

The ecocritical digital museum: Challenges and opportunities for digitisation

Dr Nicole Meehan, Lecturer in Museum and Heritage Studies,
University of St Andrews

Context

- In 2022, digital technologies accounted for between 8-10% of energy consumption, and 2-4% of greenhouse gas emissions (European Commission, 2022)
- Data centres account for 45% of greenhouse gas emissions in the global ICT sector alone (International Energy Agency, 2023)
- Data centres with several thousand servers can consume between 11 million and 19 million litres of water per day (Hsu, New Scientist, 2022)
- Over 62 million tons of e-waste was produced in 2022, an 82% rise in 12 years (UNITAR, 2024)

Materials and manufacture

Computers contain several non-renewable natural resources extracted from the earth with processes that often need considerable amounts of energy.

Waste

The UK produces one million tons of electronic waste each year. It is estimated that only 15-20% of electronic waste is recycled⁷⁷ with the vast majority going into landfills and incinerators.

Component parts

Hard drives, keyboards, screens and plastic casings are usually shipped elsewhere for assembly into the finished product and then shipped again, all over the world – packaged in plastics, Styrofoam and cardboard.

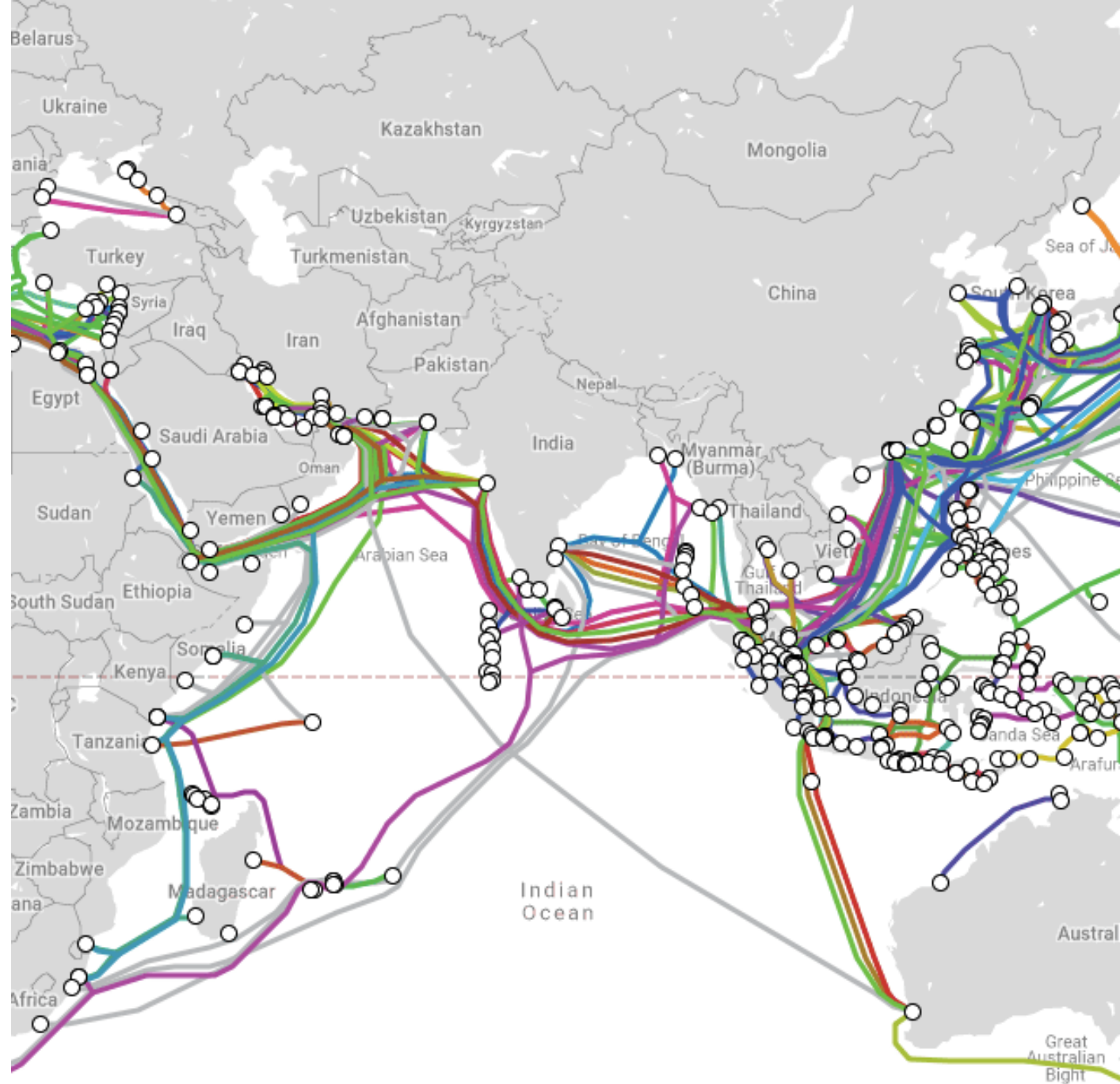
Energy

All digital activities require electricity, which in turn needs to be generated. It has been estimated by the Swedish KTH Royal Institute of Technology that internet use is around 10% of the world's total electricity consumption.

(Julie's Bicycle, and BOP Consulting, 2022)

“a vast majority
(approximately 80%) of
IT’s carbon footprint can
be attributed to the
manufacturing and
distribution of the
equipment itself.”

(Stonham, 2022)



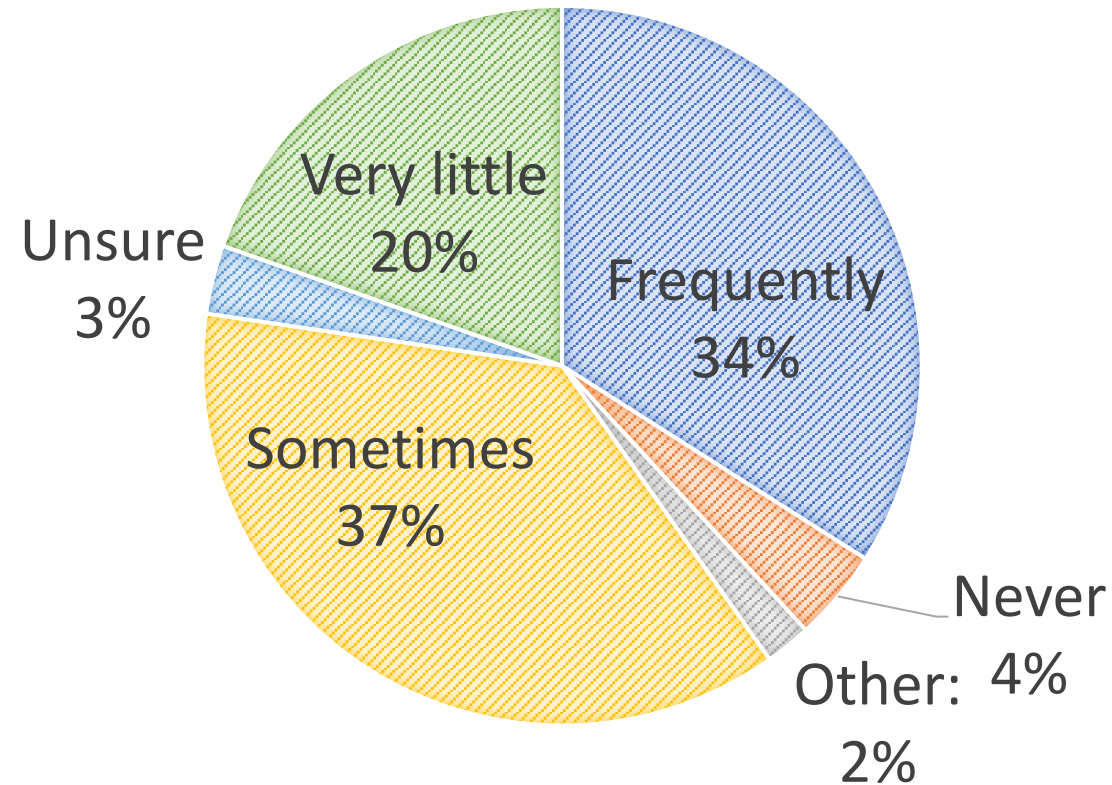
Human costs

- A narrative that can be missing from discussions of technology
- Intersects with decolonial/anticolonial efforts
- Technology depends on:
 - Mining of rare earth minerals, a practice concentrated in Global Majority World nations (Harvard International Review)
 - Increasing numbers of data centres which can be located on land considered 'cheap' (Liboiron, 2021)
 - Water which can be diverted away from communities to cool data centres (Mytton, 2021)
- E-waste that is not recycled appropriately/is processed illegally results in toxic environments for workers (WHO)

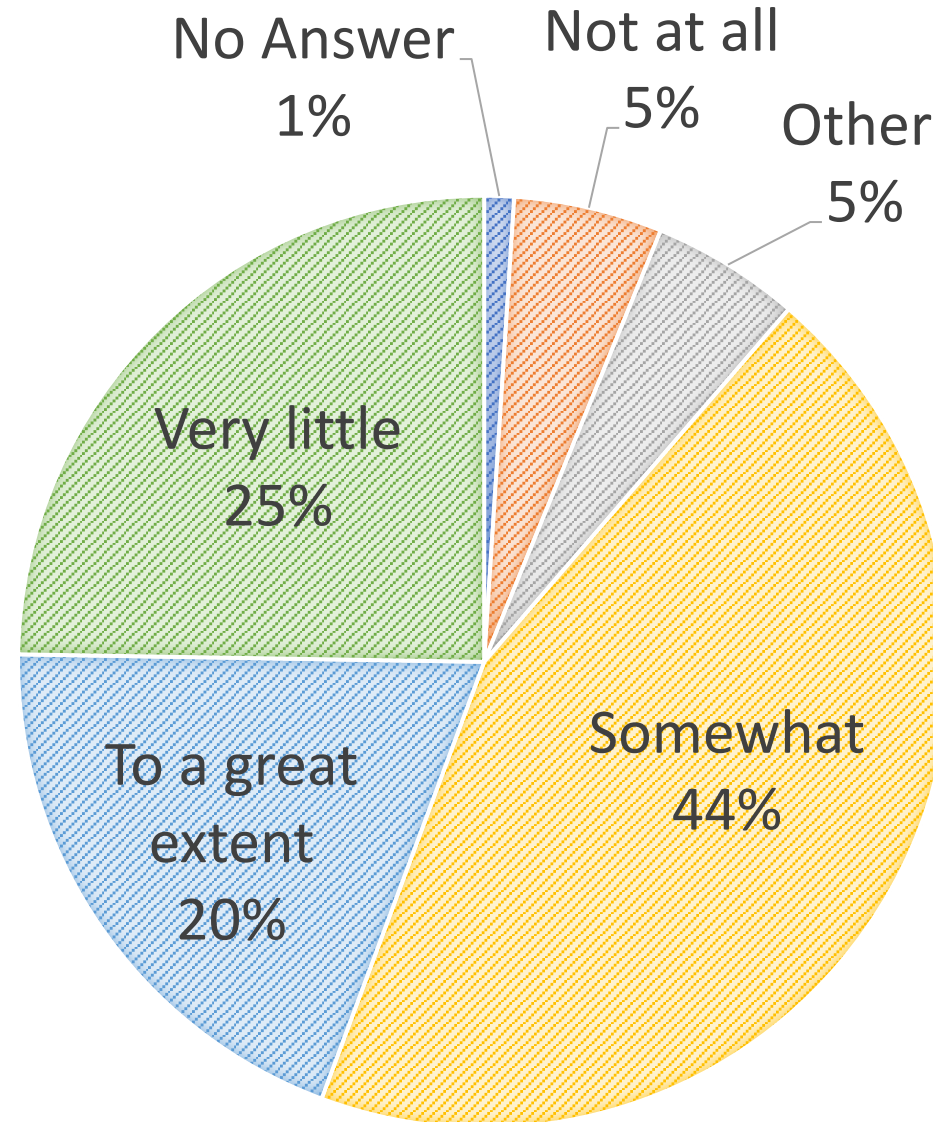
Encode(Muse) project survey

DO YOU OBSERVE YOUR INSTITUTION PRIORITIZE ENVIRONMENTAL SUSTAINABILITY?

n = 97



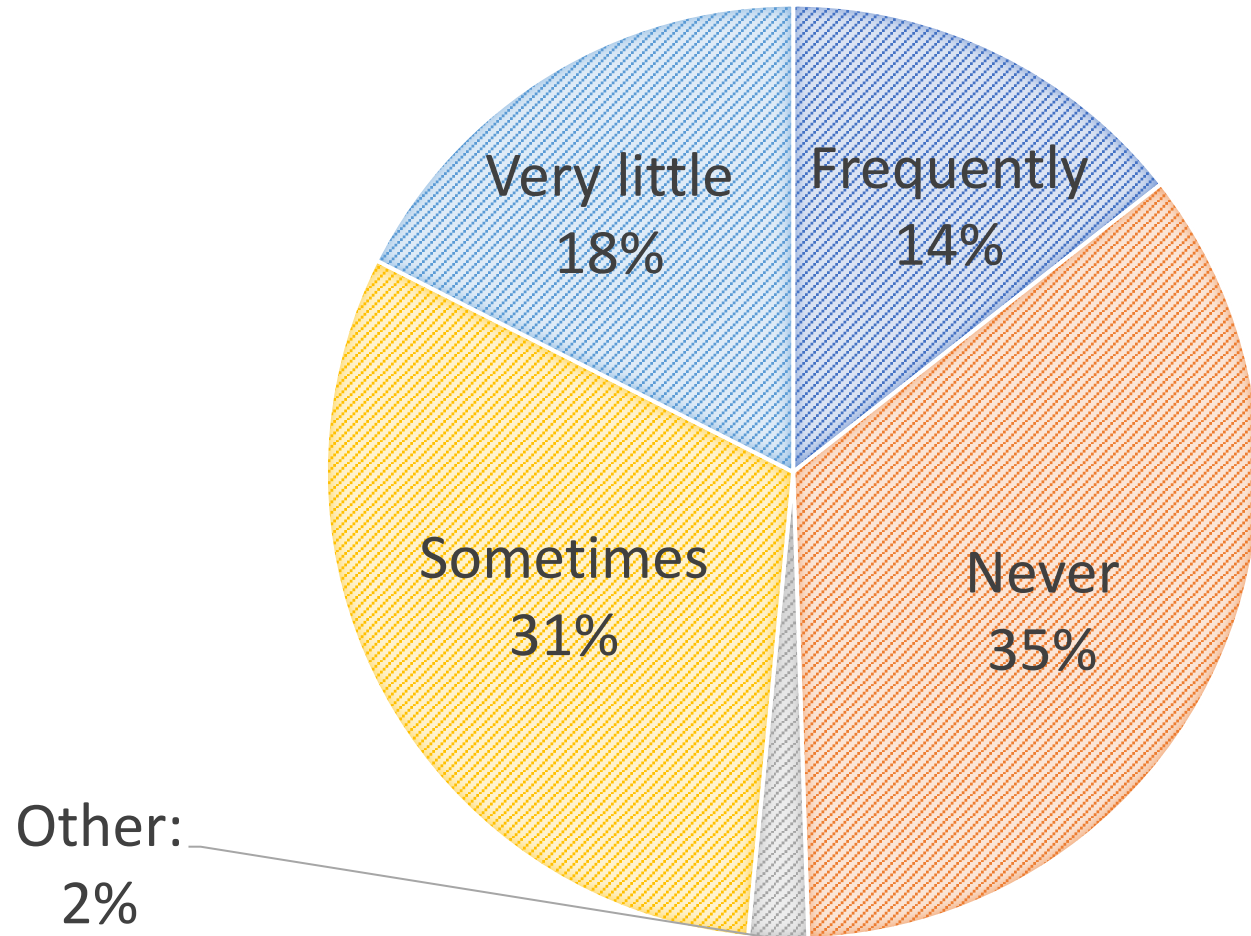
TO WHAT EXTENT DO YOU FEEL THAT YOUR INSTITUTION UNDERSTANDS ITS OWN ENVIRONMENTAL IMPACT?



n = 97

HAVE YOU OBSERVED INTERNAL DISCUSSION ON THE ENVIRONMENTAL IMPACT OF YOUR INSTITUTION'S DIGITAL ACTIVITIES?

n = 97



Current actions taken by respondents

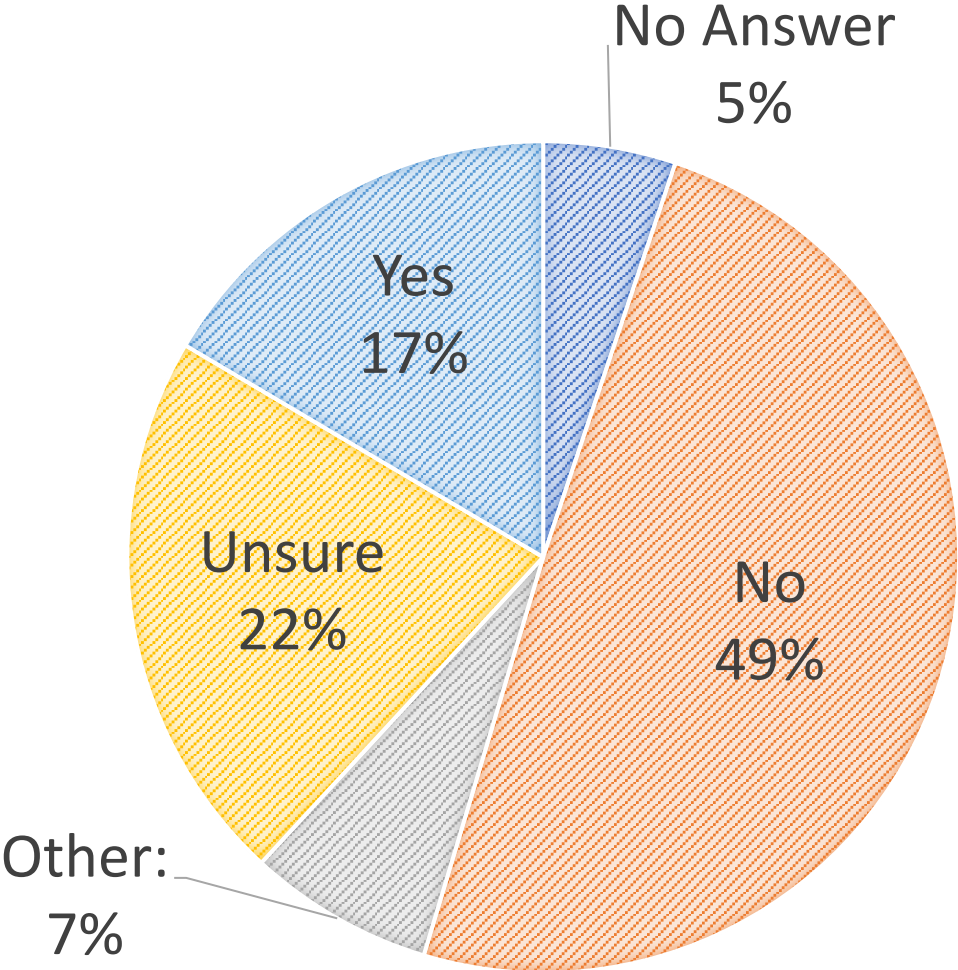
- Reducing the amount of time equipment is switched on for
- Deleting obsolete data and emails
- Website audits to refine code, reduce large images and unnecessary video content
- Rationalisation of long-term storage and moving to offline formats
- Identification and deletion of redundant/duplicated data

- Altering formats, priorities and number of images taken in digitisation projects
- Instituting new policies around file management to reduce server and cloud space storage
- Purchasing sustainable materials for digitisation studios
- Offsetting
- Changing procurement practices
- Modernising physical plant to become more energy efficient, installing solar panels and reducing heat loss

- Implementing policies to re-use older hardware (though often hampered by contractual agreements with suppliers)
- Requirement for all staff to undertake carbon literacy training
- Moving to green servers
- Ensuring the inclusion of digital staff in sustainability committees
- Using Sustainable Development Goals to plan all work

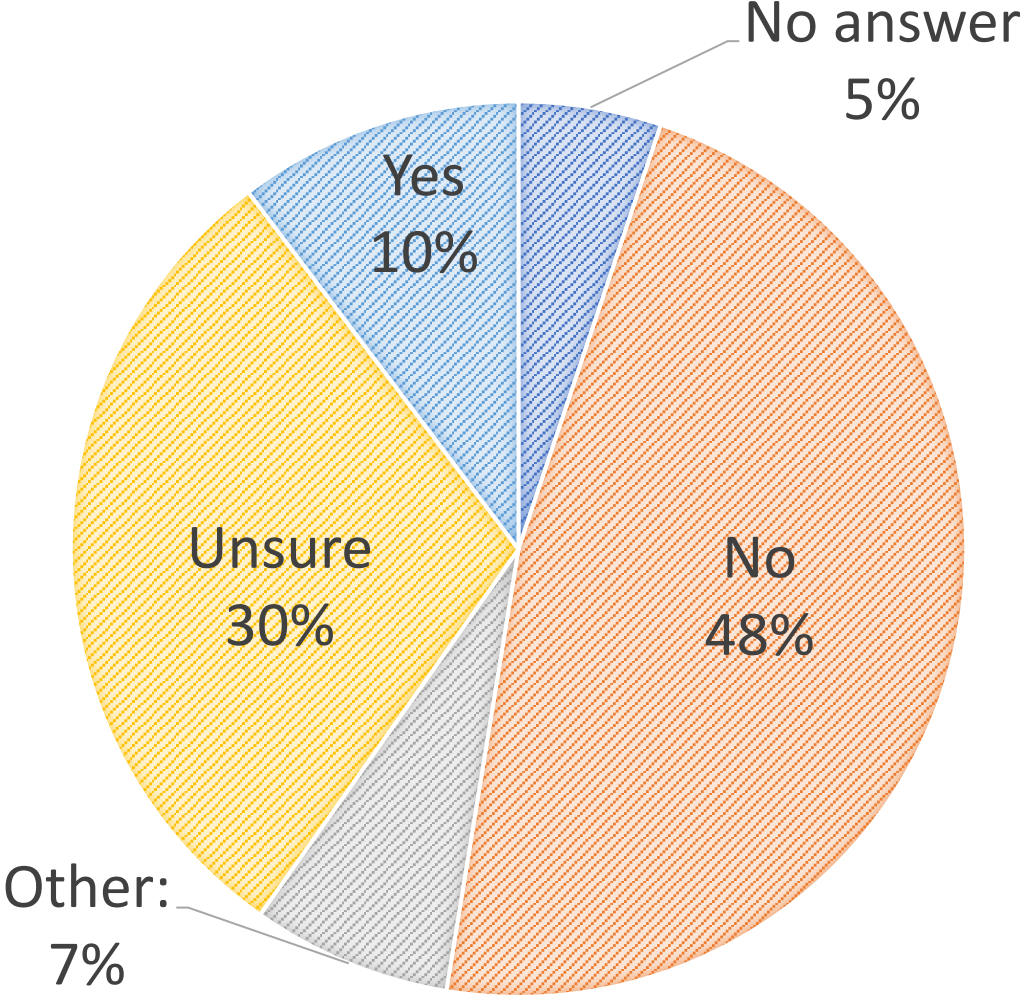
**DOES YOUR INSTITUTION CONSIDER THE ENVIRONMENTAL
IMPACT OF THE MANUFACTURING PROCESSES ASSOCIATED
WITH THE HARDWARE USED FOR DIGITIZATION?**

n = 97



**DOES YOUR INSTITUTION CONSIDER THE ENVIRONMENTAL
IMPACT OF THE SOFTWARE IT PROCURES FOR
DIGITIZATION?**

n = 97



Shared challenges

- **Measuring and tracking**
 - “I've found it very difficult to get good data, reliable data, data that is not vendor supplied.”
- **Data retention**
 - Rationalising current digitisation-related data holdings
 - Locating and tracking digitisation-related data in complex data 'ecosystems'
 - Reimagining/recalibrating digitisation-related data retention strategies
- **Procurement**
 - Knowledge required to assess policies of contractors
 - Balance of organisational priorities in selection of goods and services

- **Resourcing and funding**

- “So, we have the initial setup and then we don't have anything for the carrying costs for the projects to continue to live.”

- **Behaviour change around duplication and retention of legacy images**

- “It's just digitise, digitise, digitise, make everything accessible and it's this sort of war between accessibility and what that actually means from an environmental perspective.”

- **Audience expectation**

- Concerns around making changes that have impact upon user expectations of quality and availability of digitised images

Opportunities

- To **increase efficiencies** in digitisation processes through **environmental cost mapping**
 - The project will produce a mapping toolkit from procurement to publication
- For **cost savings** through rationalisation of storage
 - Storage audits can be conducted with new policies developed for new and retrospective projects
- To **foreground the value** of digital projects to diverse audiences
 - The project will produce a value-focused checklist
- To begin efforts to **decolonise digital museum spaces**

Contact:

`npm6@st-andrews.ac.uk`

Project report soon to be available on our website:

<https://encodemuse.wp.st-andrews.ac.uk/>