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Historic England

The FAIRness of archaeological data:

an examination of bioarchaeological and Historic High Street datasets.

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Introduction

What are the FAIR data principles

Why be FAIR

Application in:

Bioarchaeology	Historic High Street

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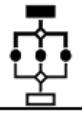
The FAIR data principles

(Wright and Richards, 2020)

Findable	Persistent IDs 	Metadata schemas 	PIDs in metadata 	
Accessible	Communication protocols 	Harvestable metadata and Endpoints 	Open Access 	Repositories 
Interoperable	Metadata models 	Standardised file formats 	Ontologies 	Controlled vocabulary 
Reusable	Systematic documentation 	Community standards 	Detailed metadata 	Usage licence 

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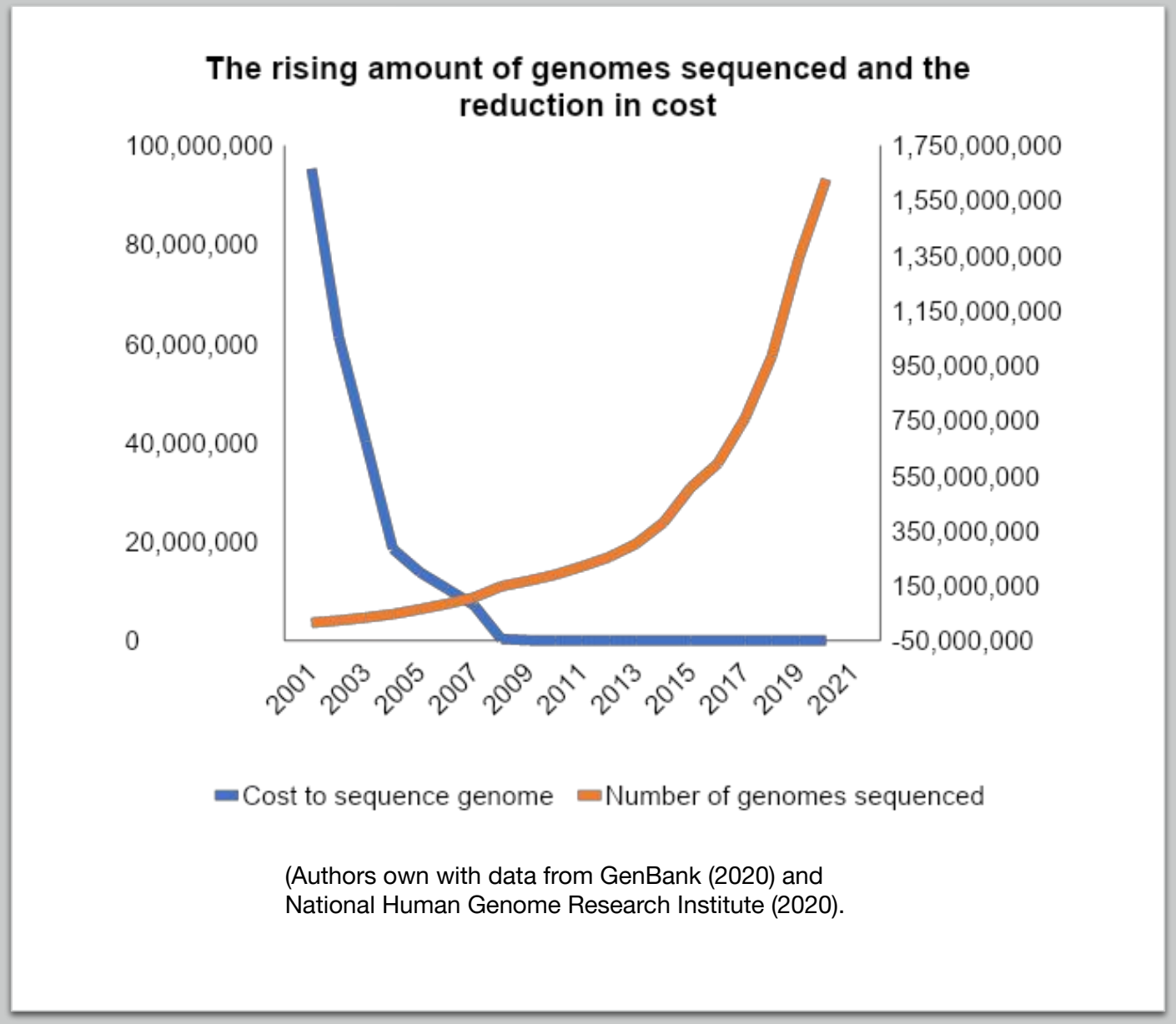
Why be FAIR

- Archaeology is a destructive process (Oakley, 2005, 171; Pálsdóttir, 2019, 2)
- More and more data created (Green *et al.*, 2017, 180).
- Increase in misuse of PDF format (Evans and Moore, 2014, p. 124; Kansa et al. 2020, p. 45; Sobotkova, 2018, p. 121).



(Authors own with data from GenBank (2020) and National Human Genome Research Institute (2020).

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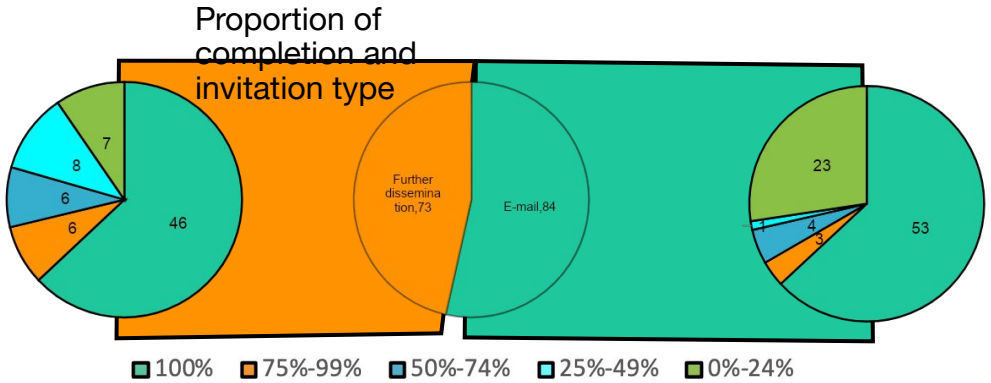
How FAIR is bioarchaeology

- Questionnaire
  - (154 responses)
  - Level of interactivity between specialisms.
  - How FAIR is bioarchaeology ?



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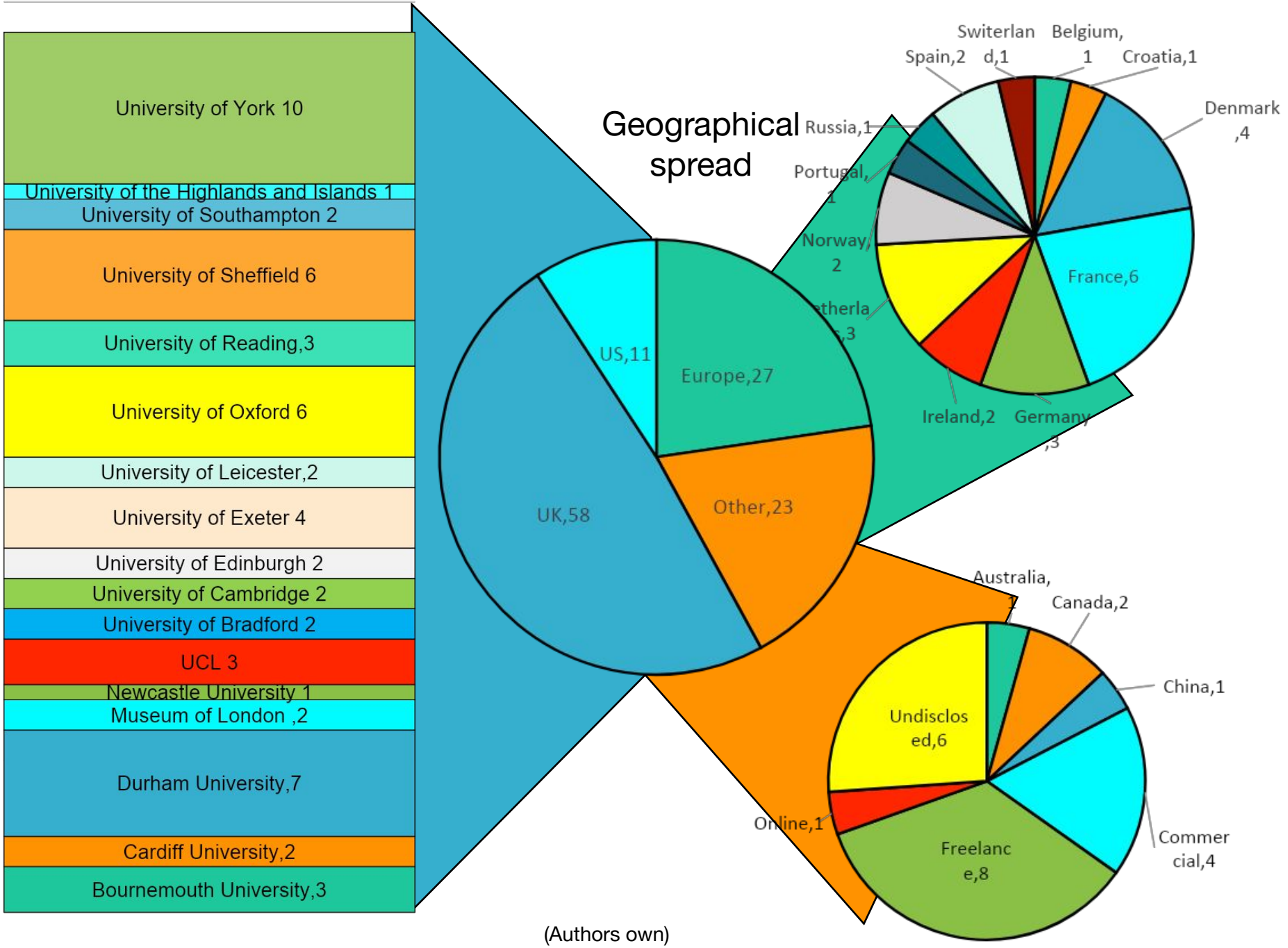
University of York 10
University of the Highlands and Islands 1
University of Southampton 2
University of Sheffield 6
University of Reading,3
University of Oxford 6
University of Leicester,2
University of Exeter 4
University of Edinburgh 2
University of Cambridge 2
University of Bradford 2
UCL 3
Newcastle University 1
Museum of London ,2
Durham University,7
Cardiff University,2
Bournemouth University,3
Geographical spread
US,11
Europe,27
UK,58
Other,23
Switerlan d,1
Belgium, 1
Spain,2
Croatia,1
Denmark ,4
Russia,1
Portugal, 1
Norway, 2
France,6
Ireland,2
Germany
Australia, 1
Canada,2
China,1
Undisclos ed,6
Online,1
Freelanc e,8
Commer cial,4

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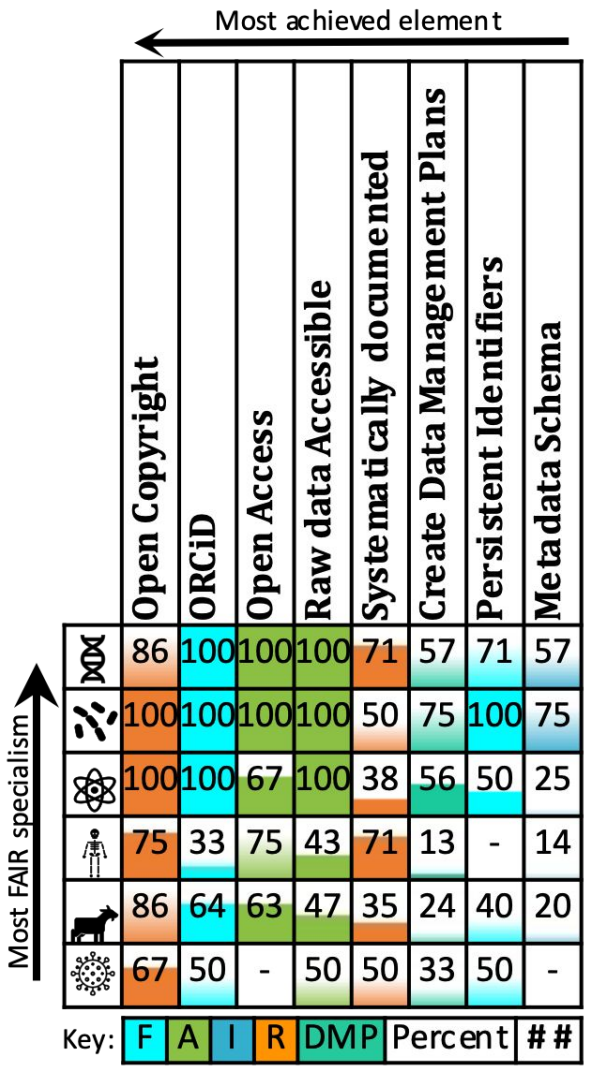
Results

- Reuse of data is important
- Some extent of reuse present
- No standardised process
- Data is not FAIR



(Authors own)

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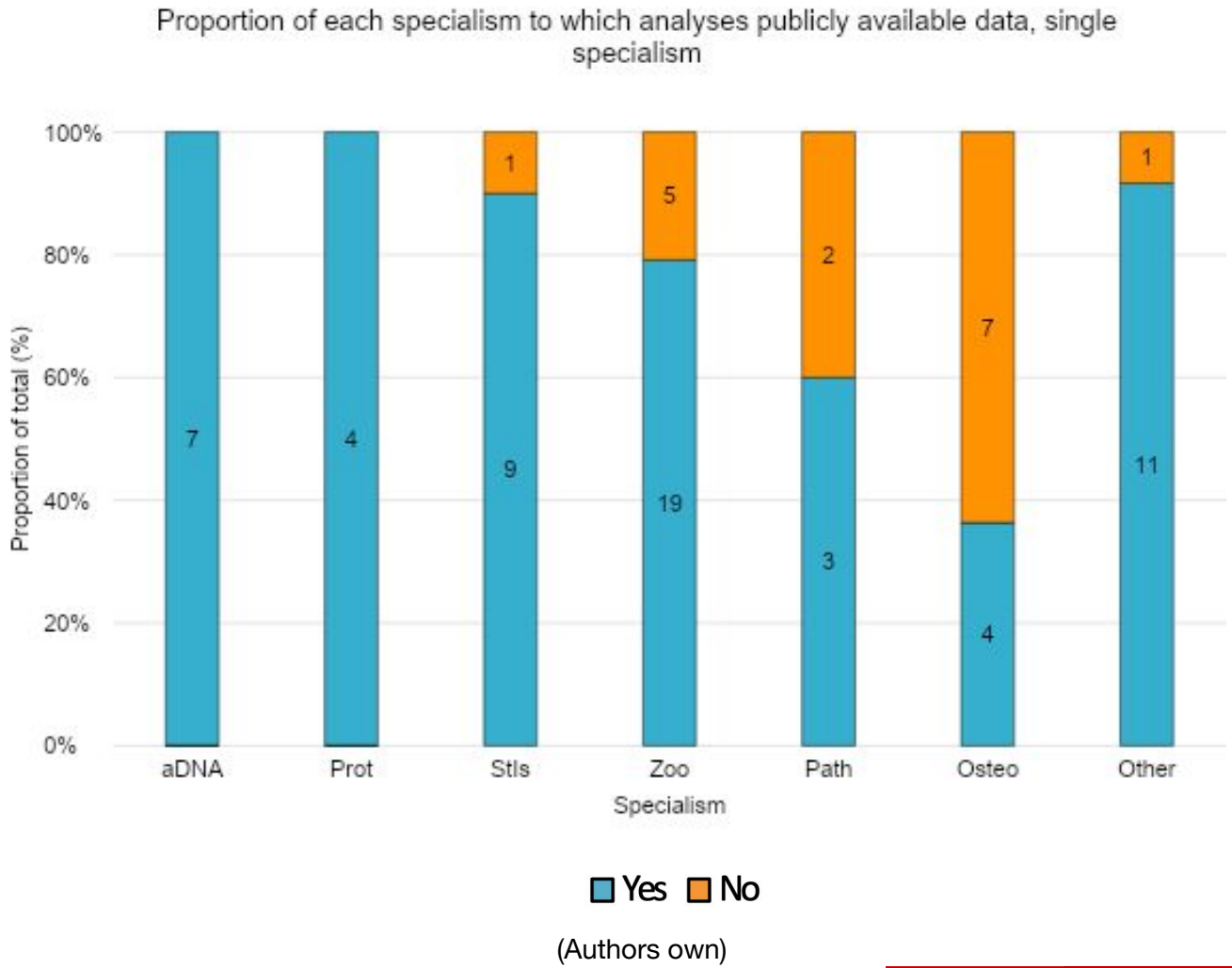
Current reuse of data: between specialisms

(Authors own)

Reuse of data



(Authors own)

Open Access

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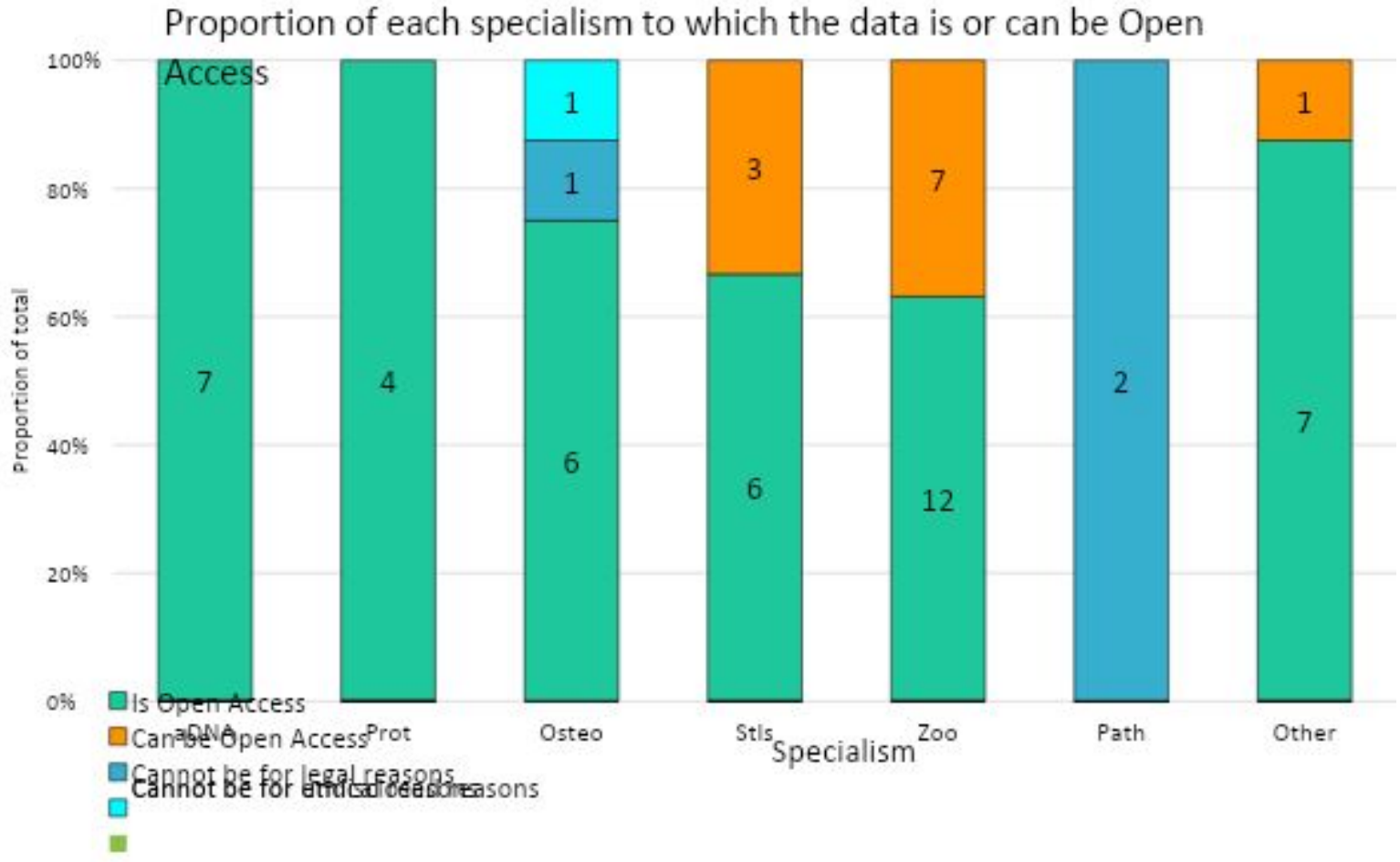

(Authors own)

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Data type

	PDF	.XLSX	CSV	JPEG	RAW	FastQ	BAM	Other
aDNA	14%	29%	14%	14%	0%	86%	71%	43%
Osteoarchaeology	67%	33%	17%	33%	0%	0%	0%	92%
Paleopathology	60%	0%	0%	40%	0%	0%	0%	60%
Pealeoproteomics	0%	0%	50%	0%	100%	0%	0%	75%
StableIsotopes	80%	70%	40%	20%	0%	0%	0%	100%
Zooarchaeology	56%	36%	32%	36%	0%	0%	0%	72%
Other	67%	42%	25%	8%	0%	0%	0%	100%

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Results summary

>50% participants	✓
50% participants	-

F	Persistent identifiers	✓	-		✓	-	
	ORCiDs	✓		-	✓	✓	✓
A	Open Access	✓	✓		✓	✓	✓
	Raw accessible	✓		-	✓	✓	
I	Metadata	✓			✓		
	Data type	FASTQ	PDF	PDF	RAW	PDF	PDF
	Level of process	Raw	Fully	Partly	Raw	Fully	Fully
R	Copyright (none)	✓	✓	✓	✓	✓	✓
	Syst. Doc.	✓	✓	-	-		
	Data reused	✓	✓	✓	-	✓	✓
DMP	Create	✓			✓	✓	

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Interoperable datasets

- Rise of “Grey Literature” and misuse of PDF format
- NLP and NER can unlock this data (Brandsen *et al.*, 2021)
- NLP – Processing of textual documents
- NER – Recognition and classifying of terms (Richards *et al.*, 2011)

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Previous works

(Richards *et al.* 2011; Tudhope *et al.* 2011; May *et al.* 2012; Binding and Tudhope 2016; Talboom 2017)

Archaeotools 2007	NLP Guided search Machine learning
STAR 2007	Ontology GATE Developer
STELLAR 2010	
SENESCHAL 2013	Controlled vocabulary
Zooarch Entity Search 2017	Basis of project

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Archaeology Data Service

(Richards 1997, 1057; Wright 2019)

26 YEARS

FREELY DISSEMINATE DIGITAL RESOURCES MADE BY RESEARCH

NATIONAL ARCHIVE FOR ARCHAEOLOGICAL DATA

OVER 1 MILLION FILES

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(Keily 2017)

Crossrail

200 ARCHAEOLOGISTS
OVER 10,000 ARTEFACTS

42 KM NEW TUNNELS AT
A DEPTH OF 30-40M

CLOSED EXAMPLE OF
DOCUMENTS

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Methods

Document selection

Document annotation

Evaluation

Reliable,
time saving,
accessible,
useful and
reuse again

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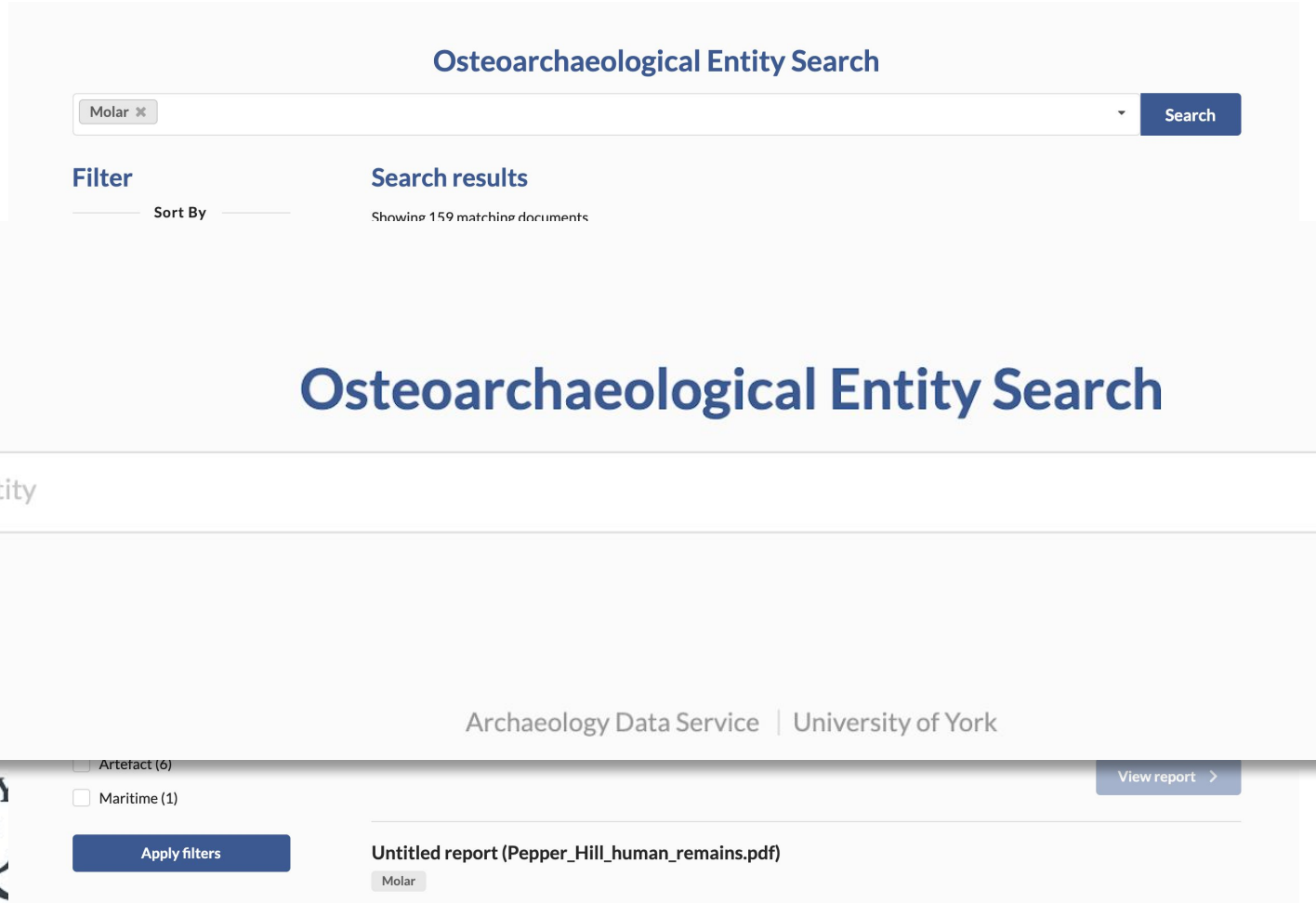
How to use the tool



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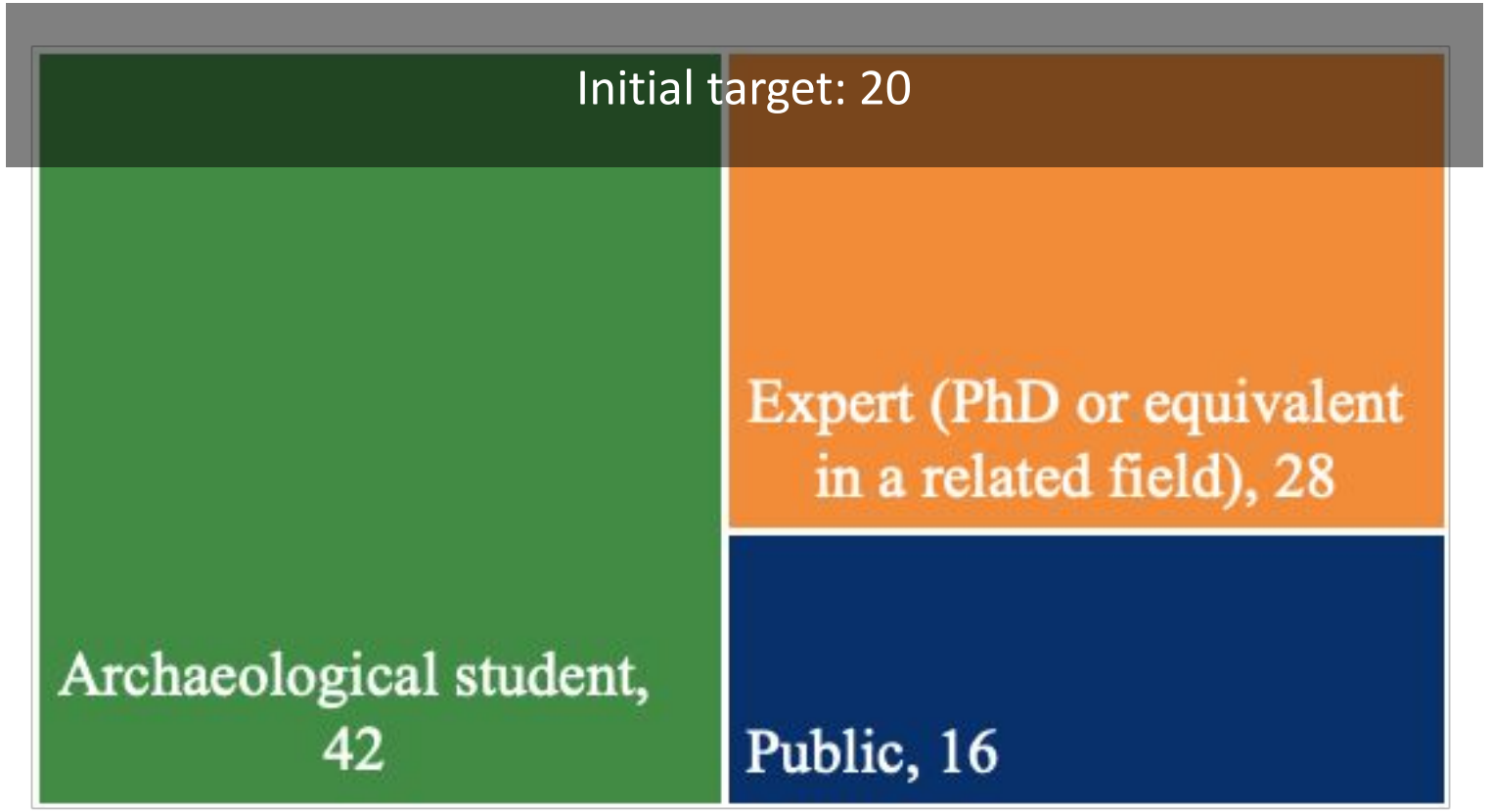
Participants



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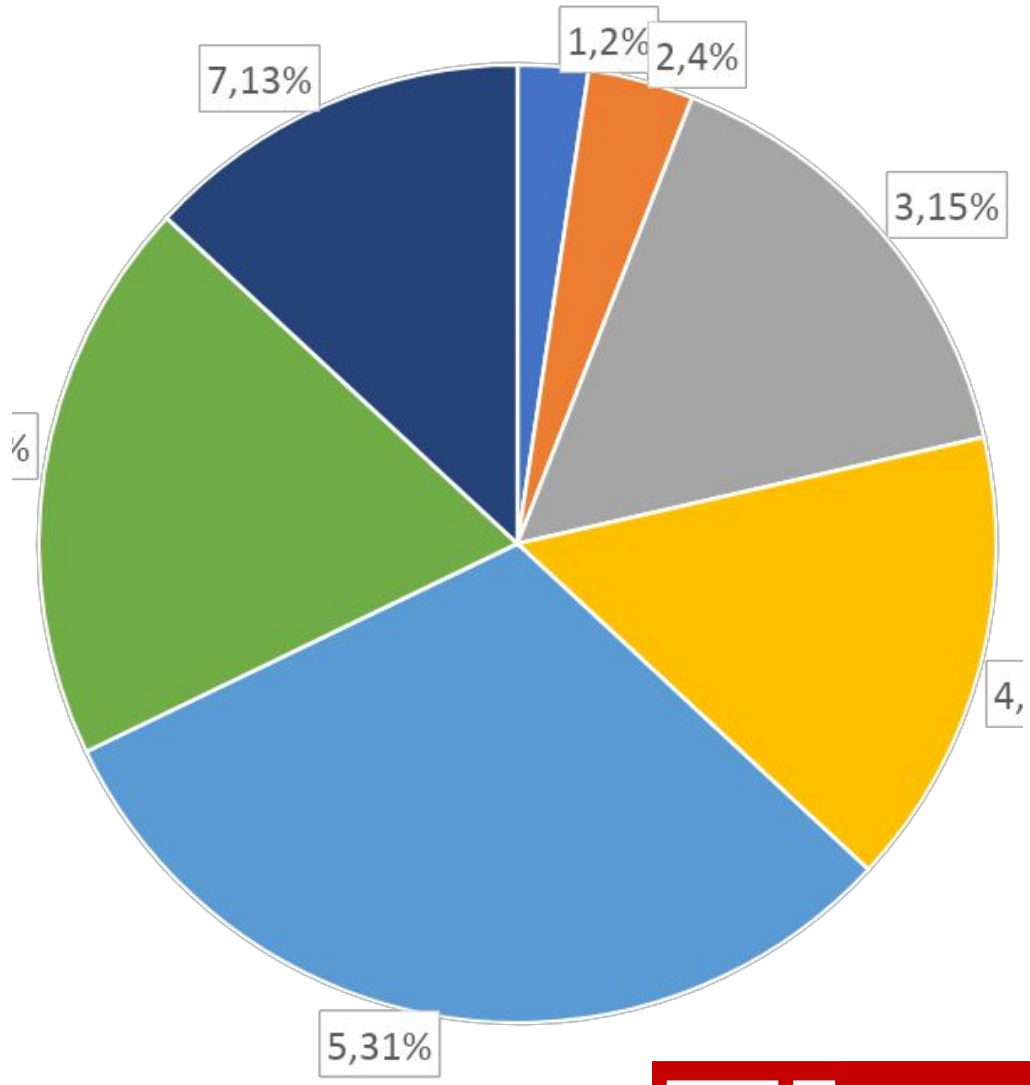
Are the results reliable?

Mean	Modal	Partially met	Fully met
4.79	5	3.5	5.25



(Authors own)

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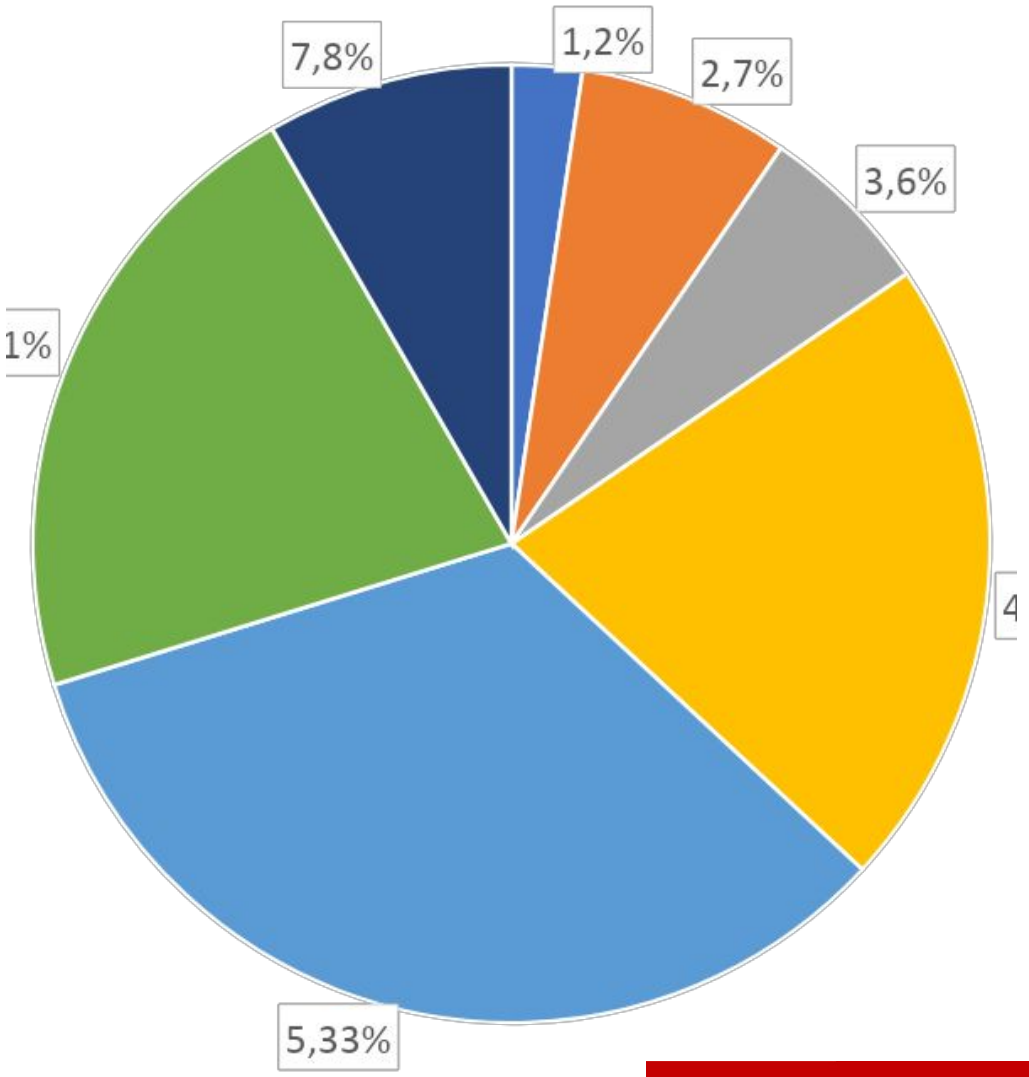
Is it time saving?

Mean	Modal	Partially met	Fully met
4.74	5	3.5	5.25



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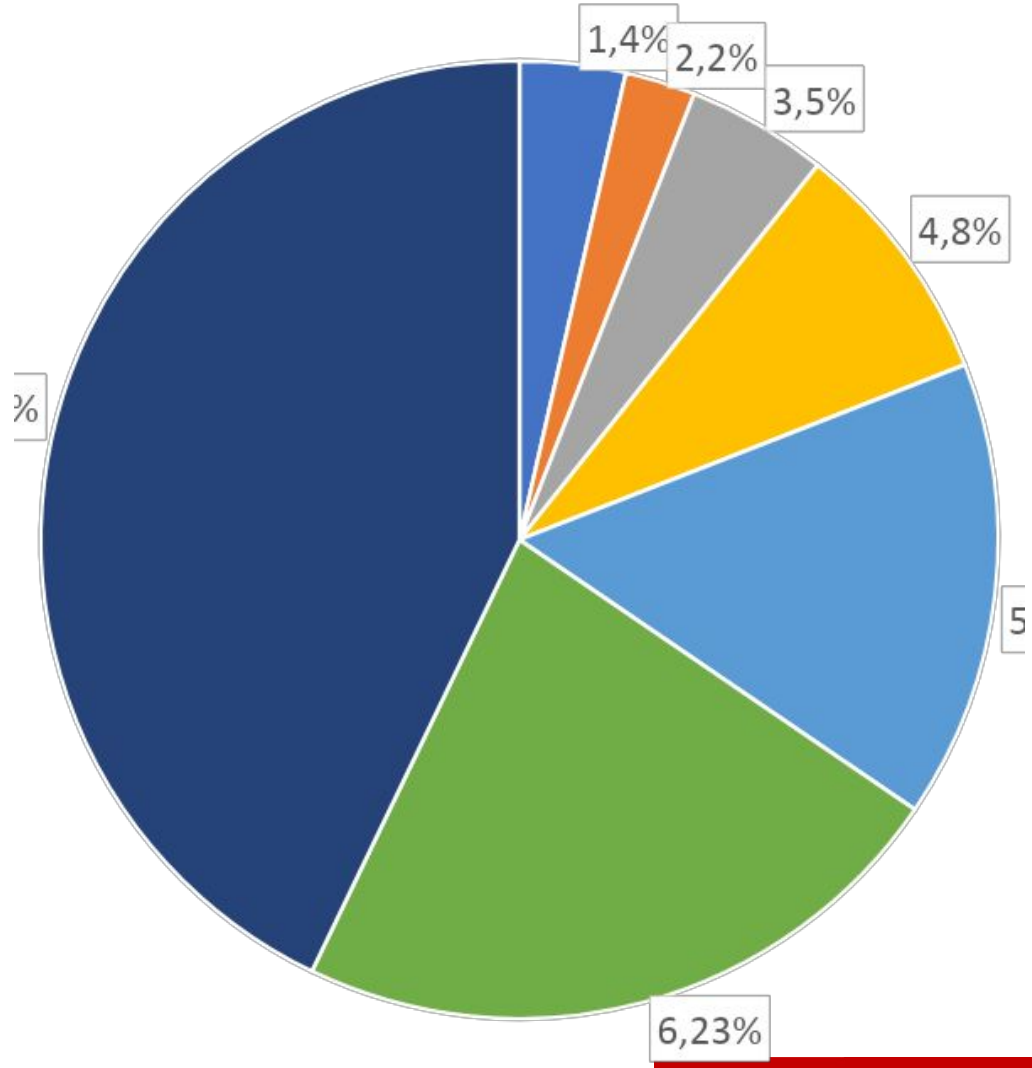
How accessible was it?

Mean	Modal	Partially met	Fully met
5.69	7	3.5	5.25



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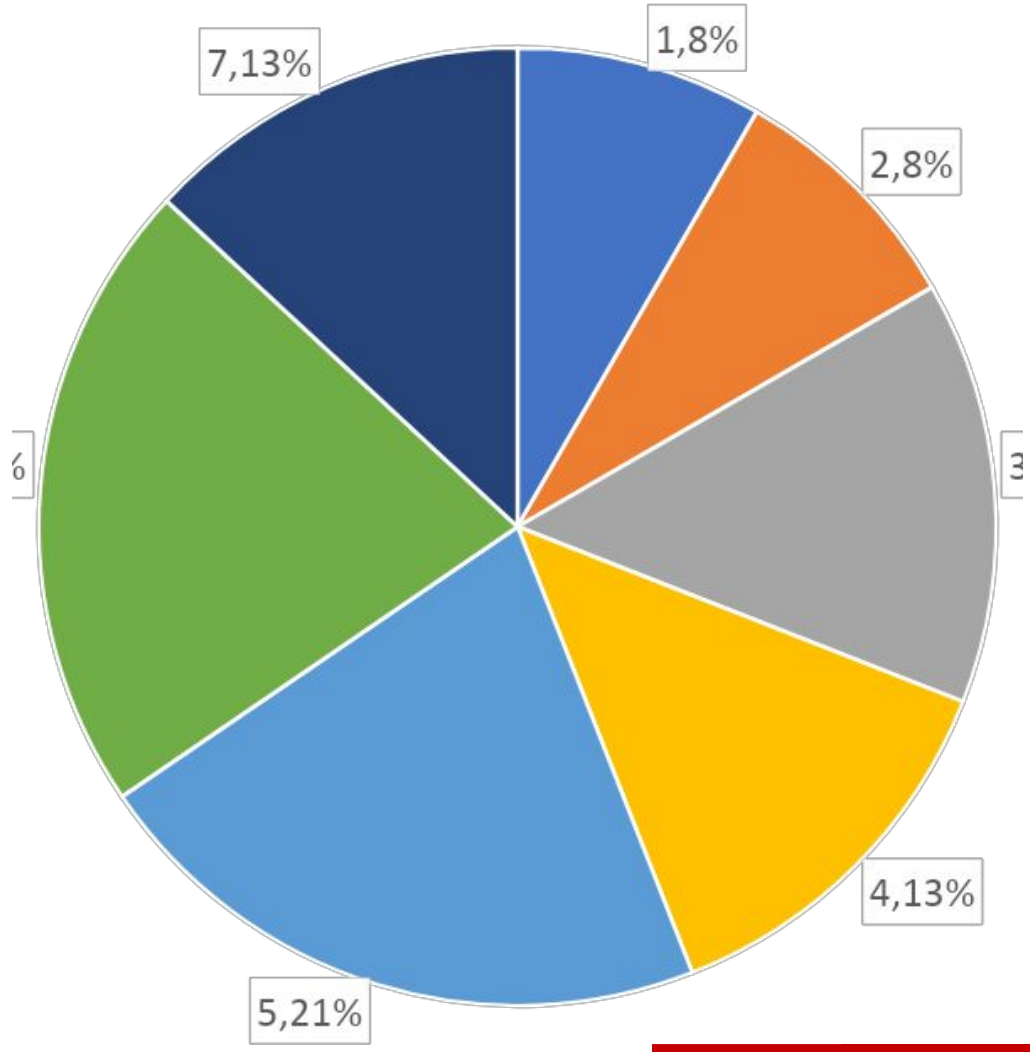
Would you use again?

Mean	Modal	Partially met	Fully met
4.48	5&6	3.5	5.25



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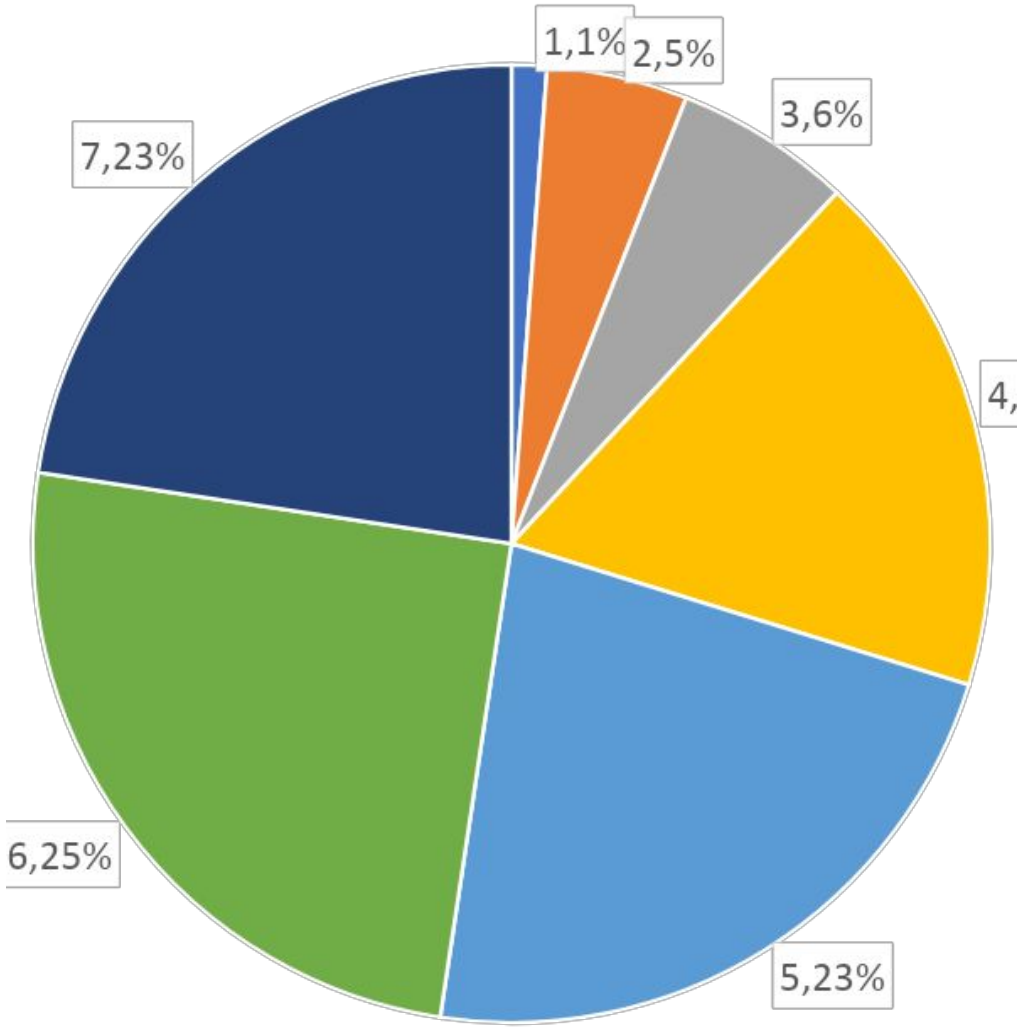
Is it useful for archaeologists?

Mean	Modal	Partially met	Fully met
5.21	6	3.5	5.25



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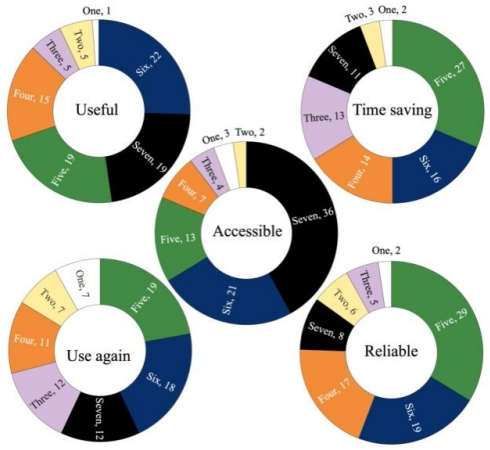
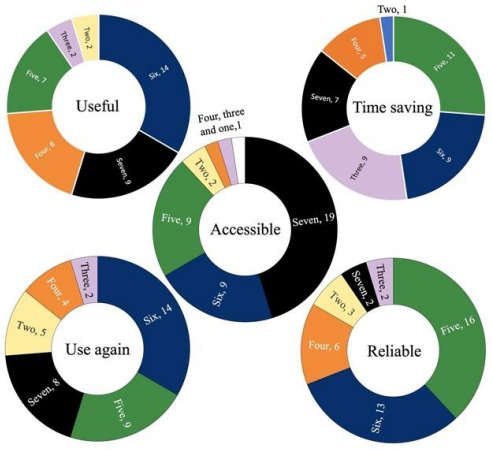


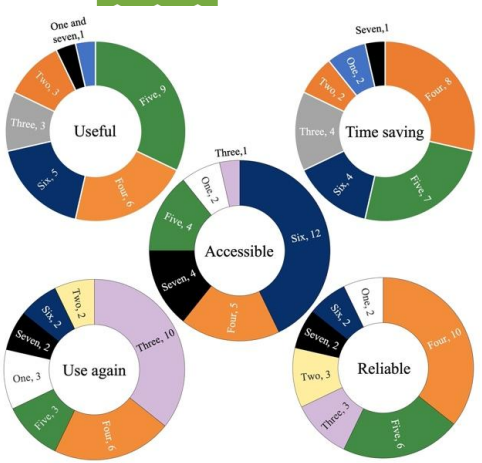
All

Number of participants: 86	Time saving		Reliable		Accessible		Use again		Useful	
1	2	2%	2	2%	3	3%	7	8%	1	1%
2	3	3%	6	7%	2	2%	7	8%	5	6%
3	13	15%	5	6%	4	5%	12	14%	5	6%
4	14	16%	17	20%	7	8%	11	13%	15	17%
5	27	31%	29	34%	13	15%	19	22%	19	22%
6	16	19%	19	22%	21	24%	18	21%	22	26%
7	11	13%	8	9%	36	42%	12	14%	19	22%
Minimum	1		1		1		1		1	
Maximum	7		7		7		7		7	
Mode	5		5		7		5		6	
Mean	4.78		4.79		5.70		4.51		5.19	
Range	6		6		6		6		6	



Students

Number of participants: 42	Time saving		Reliable		Accessible		Use again		Useful	
1	0	0%	0	0%	1	2%	0	0%	0	0%
2	1	2%	3	7%	2	5%	5	12%	2	5%
3	9	21%	2	5%	1	2%	2	5%	2	5%
4	5	12%	6	14%	1	2%	4	10%	8	19%
5	11	26%	16	38%	9	21%	9	21%	7	17%
6	9	21%	13	31%	9	21%	14	33%	14	33%
7	7	17%	2	5%	19	45%	8	19%	9	21%
Minimum	2		2		1		2		2	
Maximum	7		7		7		7		7	
Mode	5		5		7		6		6	
Mean	4.93		4.95		5.81		5.17		5.33	
Range	5		5		6		5		5	

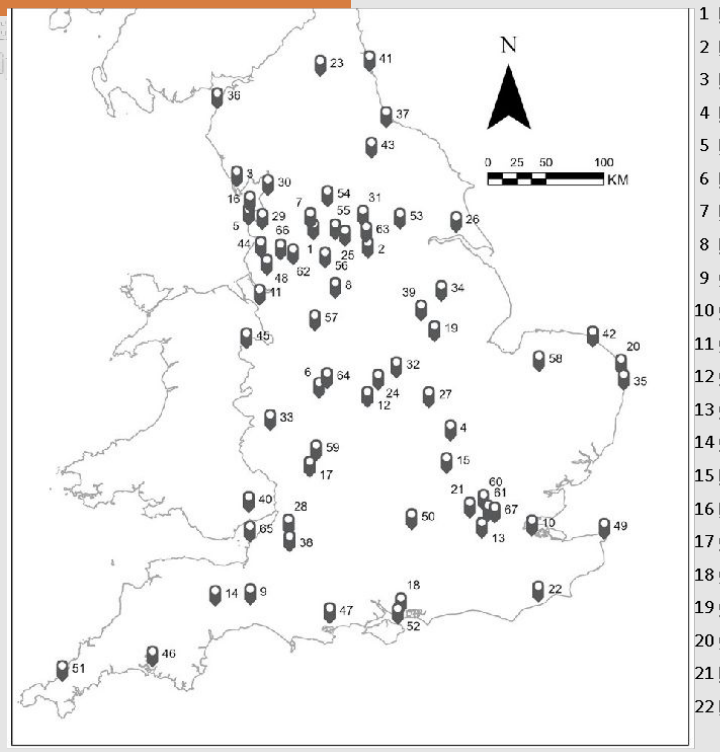


Experts

Number of participants: 28	Time saving		Reliable		Accessible		Use again		Useful	
1	2	7%	2	7%	2	7%	3	11%	1	4%
2	2	7%	3	11%	0	0%	2	7%	3	11%
3	4	14%	3	11%	1	4%	10	36%	3	11%
4	8	29%	10	36%	5	18%	6	21%	6	21%
5	7	25%	6	21%	4	14%	3	11%	9	32%
6	4	14%	2	7%	12	43%	2	7%	5	18%
7	1	4%	2	7%	4	14%	2	7%	1	4%
Minimum	1		1		1		1		1	
Maximum	7		7		7		7		7	
Mode	4		4		6		3		5	
Mean	4.14		4.04		5.18		3.64		4.36	
Range	6		6		6		6		6	

(Authors own)

Osteoarchaeological and palaeopathological entity search



1 Bacup, Rossendale	23 Hexham	46 Plymouth
2 Barnsley	24 Hinckley	47 Poole
3 Barrow in Furness	25 Huddersfield	48 Prescot
4 Bedford	26 Hull	49 Ramsgate
5 Blackpool	27 Kettering	50 Reading
6 Brierley Hill	28 Keynsham	51 Redruth
7 Burnley	29 Kirkham	52 Ryde
8 Buxton	30 Lancaster	53 Selby
9 Chard	31 Leeds	54 Skipton
10 Chatham	32 Leicester	55 Sowerby Bridge
11 Chester	33 Leominster	56 Stalybridge
12 Coventry	34 Lincoln	57 Stoke on Trent
13 Croydon	35 Lowestoft	58 Swaffham
14 Cullompton	36 Maryport, Cumbria	59 Tewkesbury
15 Dunstable	37 Middlesbrough	60 Tottenham
16 Fleetwood	38 Midsomer Norton	61 Tower Hamlets
17 Gloucester	39 Newark-on-Trent	62 Tyldesley, Greater Manchester
18 Gosport	40 Newport	63 Wakefield
19 Grantham	41 North Shields	64 Wednesbury
20 Great Yarmouth	42 North Walsham	65 Weston-super-Mare
21 Harlesden	43 Northallerton	66 Wigan
22 Hastings	44 Ormskirk	67 Woolwich
	45 Oswestry	

(Authors own)

Historic High Street

- Ensuring the accessibility and reuse of data created from the High Street
- HAZ – stakeholders for past
- HSHAZ - economic, social and cultural recovery
- Many datatypes

Previous studies

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- Historic Town Atlas – interoperability of datasets between cities
- EUS and HLC – how characterisation assists FAIR
- Mapping Medieval Chester – the relationships between datasets
- City Witness – how interoperability helps with lack of contemporary
- Know Your Place – inclusion of community datasets
- Layers of London – how to access community datasets with iteration
- CHARTEX – how to access textual documents using NLP

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Methodology

Needs Analysis

Ensure the long-term preservation and reusability of data to researchers and public

Iterate strategies of FAIR data

4 case studies

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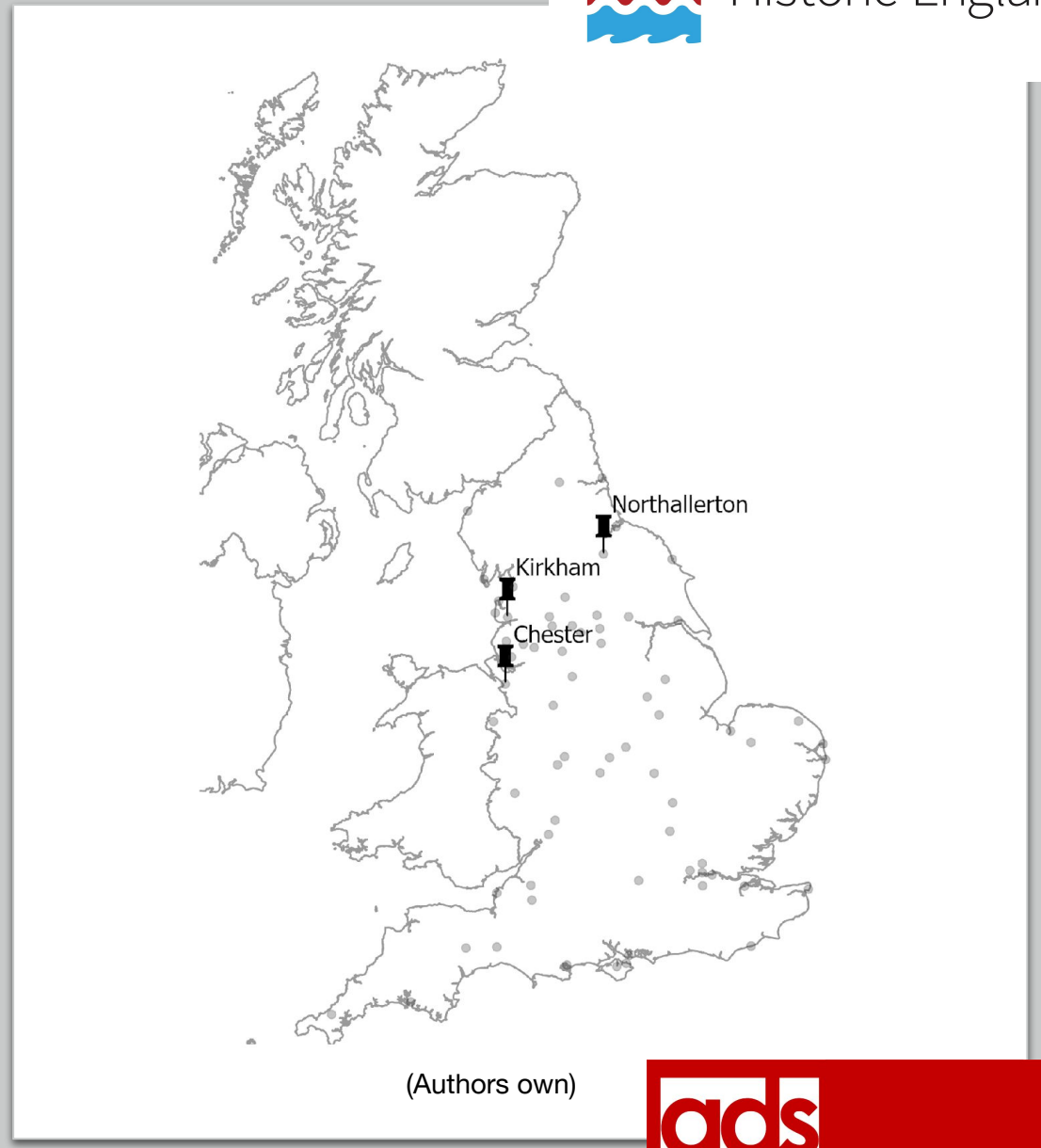
Case studies

1. Chester – “complete” dataset, for data capture and management practices
2. Northallerton – what data is being reused
3. Kirkham – beginning of HSHAZ work
4. Fourth?



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Conclusion

WHAT IS THE FAIR DATA PRINCIPLES

WHY USE THEM

HOW FAIR IS BIOARCHAEOLOGY

HOW TO ACCESS DATA INSIDE PDFS

HOW THEY ASSIST WITH THE HISTORIC HIGH STREET

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Any questions?

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