Digital Preservation and AI - Critical Challenges

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Contents

1. Introduction
2. AI or automation?
3. Research
4. Research – aim and methodology
5. Research results
6. Conclusion

1. Introduction

- Archival institutions – information society challenges
- Emerging technologies
  - change information landscape
  - new user habits and expectations
  - redesign of the relationships between users and institutions
  - traditional practices of archiving are being transformed
- Disruptive technologies
  - artificial intelligence, blockchain, big data, crowdsourcing, gamification, etc.
  - positive disruption of current archival processes (service improvement)

1. Introduction …

- Requirements for the (long-term) preservation (LTP) of digital resources in light of constant change and development of ICT
  - LTP actions = conversion, migration, emulation, virtualization

- LTP challenges – how to preserve
  - authenticity
  - integrity
  - reliability
  - usability
  - non-repudiation
  - security
  - confidentiality
  - proof of ownership

⇒ Trustworthy records

- authentic, accurate, reliable

2. AI or automation?

- "**Automation** saves time and money spent on monotonous, voluminous tasks and gives employees an opportunity to apply themselves to more complex processes."
- "**AI** deals with technologies, systems or even processes that competently mimic how human beings make decisions, react to new information, speak, hear, as well as understand language."

Mark Nasila

https://www.coriniumintelligence.com/insights/artificial-intelligence-vs-automation

- Intelligent automation?

2. AI or automation? …

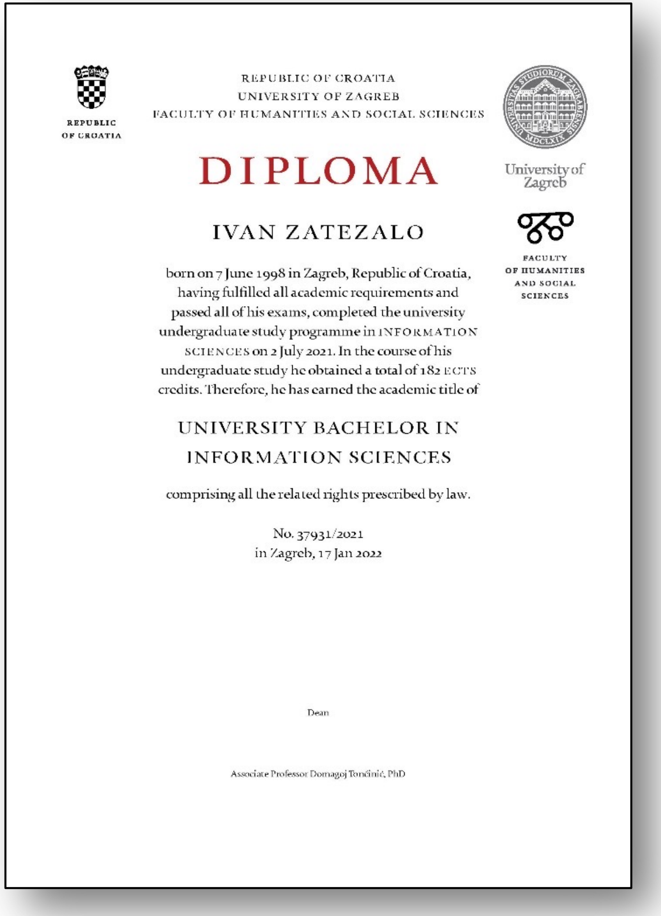
- Robotic Process Automation (RPA)
  - software robots or "bots" (similar to, but more advanced than macros in e.g. Word)
  - automation of series of tasks by mimicking human interaction with (different) software solutions
  - business process automation
  - eliminates high-volume, rule-based repetitive tasks
  - can be combined with other disruptive technologies, e.g. blockchain

2. AI or automation? …

- RPA – example
  - Faculty of Humanities and Social Sciences (FHSS), University of Zagreb – **Blockchain-based diploma authentication system**
  - Motivation for starting the project
    - FHSS annually issues around 1,300 diplomas
    - forged diplomas “issued” by the FHSS have been found by employees
    - requests for authentication of diplomas
      - in one year, we have checked authenticity of 5,500 FHSS diplomas and additional 7,500 diplomas were requested to be authenticated although other faculties issued them (requests wrongly addressed to FHSS)
    - if only 5 mins needed for verification of 1 diploma =
      27 weeks for 1 employee (1/2-year FTE)

2. AI or automation? …

Scanning QR code from the diploma back



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FACULTY OF HUMANITIES AND SOCIAL SCIENCES

University of Zagreb

FACULTY OF HUMANITIES AND SOCIAL SCIENCES

DIPLOMA

IVAN ZATEZALO

born on 7 June 1998 in Zagreb, Republic of Croatia, having fulfilled all academic requirements and passed all of his exams, completed the university undergraduate study programme in INFORMATION SCIENCES on 2 July 2021. In the course of his undergraduate study he obtained a total of 182 ECTS credits. Therefore, he has earned the academic title of

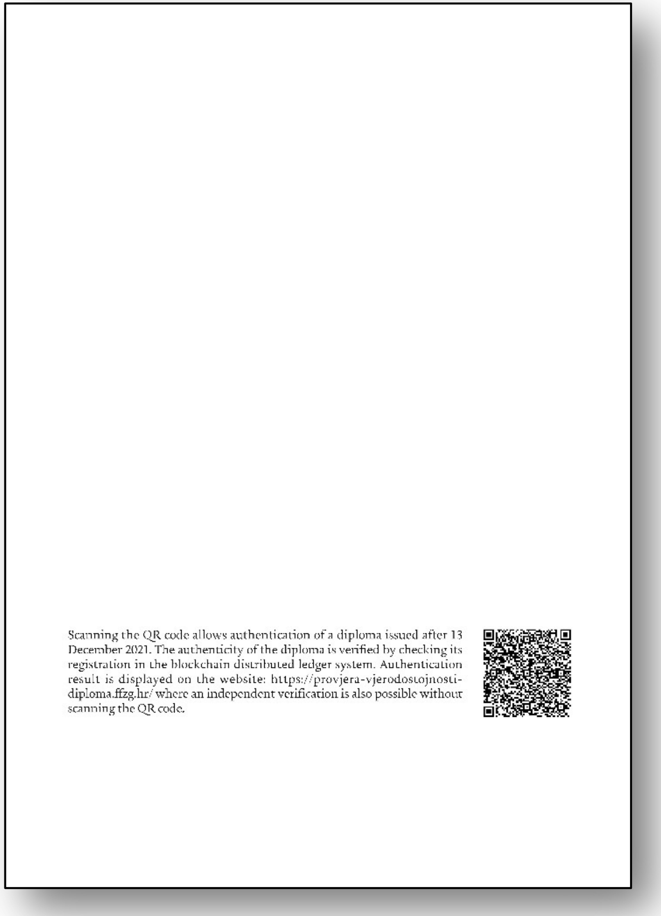
UNIVERSITY BACHELOR IN INFORMATION SCIENCES

comprising all the related rights prescribed by law.

No. 37931/2021
in Zagreb, 17 Jan 2022

Dean

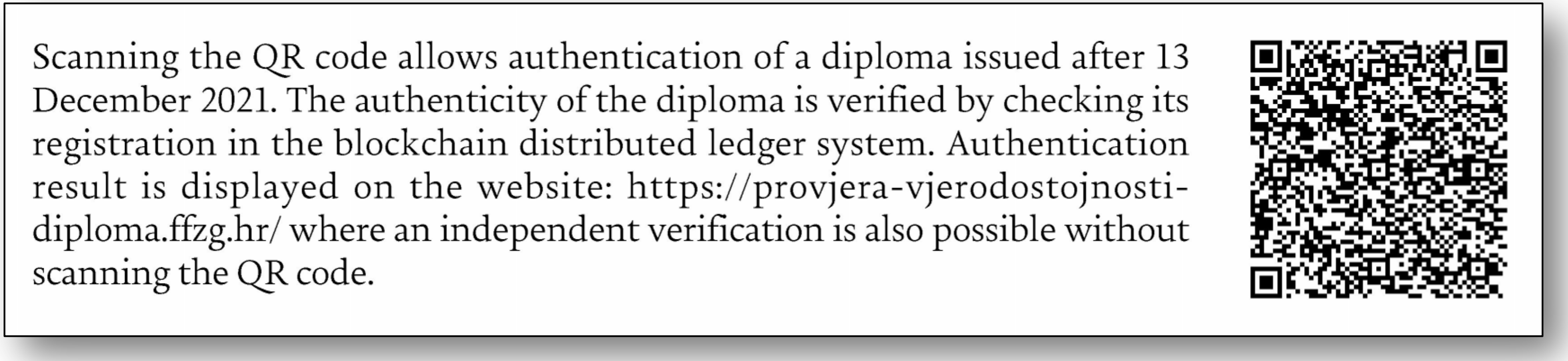
Associate Professor Domagoj Tončinić, PhD



Scanning the QR code allows authentication of a diploma issued after 13 December 2021. The authenticity of the diploma is verified by checking its registration in the blockchain distributed ledger system. Authentication result is displayed on the website: https://provjera-vjerodostojnosti-diploma.ffzg.hr/ where an independent verification is also possible without scanning the QR code.

2. AI or automation? …

Scanning QR code from the diploma back …



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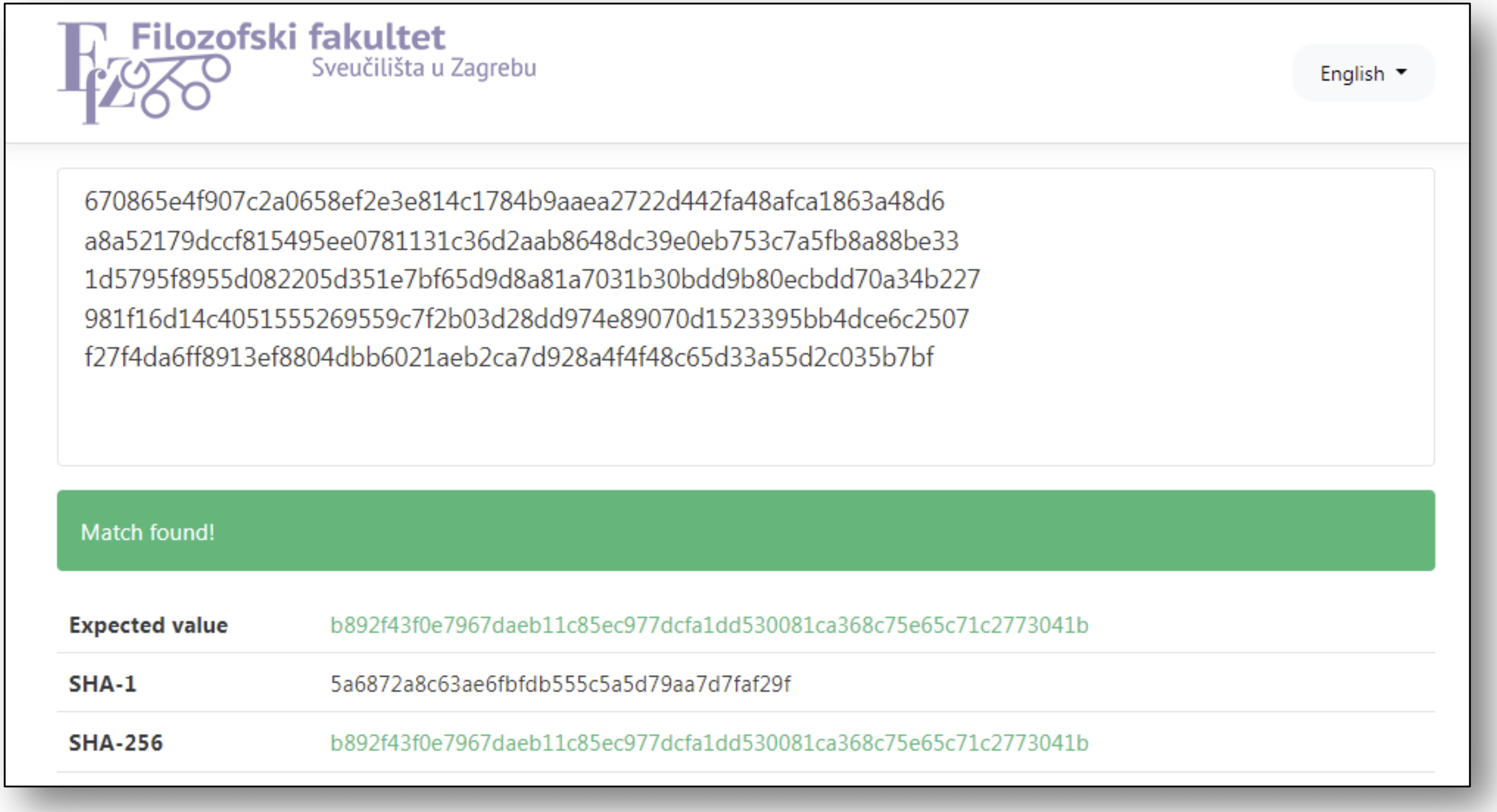
https://provjera-vjerodostojnosti-diploma.ffzg.hr/

2. AI or automation? …

- Proof from the blockchain distributed system



```
670865e4f907c2a0658ef2e3e814c1784b9aaea2722d442fa48afca1863a48d6
a8a52179dccf815495ee0781131c36d2aab8648dc39e0eb753c7a5fb8a88be33
1d5795f8955d082205d351e7bf65d9d8a81a7031b30bdd9b80ecbdd70a34b227
981f16d14c4051555269559c7f2b03d28dd974e89070d1523395bb4dce6c2507
f27f4da6ff8913ef8804dbb6021aeb2ca7d928a4f4f48c65d33a55d2c035b7bf
```

Match found!

Expected value	b892f43f0e7967daeb11c85ec977dcfa1dd530081ca368c75e65c71c2773041b
SHA-1	5a6872a8c63ae6fbfdb555c5a5d79aa7d7faf29f
SHA-256	b892f43f0e7967daeb11c85ec977dcfa1dd530081ca368c75e65c71c2773041b

3. Research

- InterPARES Trust AI research project's study
  - Identification of critical archival challenges which are the best candidates for improvement by AI technologies in the context of retention and preservation of digital records

3. Research

- Hrvoje **Stancic**, lead & Arian **Rajh + GAAs:** Zeljko **Trbusic**, Vladimir **Bralic**, Patricija **Gligora**, Faculty of Humanities and Social Sciences (FHSS), Croatia
- Alicia **Barnard**, Universidad Nacional Autónoma de México - ENES-Morelia
- Gabriele **Bezzi**, Regione Emilia-Romagna, Italy
- Meltem **Dişli**, Hacettepe University, Turkey
- Pat **Franks**, San Jose State University - School of Information
- Arien **Gonzales Crespo**, El Colegio de México
- Claudia **Lacombe Rocha**, National Archives of Brazil
- Lungile **Luthuli-Ngidi**, University of South Africa
- Patricia (Pat) **Moore**, Carleton University, Canada
- Samir **Musa**, European University Institute - Historical Archives of the European Union, Italy
- Rosely **Rondinelli**, Institute of Technology and Society, Brazil

4. Research – aim and methodology

- Identification of critical archival challenges in the context of retention and preservation of digital records
- Identification of archival challenges arising from digital preservation risks
- Specific factors within challenges will be identified and mapped
- Proposal of how to address them by AI

4. Research – aim and methodology

- Online survey
  - targeted archival practitioners and experts in the field

- Follow up in-person interviews (in progress)

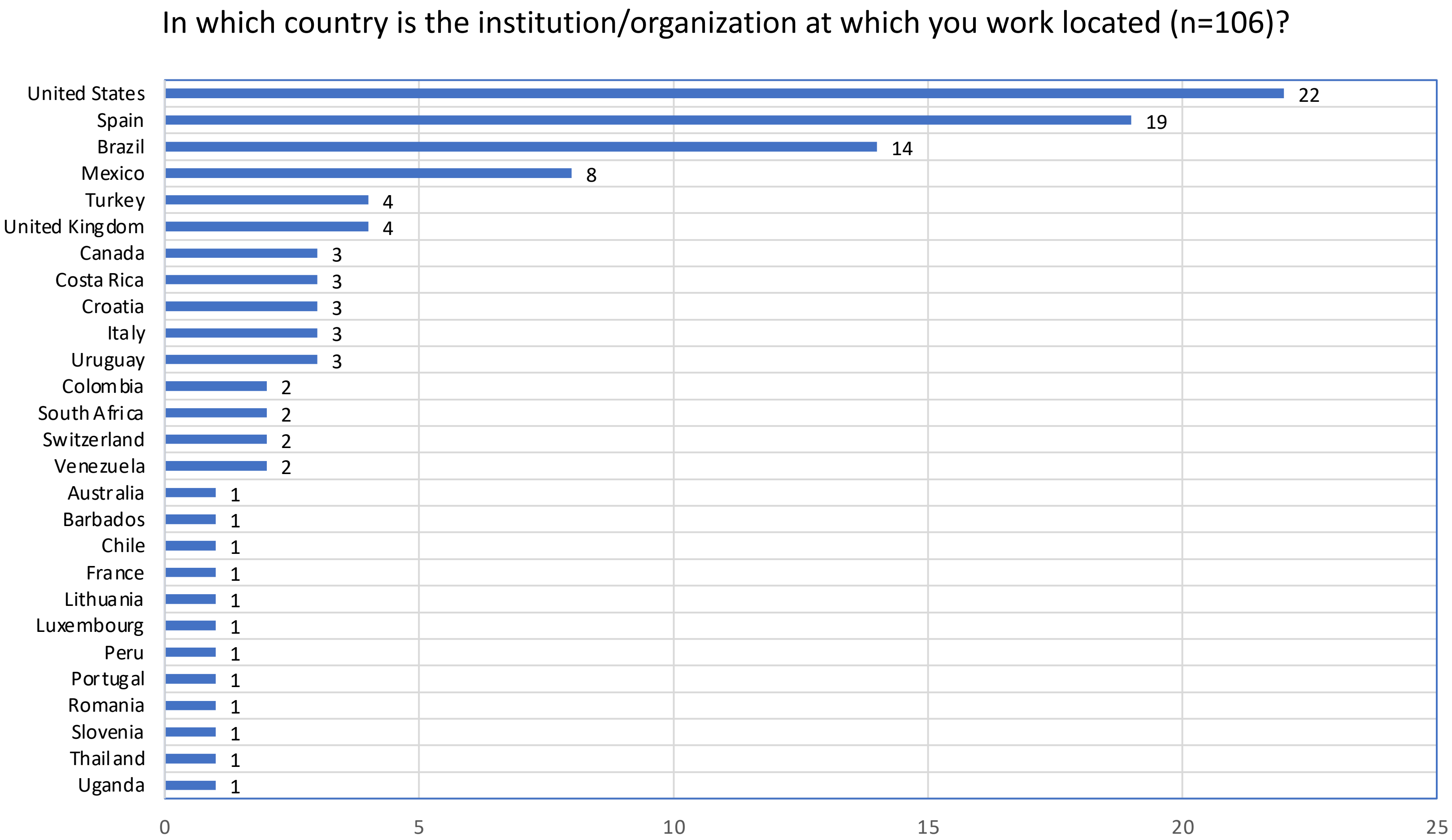
5. Research results

- Online survey
  - 5 March – 9 April 2022 (5 weeks)
  - in English, Spanish, and Portuguese
  - JotForm (https://www.jotform.com/)
- Survey structure
  - 3 parts
  - 14 questions + possible sub questions
- Responses
  - n=106

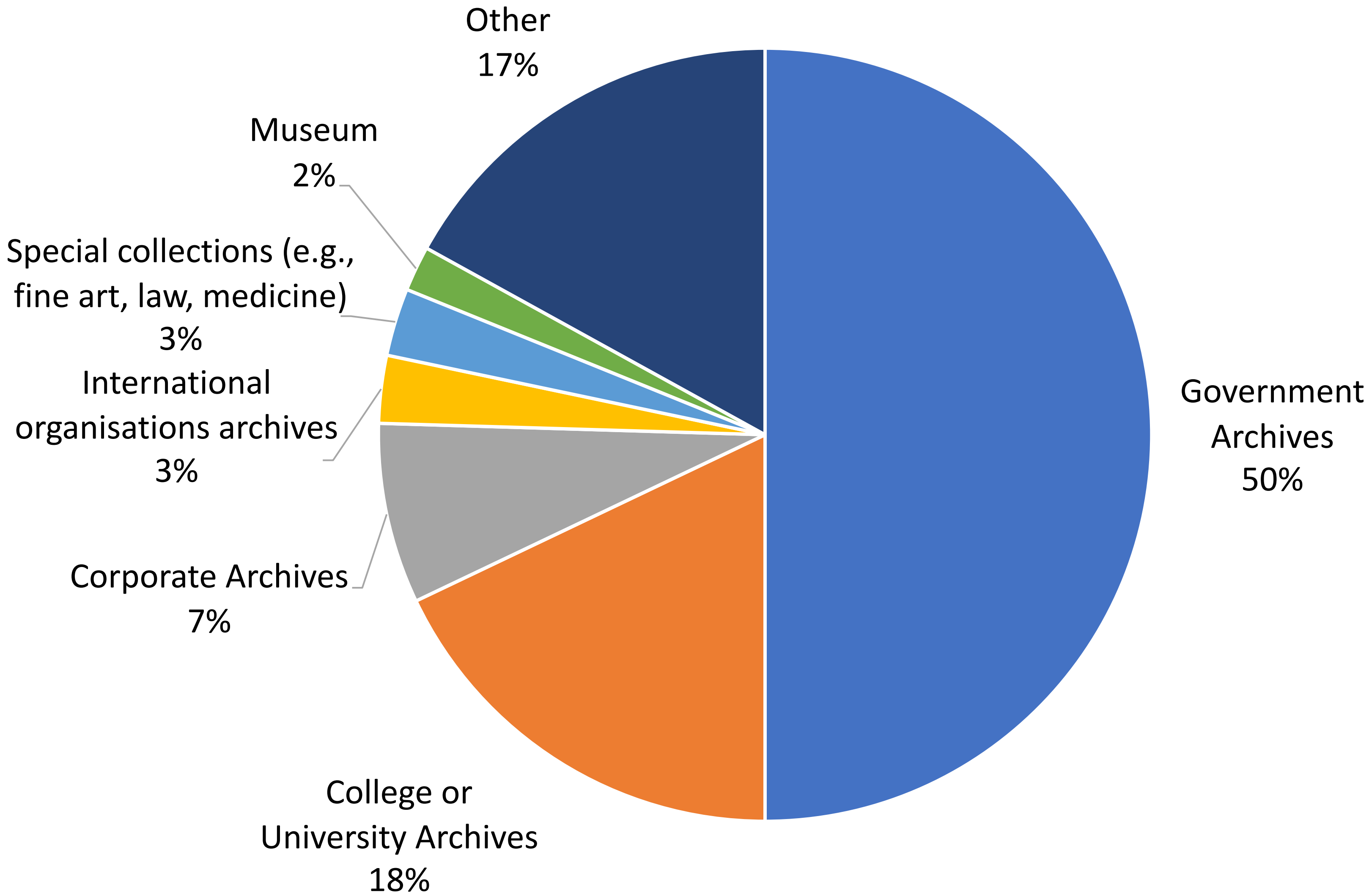
5. Research results ...

- Translation of responses
  - ES → ENG
  - POR → ENG
- Analysis of the results in English

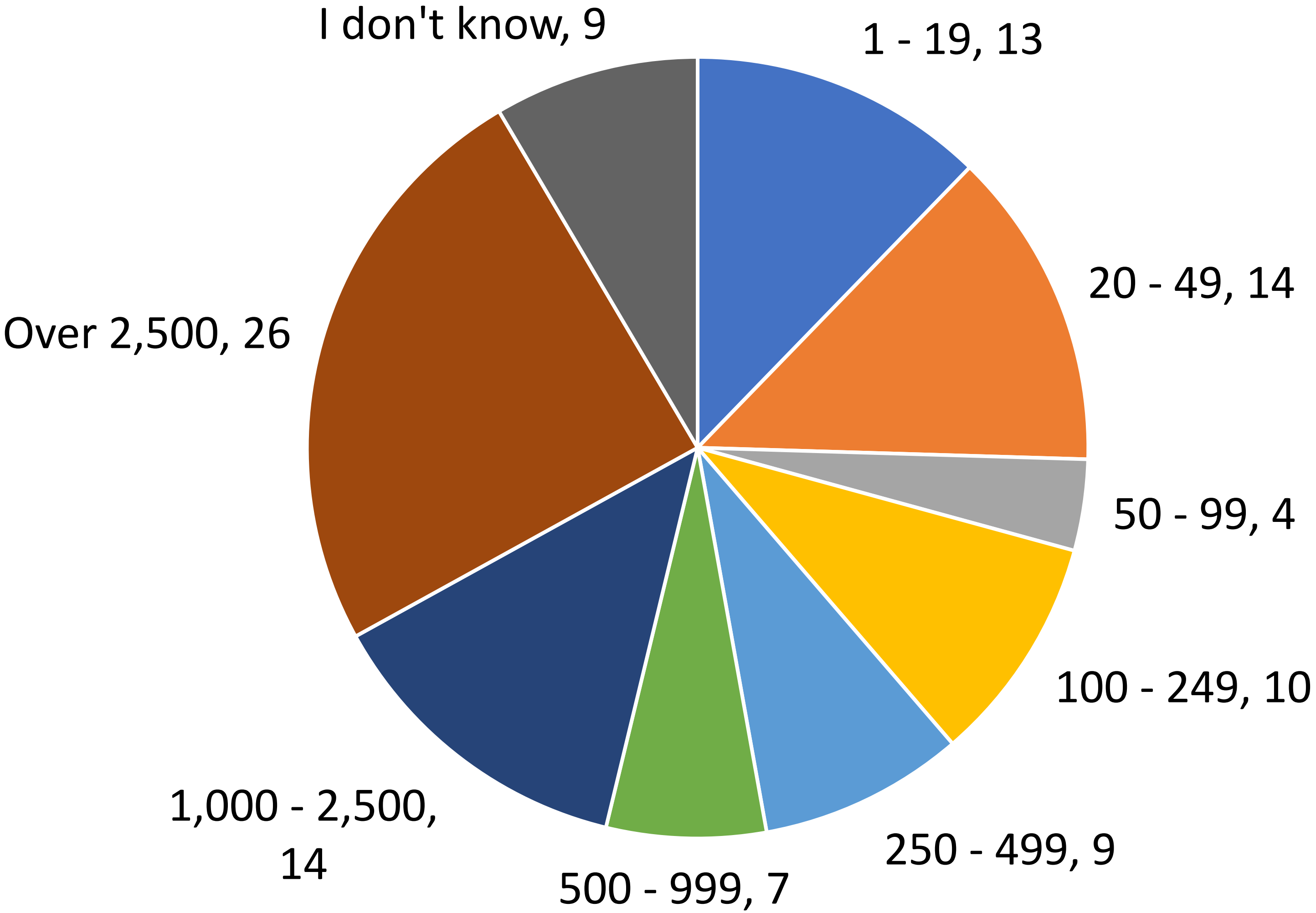
Countries (27)



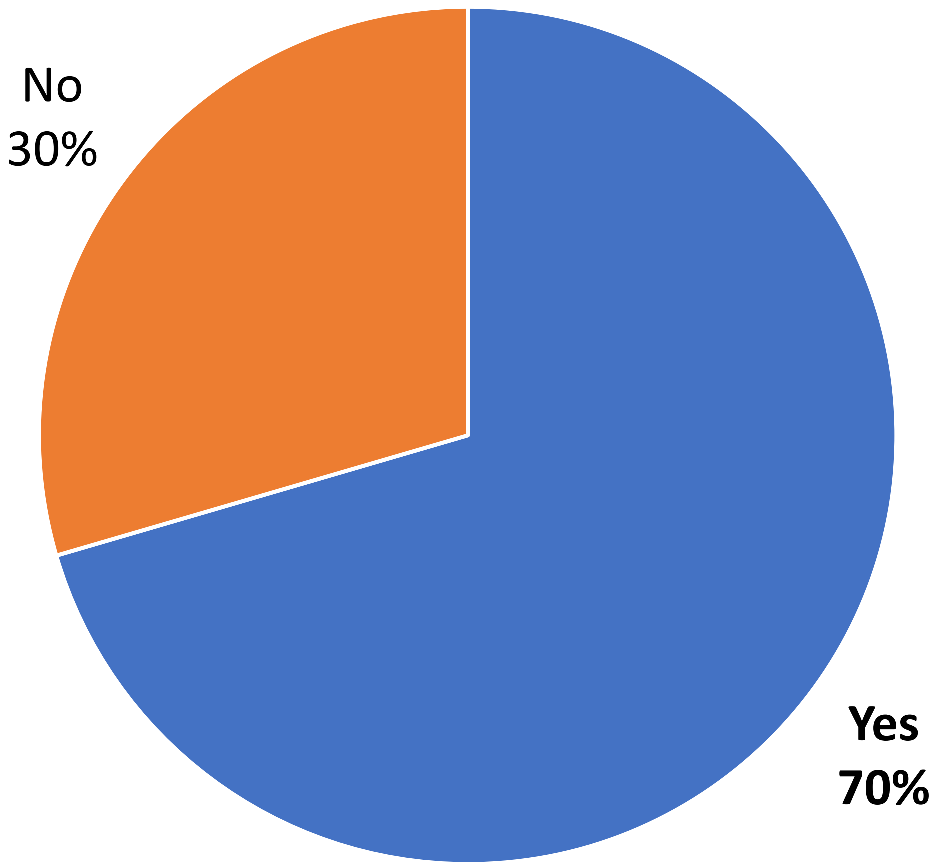
In which type of institution/organization do you work (n=106)?



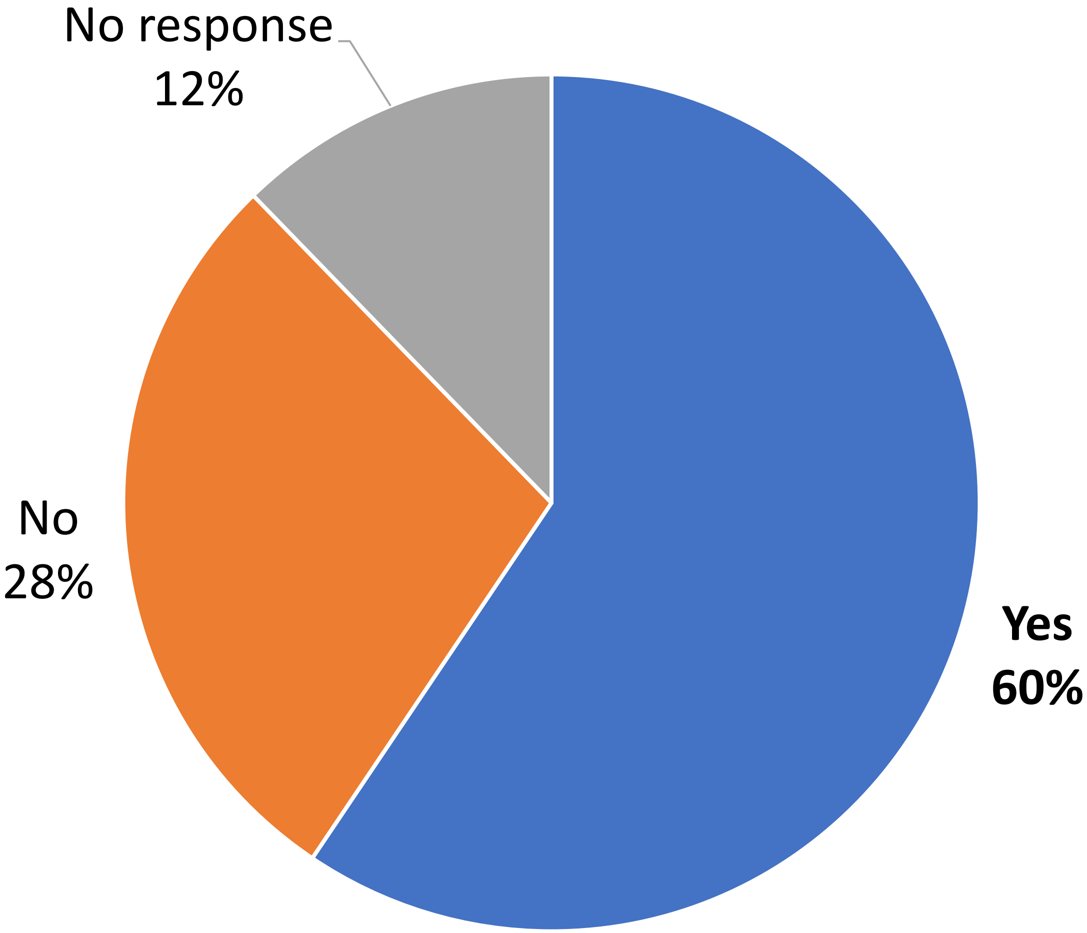
Approximate total number of employees at all locations within the country (n=106)?



Do you perform digital preservation tasks in your institution/organization (n=106)?



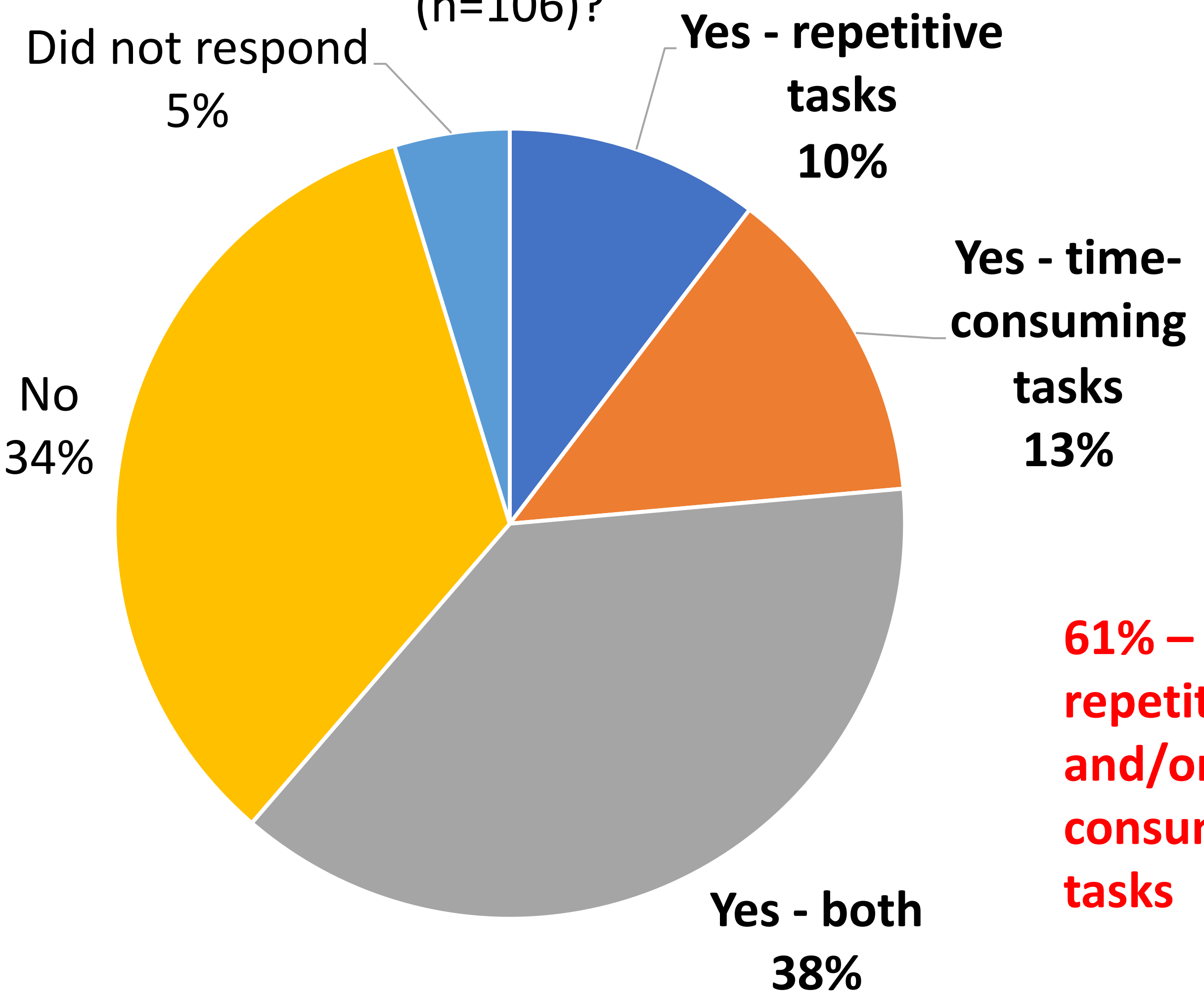
Do any of the digital preservation processes involve large quantities of digital records (n=106)?



What does "large quantity" mean to you (e.g. measured in [giga/tera/peta]bytes, or in number of files)? Please specify, and if possibly elaborate.

- From "numerous files" to 9 PB
  - 9 GB
  - Over 2 billion files
  - A few collections have hundreds of compact discs, or a couple hard drives
  - PB, our holdings are in TB, largest single deposit 130 GB

Do any of the digital preservation processes in your institution/organization involve repetitive or time-consuming tasks (n=106)?

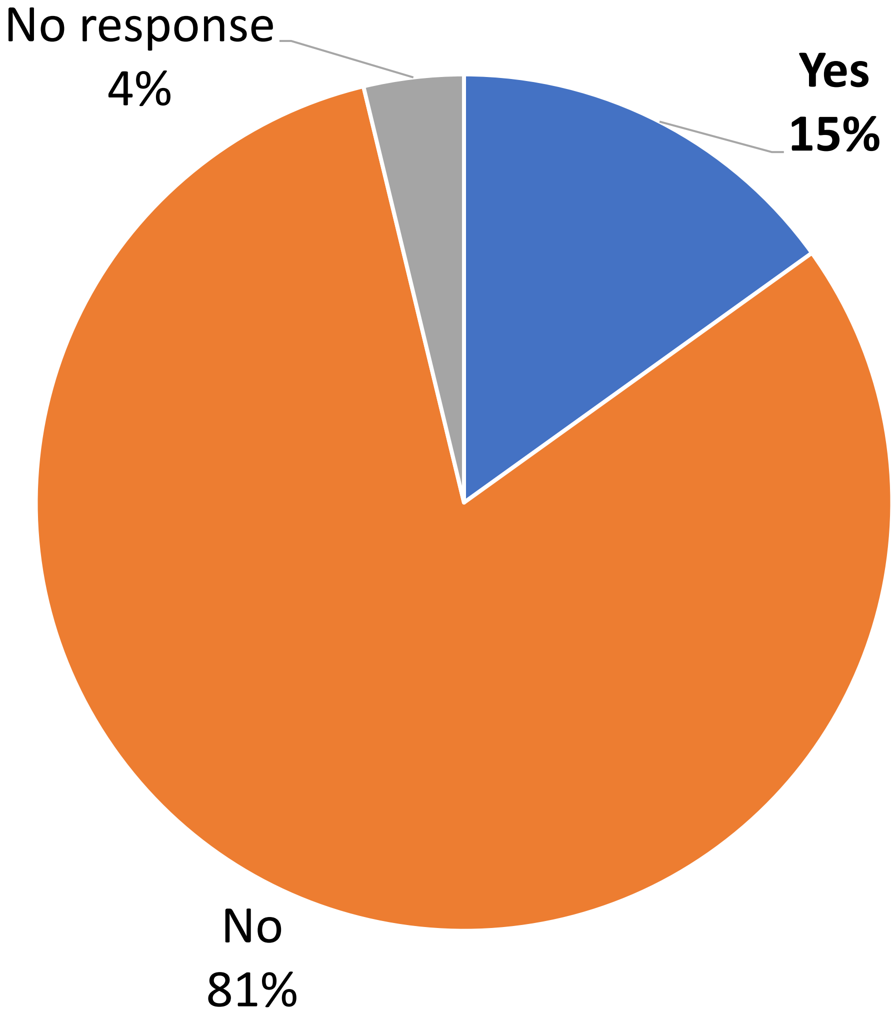


61% – repetitive and/or time consuming tasks

Identified repetitive and/or time-consuming tasks (30 in total, showing 3+)

Adding, gathering, extracting metadata	11
Digitization	10
Capture / ingest	7
File integrity check	6
Indexing	5
Records management	5
Appraisal	4
Backup	3
Renaming files (based on their content)	3

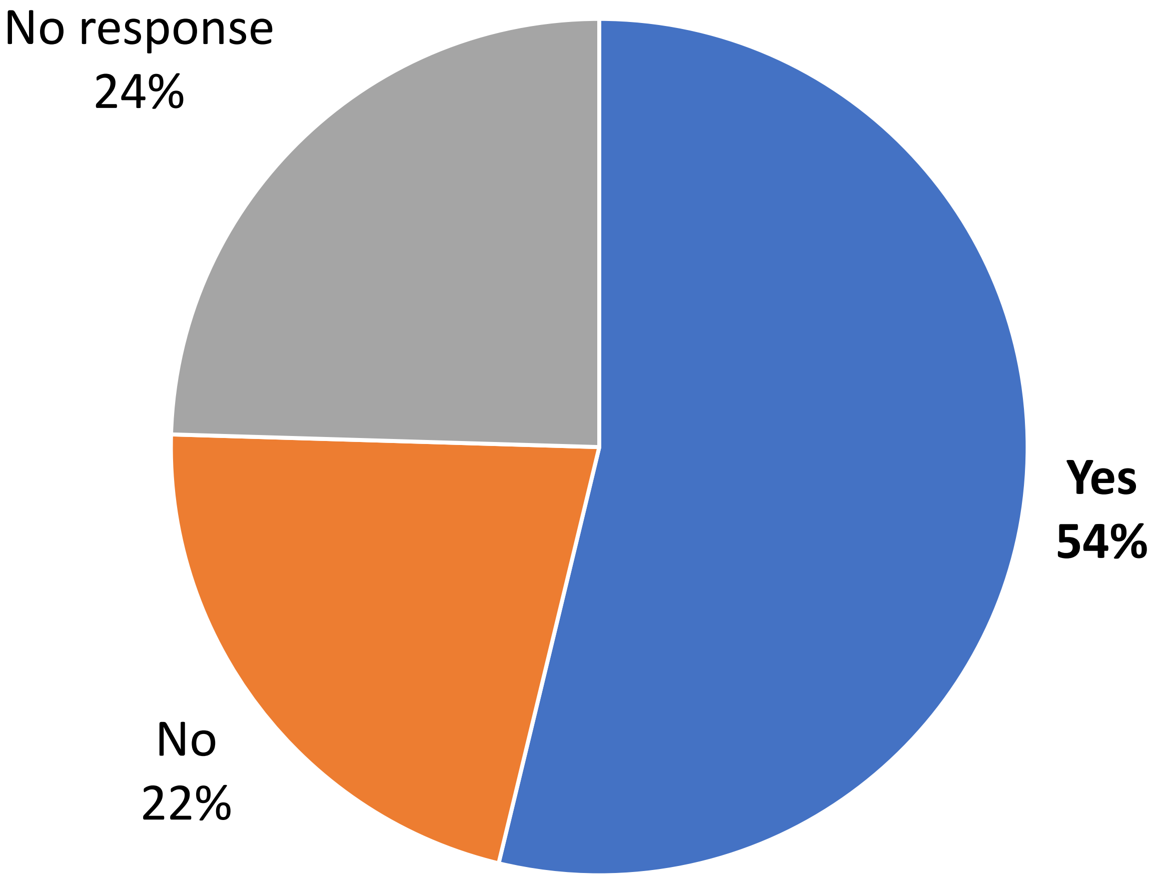
Does your institution/organization use any automated or AI-supported activities in the digital preservation processes (n=106)?



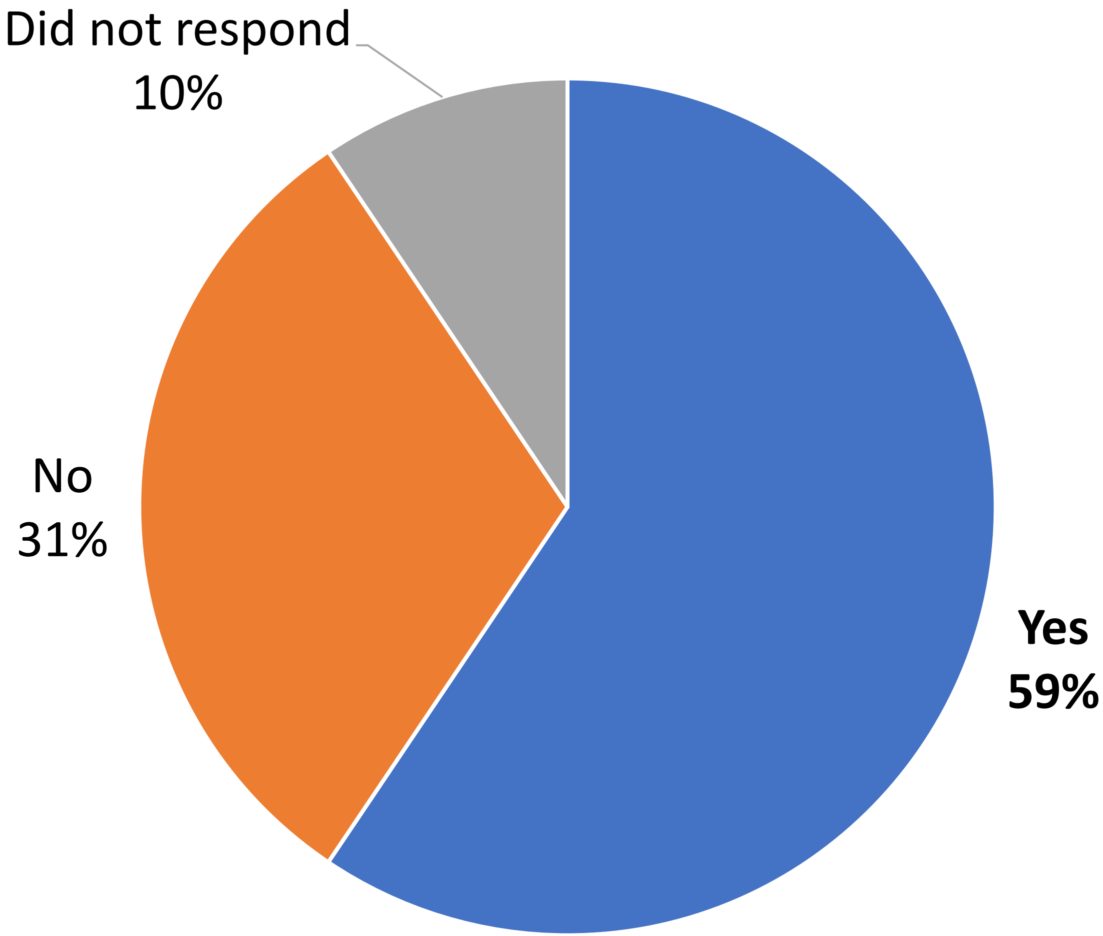
Identified automated or AI-supported activities in the digital preservation processes

Ingest / upload / capture / packiging	3
Classification (and granting access based on it)	2
Metadata operations (description / extraction from records)	2
Search / recommendation engines	2
Software built-in tools	2
Analysis of metadata for PII detection	1
Basic MS Word operations (adding date, grammar check)	1
Data profiling	1
Digitization	1
Format validation	1
ML for identifying born-digital moving image records for preservation	1
Scripts for process automation	1

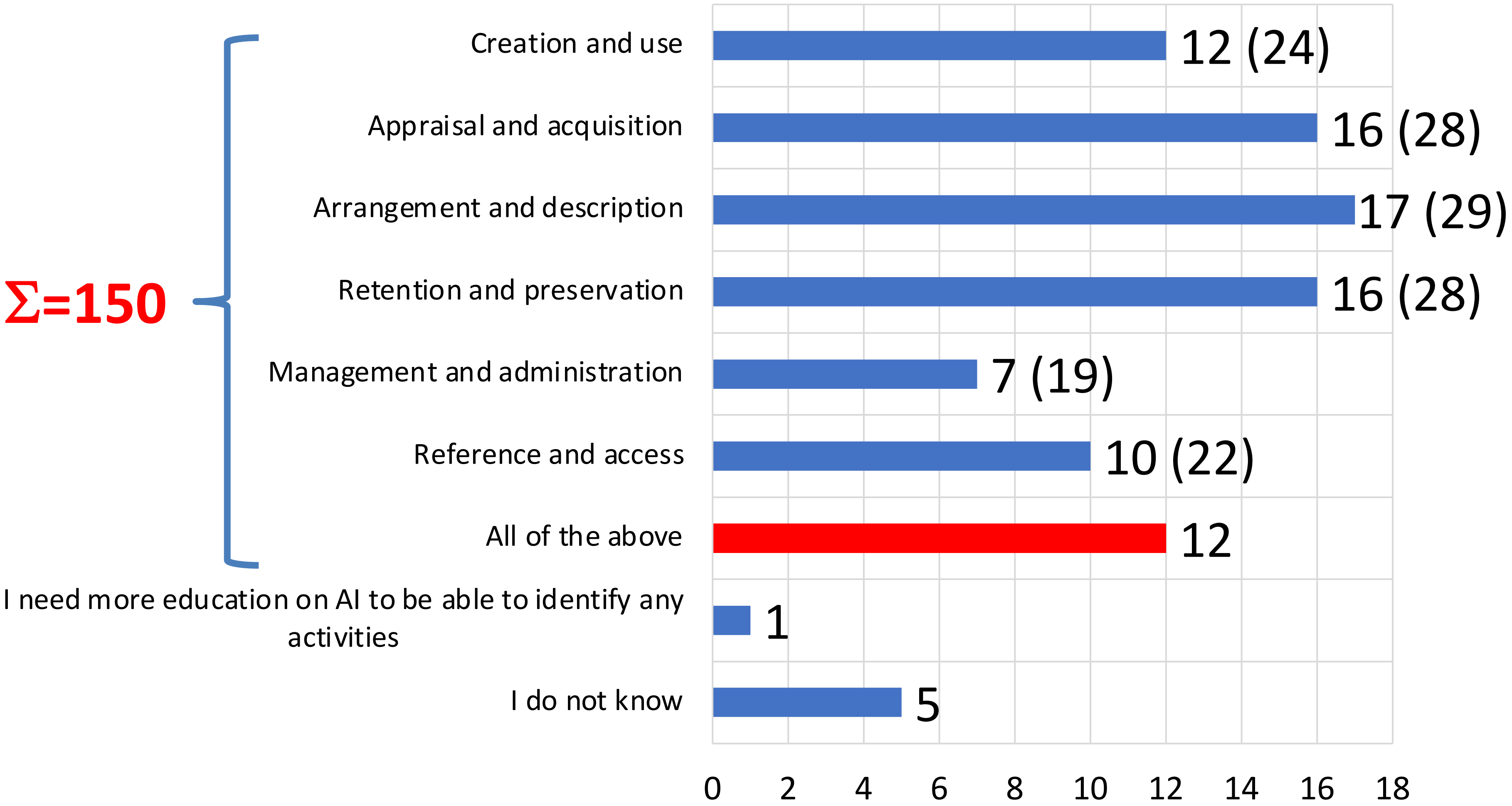
Could the AI-related technologies be integrated into the digital preservation system you are using (n=106)?



Do you have any particular processes which can be (additionally) improved by AI-related technologies (n=106)?



To which group of activities the identified processes which can be (additionally) improved by AI-related technologies best relate to (n=63)?



6. Conclusion

- Critical challenges to be improved by AI
  - Digitisation supported by AI
    - automatic text recognition
    - quality control
    - indexing / classification / metadata extraction
  - Digital preservation supported by AI
    - experience gained from past situations (AI training set) with similar file formats and flagging potential problems with currently kept file formats
  - Reference and access supported by AI
    - identification of PII
    - context-based redaction

THANK YOU!

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