
7.	Others	90	18.3%
	TOTAL	493	100.0%

Q16. Data collection methods

How often do you use data obtained in the following ways?

Data collection	Don't use		Occasionally		Often		Total
	Count	%	Count	%	Count	%	
Collected/created by myself	40	7.4%	121	22.5%	376	70.0%	537
Collected/created as a team	65	12.3%	148	27.9%	317	59.8%	530
Directly from other researcher	146	28.2%	269	52.0%	102	19.7%	517
From archives/repositories data	222	42.4%	168	32.1%	133	25.4%	523
From 3rd party research organisations	221	43.2%	210	41.0%	81	15.8%	512
From commercial online sources	375	75.5%	91	18.3%	31	6.2%	497
Other	164	90.6%	6	3.3%	11	6.1%	181

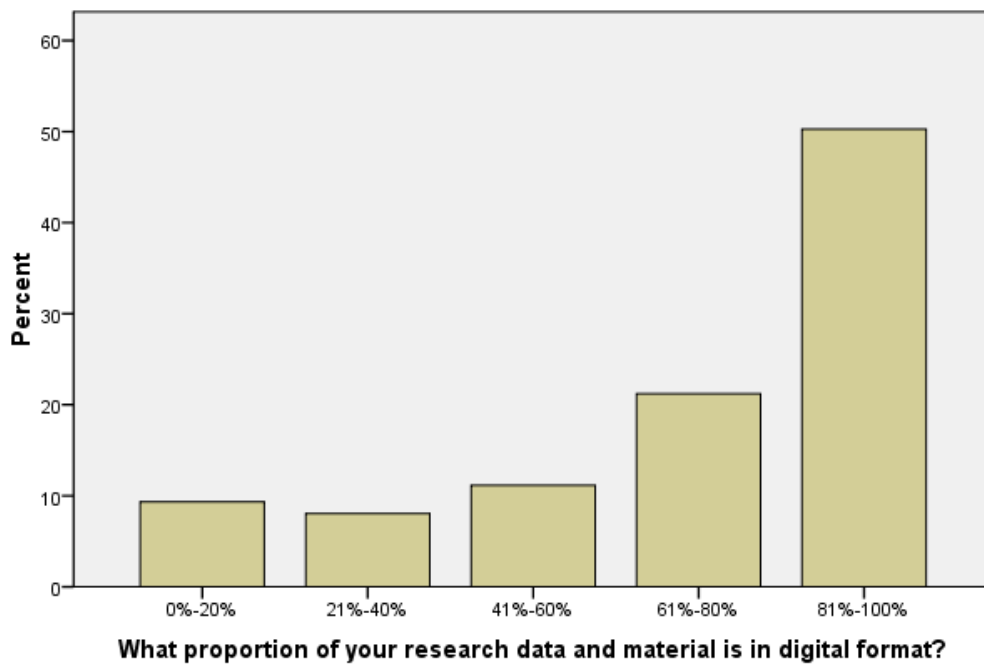
Total answered question = 548



Q.17. Digital data proportion

What proportion of your research data and material is digital in format?

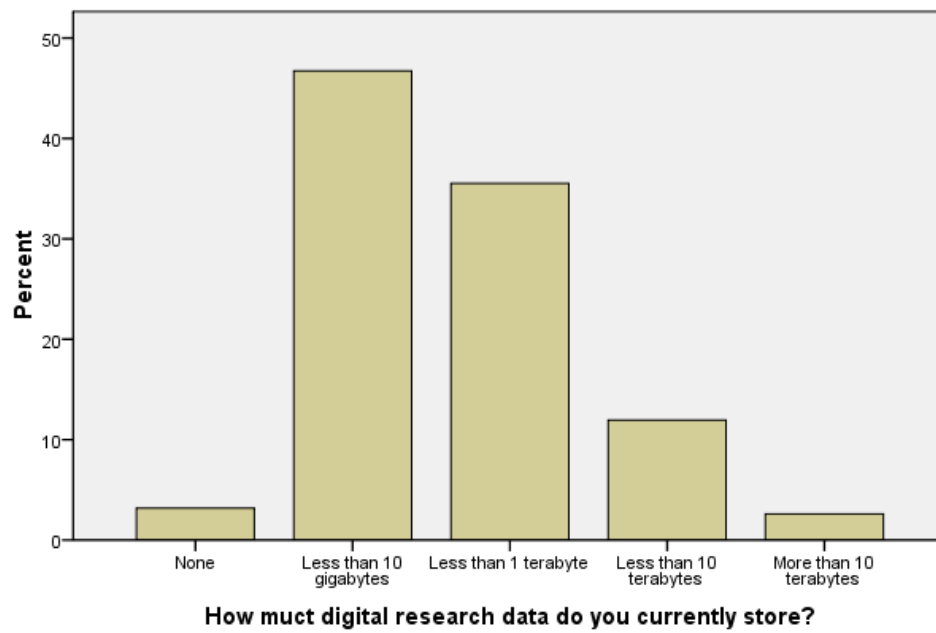
		Frequency	Percent	Valid Percent
Valid	0%-20%	51	7.8	9.3
	21%-40%	44	6.7	8.0
	41%-60%	61	9.3	11.2
	61%-80%	116	17.6	21.2
	81%-100%	275	41.8	50.3
	Total	547	83.1	100.0
Missing		111	16.9	
Total		658	100.0	



Q.18. Digital data storage

How much digital research data do you currently store?

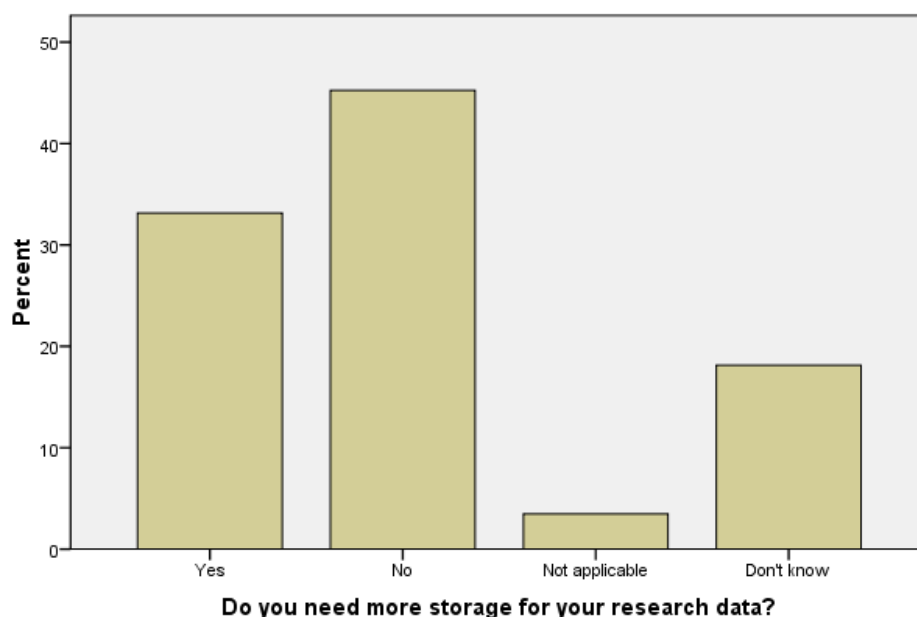
		Frequency	Percent	Valid Percent
Valid	None	17	2.6	3.2
	Less than 10 gigabytes	250	38.0	46.7
	Less than 1 terabyte	190	28.9	35.5
	Less than 10 terabytes	64	9.7	12.0
	More than 10 terabytes	14	2.1	2.6
	Total	535	81.3	100.0
Missing		123	18.7	
Total		658	100.0	



Q.19. Data storage needs

Do you need more storage for your research data?

	Frequency	Percent	Valid Percent
Valid			
Yes	181	27.5	33.2
No	247	37.5	45.2
Not applicable	19	2.9	3.5
Don't know	99	15.0	18.1
Total	546	83.0	100.0
Missing	112	17.0	
Total	658	100.0	



If yes, how much data storage do you need in total?

All open-ended responses to this question have been analysed and summarised in the table below. Complete tables of these responses are reproduced in Appendix 1.

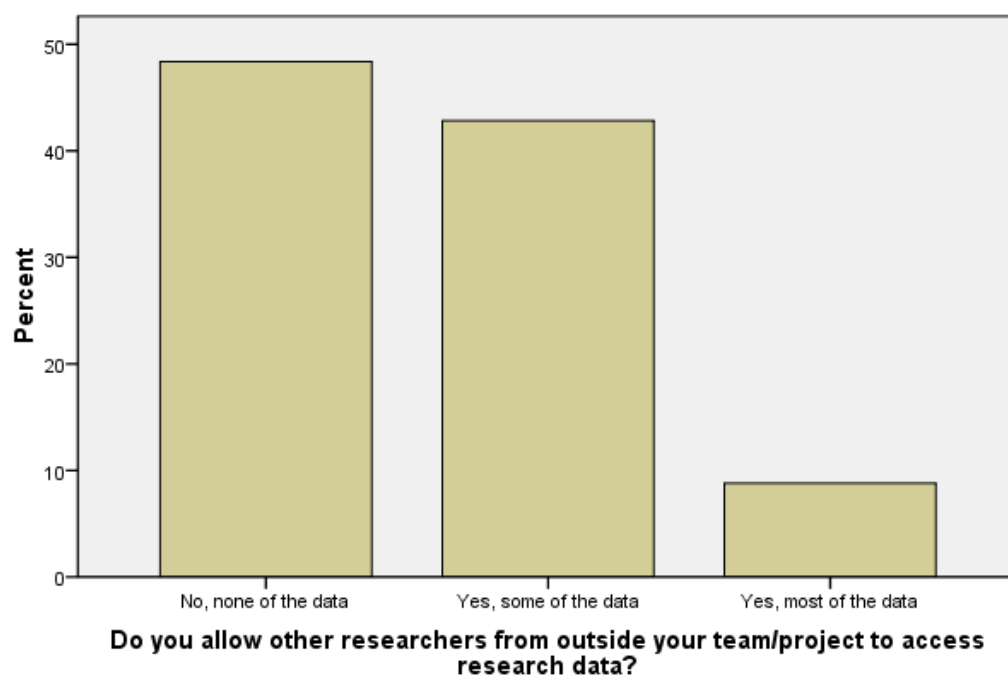
Q19	Data storage needs	Frequency	Percent
1	Less than 500 Gigabytes	20	19.2%
2	500 GB to less than 1 terabyte	3	2.9%
3	1 to less than 10 terabytes	38	36.5%
4	10 terabytes or more	30	28.8%
5	More space, no specific amount	6	5.8%
6	Other answers	7	6.7%
	TOTAL	104	100.0%

5. Data Sharing Practices

Q20. Data access and restrictions

Do you allow researchers from outside your team/project to access your research data?

		Frequency	Percent	Valid Percent
Valid	No, none of the data	253	38.4	48.4
	Yes, some of the data	224	34.0	42.8
	Yes, most of the data	46	7.0	8.8
	Total	523	79.5	100.0
Missing		135	20.5	
Total		658	100.0	



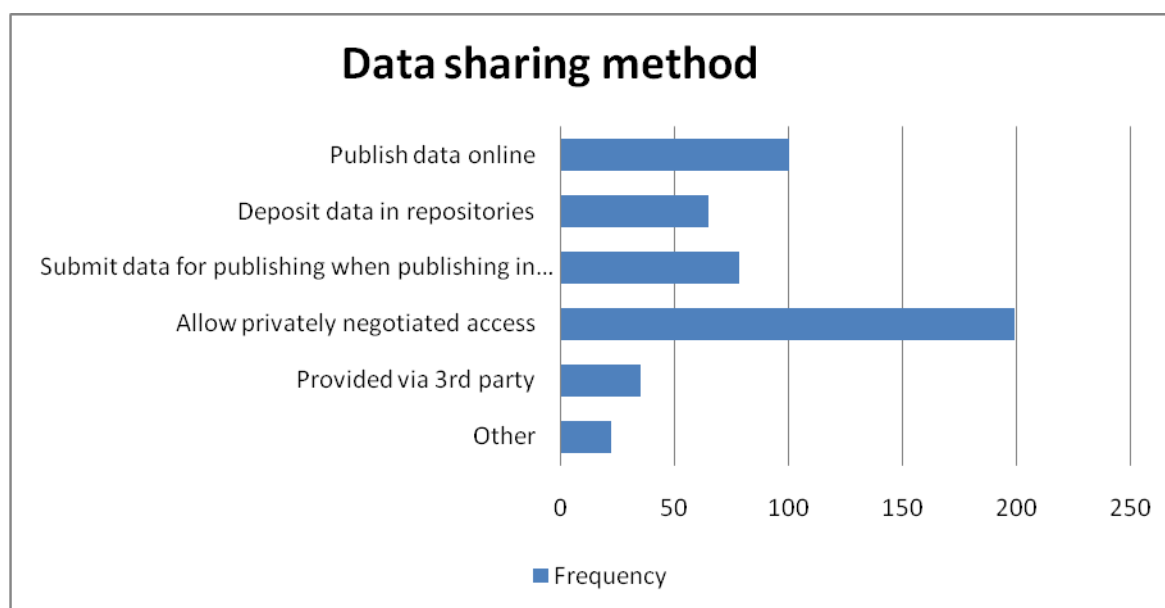
Q21. Data access methods

In which of the following ways do you typically provide access to your data?

Data sharing	Yes	
	Count*	%
Publish data online	100	36.90%
Deposit data in repositories	65	23.99%
Submit data for publishing when publishing in ejournals	78	28.78%
Allow privately negotiated access	199	73.43%
Provided via 3rd party	35	12.92%

Other	22	8.12%
Valid Total	271	100.00%

*Total = 658, Missing or not applicable = 387



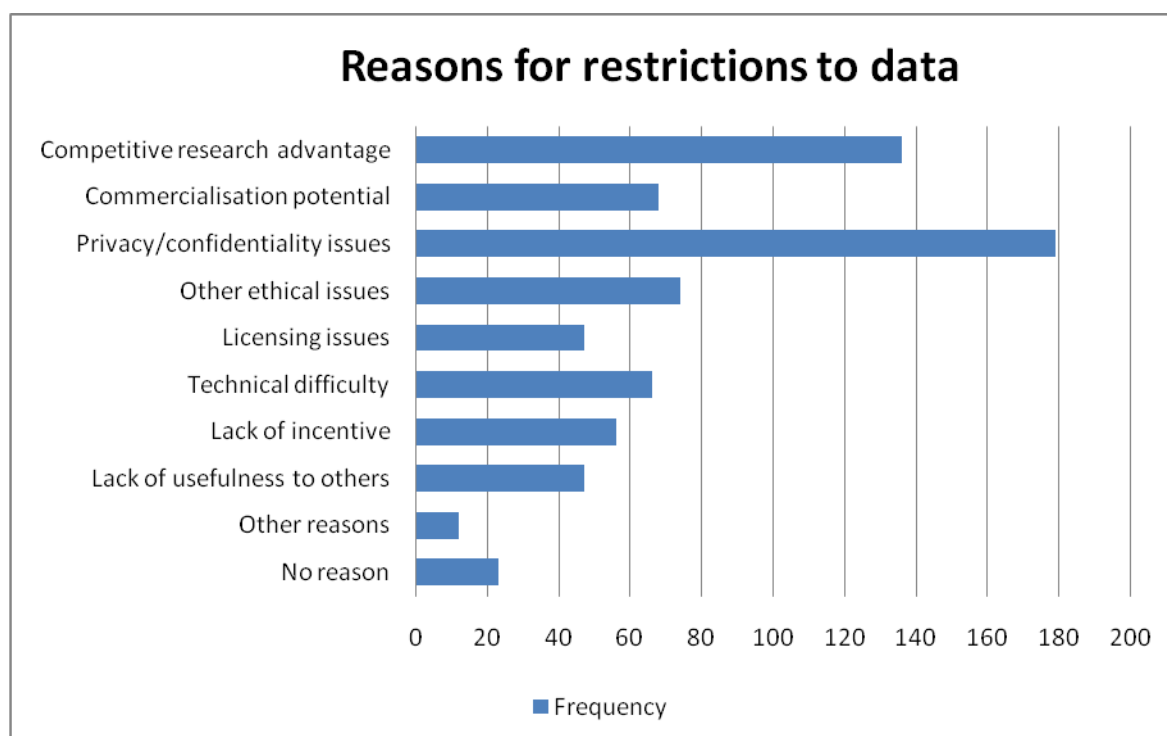
Q22. Reasons for data restriction

If there are any restrictions on accessing your data, what are the reasons for these restrictions?

Reasons for restrictions	Yes	
	Count*	%
Competitive research advantage	136	43.59%
Commercialisation potential	68	21.79%
Privacy/confidentiality issues	179	57.37%
Other ethical issues	74	23.72%
Licensing issues	47	15.06%
Technical difficulty	66	21.15%
Lack of incentive	56	17.95%
Lack of usefulness to others	47	15.06%
Other reasons	12	3.85%

No reason	23	7.37%
Valid total	312	100.00%

* Total = 658, missing or not applicable = 346

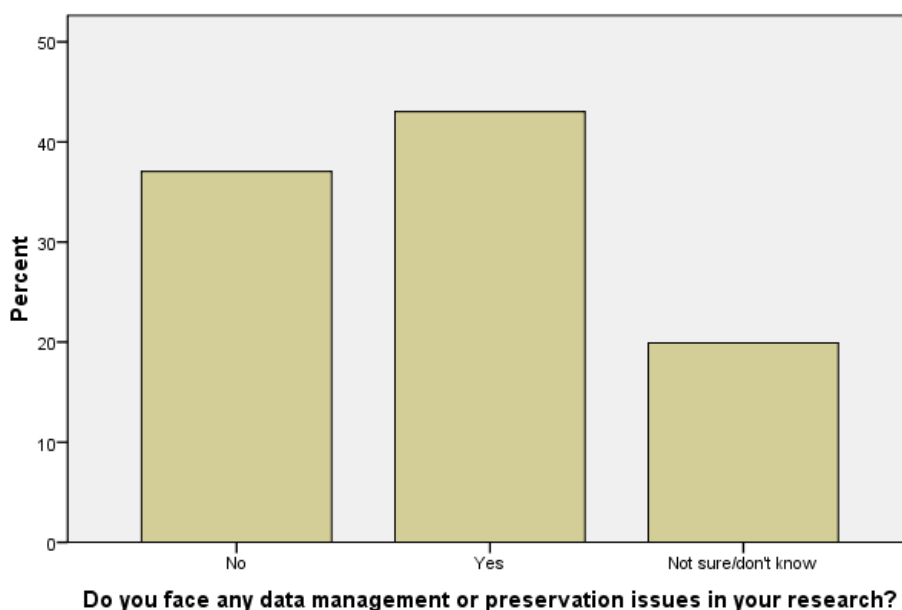


6. Data Management and Preservation

Q23. Data management/preservation issues

Do you face any data management or preservation issues in your research?

	Frequency	Percent	Valid Percent
Valid			
No	186	28.3	37.1
Yes	216	32.8	43.0
Not sure/don't know	100	15.2	19.9
Total	502	76.3	100.0
Missing	156	23.7	
Total	658	100.0	



If you face data management or preservation issues in your research, please describe them.

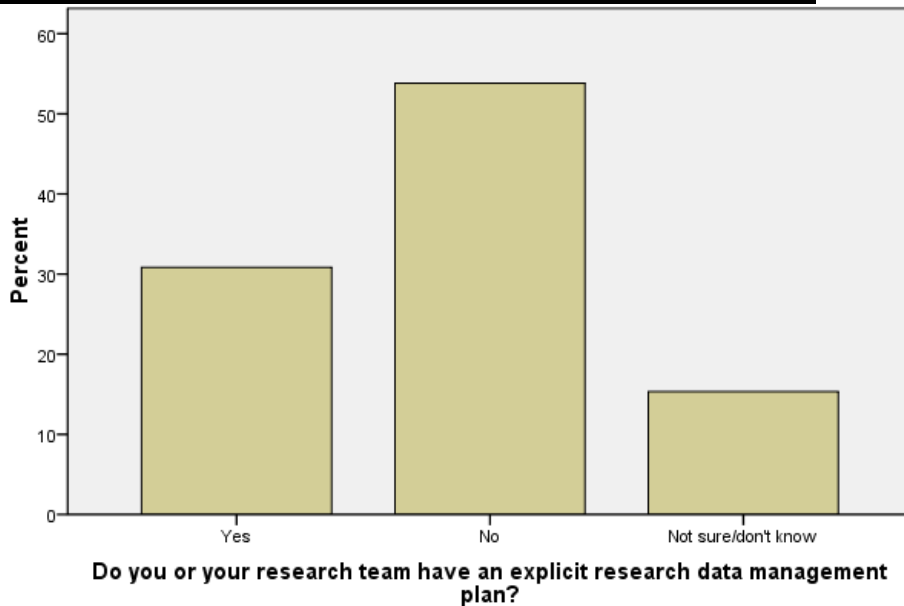
All open-ended responses to this question have been analysed and summarised in the table below. Complete tables of these responses are reproduced in Appendix 1.

Q23	Data management or preservation issues	Frequency	Percent
1	Storage, backup, and archiving: General issues and concerns related to the storage, back up, or archiving of digital data.	24	14.1%
2	Physical data: Storage, back up, or archiving of physical data, including the digitisation of physical data.	12	7.1%
3	Compatibility and data format issues	21	12.4%
4	Storage space: Issues and concerns related to the amount of digital data.	30	17.6%
5	Storage duration: Issues related to the security or confidentiality of archived and stored data.	31	18.2%
6	Safety: Issues and concerns related to the time digital data needs to be stored.	25	14.7%
7	Resources: Issues related to the lack of funding or dedicated staff to manage data	12	7.1%
8	Data sharing issues	10	5.9%
9	Data management plan or protocol	20	11.8%
10	Other	15	8.8%
	TOTAL	170	100.0%

Q24. Data management plan

Do you or your research team have an explicit research data management plan?

		Frequency	Percent	Valid Percent
Valid	Yes	153	23.3	30.8
	No	267	40.6	53.8
	Not sure/don't know	76	11.6	15.3
	Total	496	75.4	100.0
Missing		162	24.6	
Total		658	100.0	



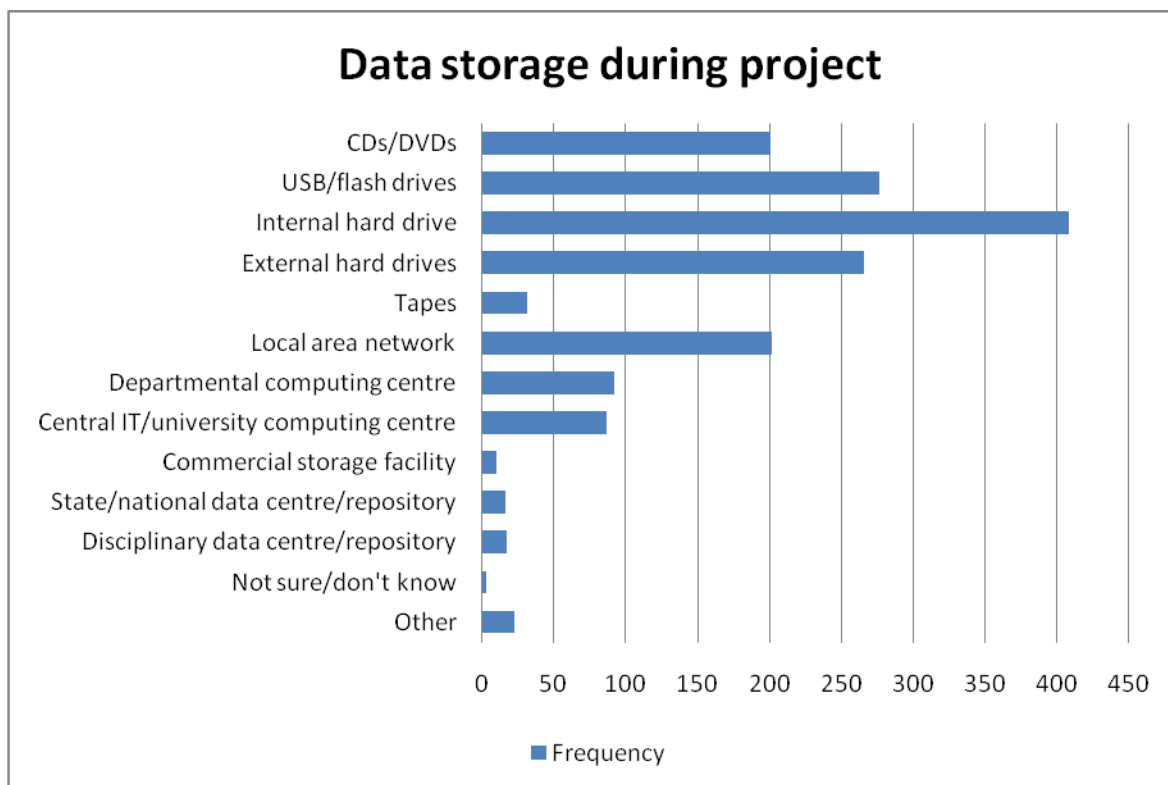
Q25. Data storage during project

Where do you store your data during a project?

Data storage during project	Yes	
	Count*	%
CDs/DVDs	201	39.96%
USB/flash drives	277	55.07%
Internal hard drive	409	81.31%
External hard drives	266	52.88%

Tapes	31	6.16%
Local area network	202	40.16%
Departmental computing centre	92	18.29%
Central IT/university computing centre	87	17.30%
Commercial storage facility	10	1.99%
State/national data centre/repository	16	3.18%
Disciplinary data centre/repository	17	3.38%
Not sure/don't know	3	.60%
Other	22	4.37%
Valid total	503	100.00%

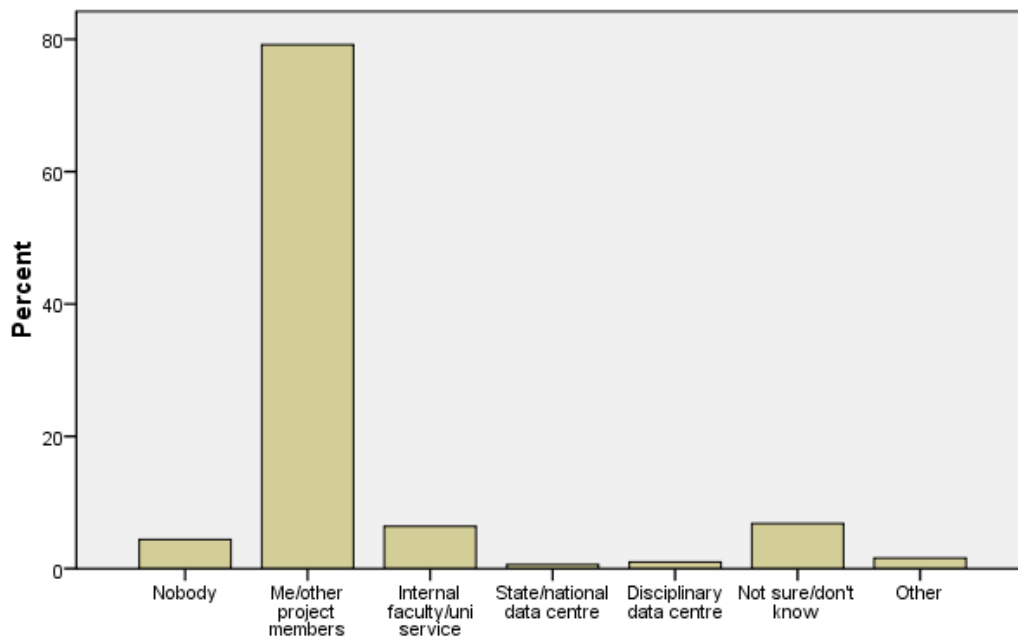
*Total = 658, missing = 155



Q26. Data storage after project completion

Who typically stores and cares for your data after the end of a project?

		Frequency	Percent	Valid Percent
Valid	Nobody	22	3.3	4.4
	Me/other project members	396	60.2	79.2
	Internal faculty/uni service	32	4.9	6.4
	State/national data centre	3	.5	.6
	Disciplinary data centre	5	.8	1.0
	Not sure/don't know	34	5.2	6.8
	Other	8	1.2	1.6
	Total	500	76.0	100.0
Missing		158	24.0	
Total		658	100.0	



Who typically stores and cares for your data after the end of a project?

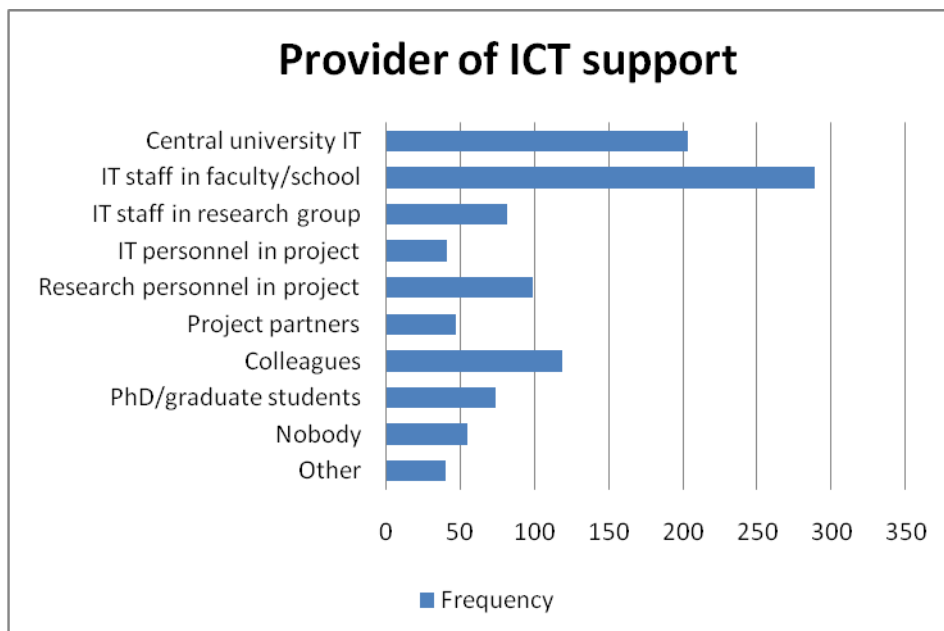
7. eResearch Support, Training, and Services

Q27. ICT support for research

Who typically provides you with ICT-related support for your research?

Provider of ICT support	Yes	
	Count*	%
Central university IT	203	39.65%
IT staff in faculty/school	289	56.45%
IT staff in research group	82	16.02%
IT personnel in project	41	8.01%
Research personnel in project	99	19.34%
Project partners	47	9.18%
Colleagues	119	23.24%
PhD/graduate students	74	14.45%
Nobody	55	10.74%
Other	40	7.81%
Valid Total	512	100.00%

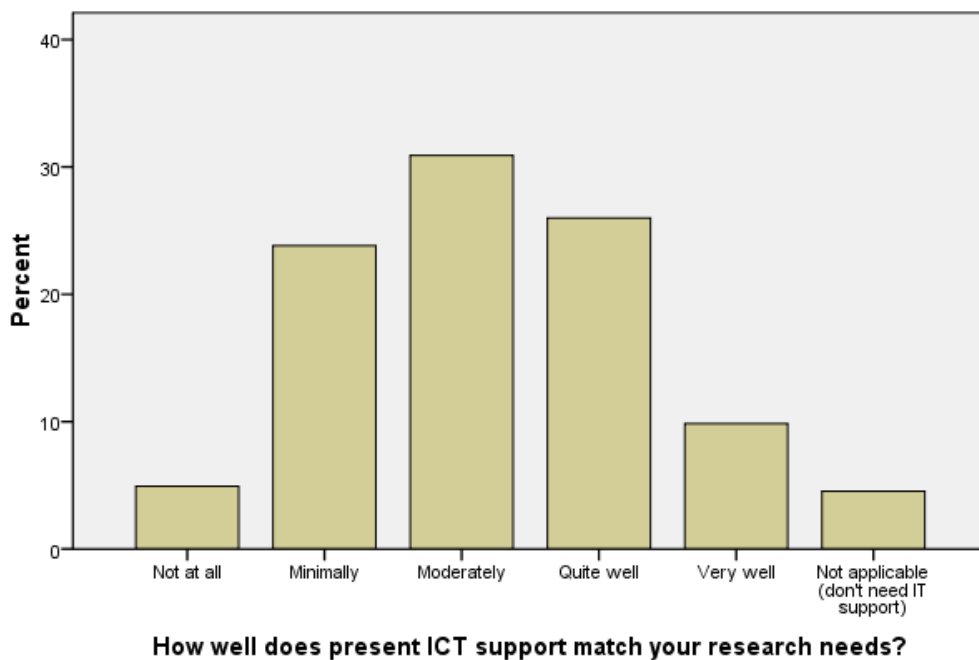
* Total = 658, Missing = 146



Q28. ICT support needs

How well does present ICT support match your research needs?

		Frequency	Percent	Valid Percent
Valid	Not at all	25	3.8	4.9
	Minimally	121	18.4	23.8
	Moderately	157	23.9	30.9
	Quite well	132	20.1	26.0
	Very well	50	7.6	9.8
	Not applicable (don't need IT support)	23	3.5	4.5
	Total	508	77.2	100.0
Missing		150	22.8	
Total		658	100.0	

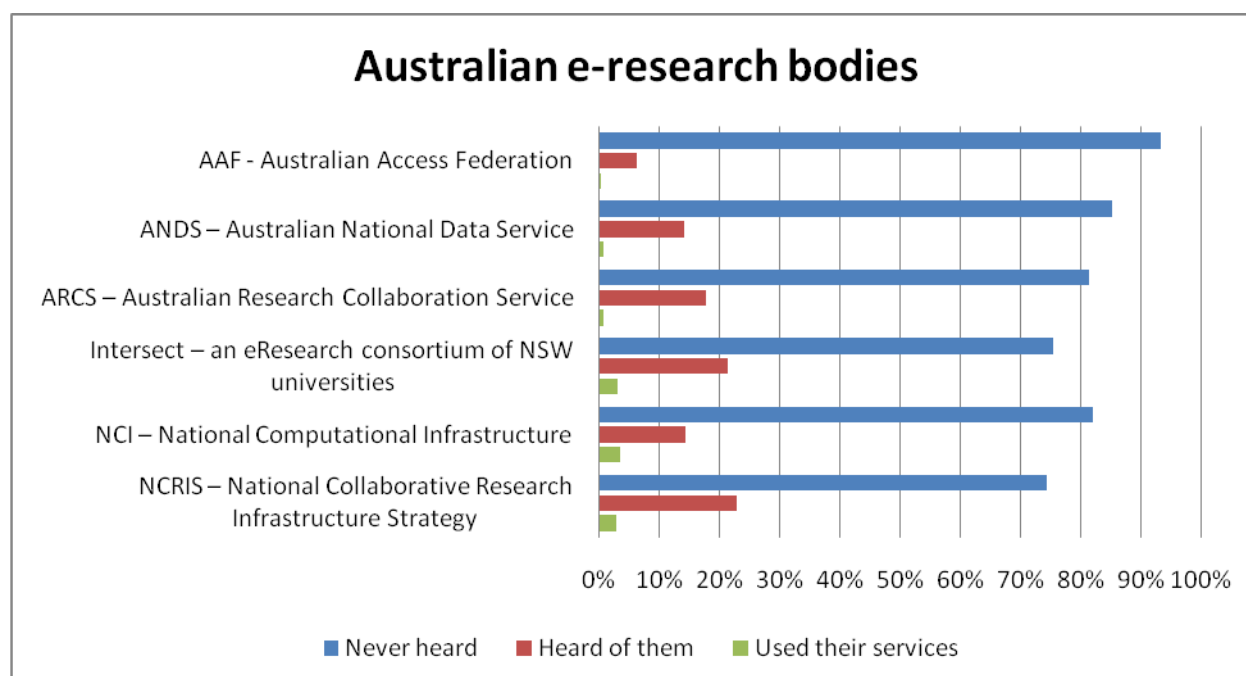


Q29. eResearch related bodies

Have you heard about or used services provided by the following Australian bodies?

Name of body	Never heard		Heard of them		Used their services		Total
	Count	%	Count	%	Count	%	
AAF - Australian Access Federation	467	93.2%	32	6.4%	2	.4%	501
ANDS – Australian National Data Service	428	85.1%	71	14.1%	4	.8%	503
ARCS – Australian Research Collaboration Service	406	81.4%	89	17.8%	4	.8%	499
Intersect – an eResearch consortium of NSW universities	379	75.3%	108	21.5%	16	3.2%	503
NCI – National Computational Infrastructure	409	82.0%	72	14.4%	18	3.6%	499
NCRIS – National Collaborative Research Infrastructure Strategy	371	74.2%	114	22.8%	15	3.0%	500

Total answered question = 510



Q30. ICT support areas

List up to 3 specific ICT technical or human support areas that would enhance your research capacities.

All open-ended responses to this question have been analysed and summarised in the table below. Complete tables of these responses are reproduced in Appendix 1.

Q30	Areas for ICT support	Frequency	Percent
1	Access to specific resources: Software, hardware, and other resources that are discipline-specific or related to data analysis.	53	21.0%
2	Expert support (discipline-specific): Support and services in the form of software expertise that is discipline specific or related to specific data analysis.	85	33.7%
3	Access to general resources: Software (e.g. wiki, word processors) and hardware (e.g. computer capacity and performance) that is not discipline specific or related to data analysis.	48	19.0%
4	Expert support (general): Support and services in the form of general ICT expertise.	66	26.2%
5	Storage: Issues and needs related to the storage of data.	38	15.1%
6	Backup: Issues and needs related to data backup.	10	4.0%
7	Data management: Issues and needs related to data management, including archiving.	61	24.2%
8	Collaboration: Support for collaboration.	21	8.3%
9	Training: Training to develop skills for using software and digital technologies, both discipline specific and general.	24	9.5%
10	Other	32	12.7%
	TOTAL	252	100.0%

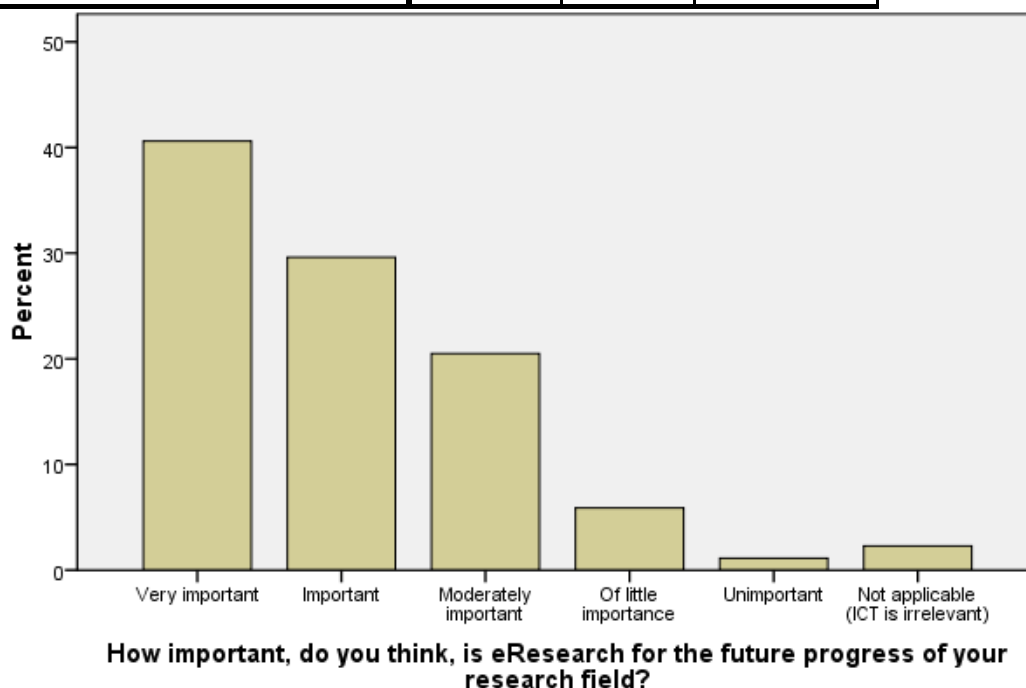
8. Attitudes Towards Digital Technologies in Research

Q31. Importance of eResearch

How important do you think is eResearch for the future progress of your research field?

	Frequency	Percent	Valid Percent
Valid Very important	214	32.5	40.6
Important	156	23.7	29.6
Moderately important	108	16.4	20.5
Of little importance	31	4.7	5.9
Unimportant	6	.9	1.1

Not applicable (ICT is irrelevant)	12	1.8	2.3
Total	527	80.1	100.0
Missing	131	19.9	
Total	658	100.0	



Q32. Future applications of ICT

Write up to 3 phrases that describe the most important future applications of ICT in your research field.

All open-ended responses to this question have been analysed and summarised in the table below. Complete tables of these responses are reproduced in Appendix 1.

Q32	Future applications of ICT	Frequency	Percent
1	Delivery of services	16	5.9%
2	Access to and collection of data	76	28.0%
3	Applications of ICT related to data analysis:		
3.1	Data simulation and modelling	25	9.2%
3.2	Data mining	15	5.5%

3.3	Quantitative data analysis	13	4.8%
3.4	Textual and linguistic data analysis	12	4.4%
3.5	Visual and spatial data analysis	33	12.2%
3.6	Other data handling and analysis	58	21.4%
4	Computational power	22	8.1%
5	Storage of data	37	13.7%
6	Back up, archiving, and management of data	60	22.1%
7	Virtual communication and collaboration in research	92	33.9%
8	Dissemination of research findings	34	12.5%
9	Other	69	25.5%
	TOTAL	271	100.0%

Q33. Challenges to ICT application

Write up to 3 phrases that describe the most important challenges for the application of ICT in your research field.

All open-ended responses to this question have been analysed and summarised in the table below. Complete tables of these responses are reproduced in Appendix 1.

	Q33 Challenges to ICT application	Frequency	Percent
1	Funding	40	16.3%
2	ICT services and policy:		
2.1	Technical support	35	14.2%
2.2	Policy and administration	17	6.9%
3	Ethics and safety	25	10.2%
4	Access to and adequacy of ICT:		
4.1	Access to and adequacy of ICT (general)	20	8.1%
4.2	Computers and computing power	20	8.1%
4.3	Bandwidth or online infrastructure	19	7.7%
4.4	Software	14	5.7%
5	Data analysis	36	14.6%
6	Data related needs and issues:		
6.1	Storage and size of data	38	15.4%
6.2	Data sharing, preservation, and management	46	18.7%
7	Training or ICT expertise development	64	26.0%
8	Collaboration and competition	17	6.9%
9	Compatibility or interoperability of systems or technologies	10	4.1%
10	Other	46	18.7%

TOTAL	246	100.0%
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9. Further Information

Q34. Would you be willing to participate in a follow-up focus group?

	Frequency	Percent	Valid Percent
Valid Yes	173	26.3	33.3
No	346	52.6	66.7
Total	519	78.9	100.0
Missing	139	21.1	
Total	658	100.0	

Q35. Would you be willing to participate in discussions with a group aimed at developing eResearch support and services in NSW?

	Frequency	Percent	Valid Percent
Valid Yes	154	23.4	30.0
No	359	54.6	70.0
Total	513	78.0	100.0
Missing	145	22.0	
Total	658	100.0	

Q36. Would you like to receive a brief report of the survey?

	Frequency	Percent	Valid Percent
Valid Yes	305	46.4	58.9
No	213	32.4	41.1
Total	518	78.7	100.0
Missing	140	21.3	
Total	658	100.0	

Q37. Would you like to receive announcements about other eResearch activities from Intersect (an eResearch consortium of NSW universities)?

	Frequency	Percent	Valid Percent
Valid Yes	269	40.9	52.2
No	246	37.4	47.8
Total	515	78.3	100.0
Missing	143	21.7	
Total	658	100.0	

Q38. Would you like to receive announcements about other eResearch activities from your university?

	Frequency	Percent	Valid Percent
Valid Yes	309	47.0	60.4
No	203	30.9	39.6
Total	512	77.8	100.0
Missing	146	22.2	
Total	658	100.0	

Q40. If you have any comments about this survey, or would like to provide more information or comments about the use of digital technologies in your research, please use the space below.

Analysis of these responses will be released shortly.