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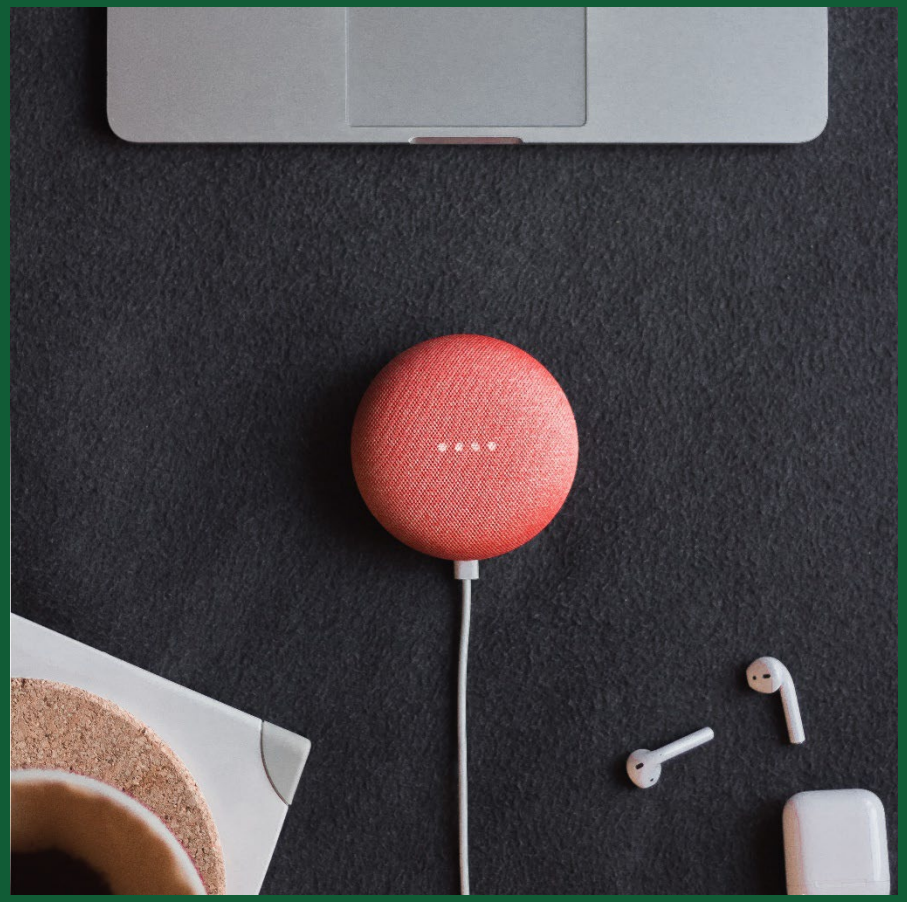
APAC Library Dialogue



Artificial Intelligence in Academic Libraries

How AI might change academic library work

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University of Sheffield | Information School

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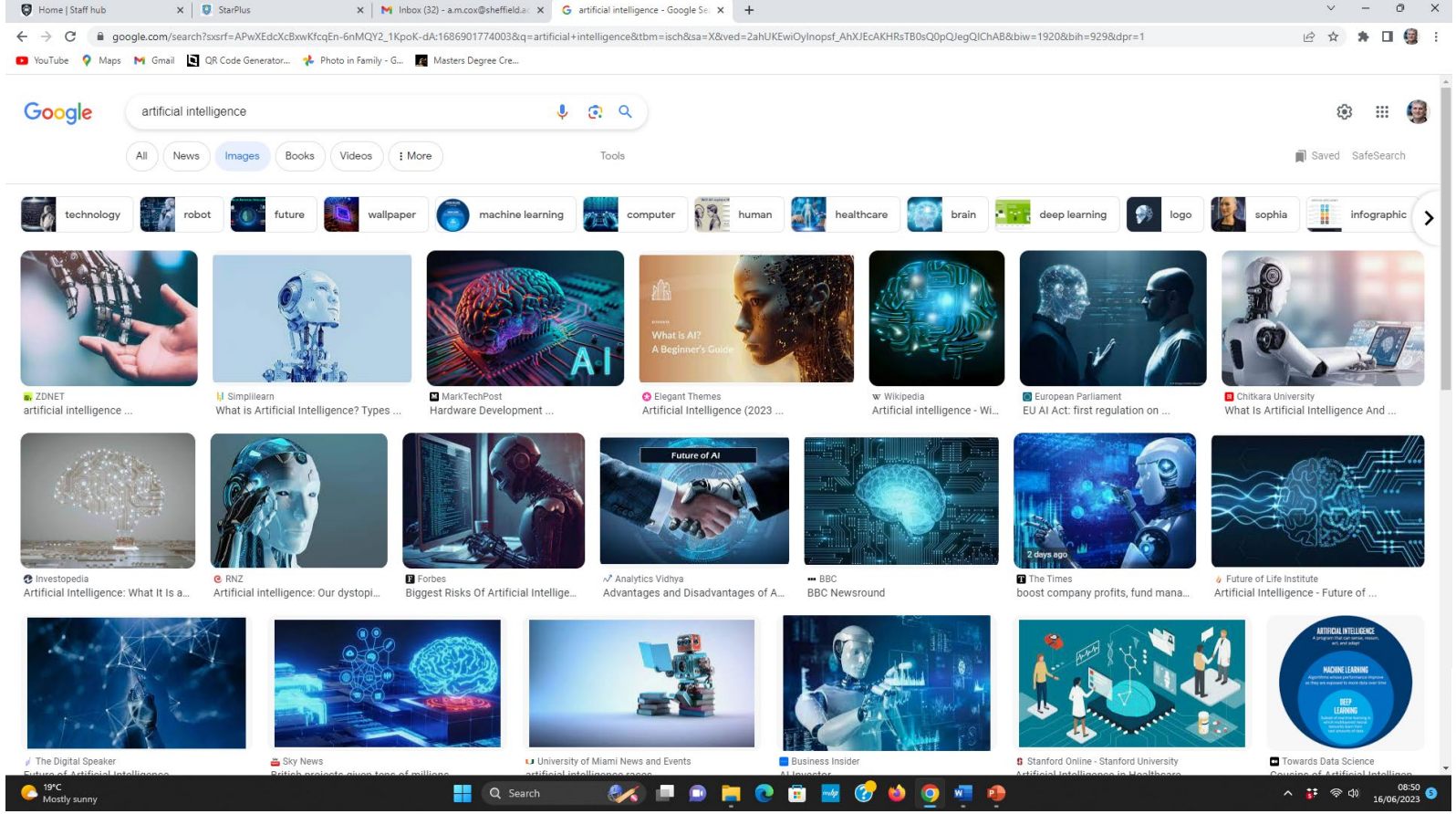
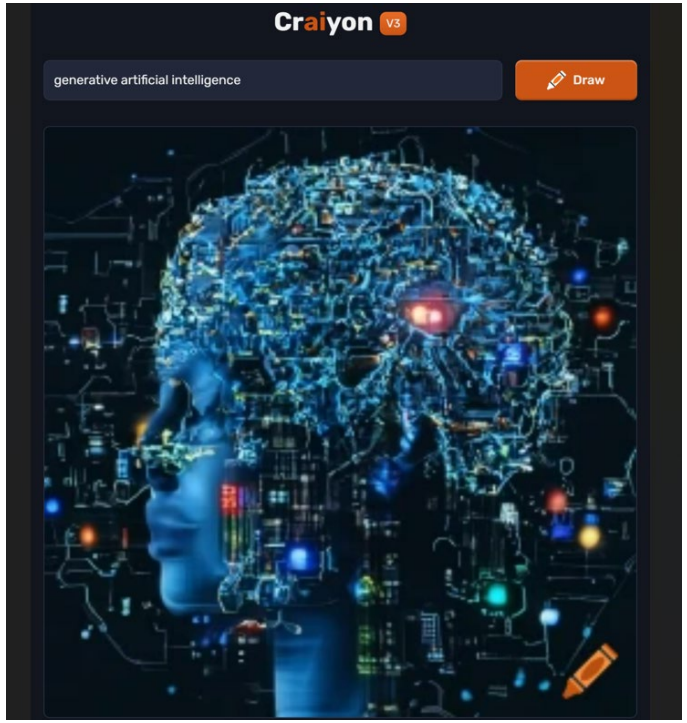
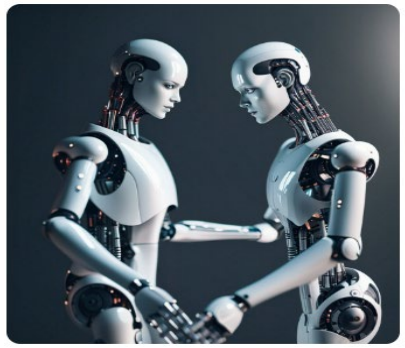
What is Artificial Intelligence?







Artificial Intelligence

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Formal definitions

- “AI is the ability of a computer system to solve problems and perform tasks that would otherwise require human intelligence.” (US National Security Commission on AI, 2021)

- A suite of technologies and tools that aim to reproduce or surpass abilities in computational systems that would require ‘intelligence’ if humans were to perform them. This could include the ability to learn and adapt; to sense, understand and interact; to reason and plan; to act autonomously; or even create. It enables us to use and make sense of data.” (UKRI, 2021: 4)

- “Machines that imitate some features of human intelligence, such as perception, learning, reasoning, problem-solving, language interaction and creative work (UNESCO, 2022: 9).

- “A machine-based system that is capable of influencing the environment by producing an output (predictions, recommendations or decisions) for a given set of objectives. It uses machine and/or human-based data and inputs to: (i) perceive real and/or virtual environments; (ii) abstract these perceptions into models through analysis in an automated manner (e.g. with machine learning), or manually; and (iii) use model inference to formulate options for outcomes. AI systems are designed to operate with varying levels of autonomy.” (OECD, 2019)

- Simply put, AI is a collection of technologies that combine data, algorithms and computing power.” (European Commission, 2020: 2)

The familiar face of AI

- Spam filtering
- Plagiarism detection
- Transcription and captioning
- Translation
- Search
- Recommendation
- Predictive text

The old new face of AI in libraries? Descriptive AI

- 10,000 video files with only titles to search on
  - Unrealistic to manually enhance records
- AI might offer search services
  - Based on voice recognition (as per captioning) provide a transcript of things people say that can be used to search
  - Based on image recognition
    - Identify types of objects (eg cars, houses)
    - Identify places / people
  - Identify music

- Will not be 100% accurate
- Might be hard to explain it how works
- Might be systematically inaccurate, eg if trained on majority voices (eg English people speaking English, not a broad accent or in a minority language) – *not bias in AI, bias in data or how data is handled – but problem may be deeper in whole idea of classification of peoples problematic*
- Challenges of prioritisation
- Guidelines eg via Lee (2022) https://arxiv.org/abs/2207.02960
- Cost of systems v skills to build

New new face of AI: Generative AI as general AI

Chat GPT

- Draft a short or long piece of text eg essay or cover letter for job application or a tweet or a policy document
- Answer questions
- Write code
- Solve a maths problem
- Create content in multiple languages
- Supply a recipe

- A new paradigm of search?

- Proliferation of GPT based applications for “research” - https://www.futurepedia.io/
- LLM can be leveraged to perform tasks such as generating metadata or transforming between standards

Why has Generative AI created such a strong response

- Its appealing to users because its easy to use
- “Sudden” appearance
- Its directly used in search
- Wider moral panic about AI

Ethical challenges of AI (in the hands of BigTech) example: Chat GPT

- Makes biased statements, eg GPT biased about gender
- "Hallucinates" information which is inaccurate, threatening trust in information – fabricates citations – cannot be cited
- Will accelerate content creation explosion – leading to even more challenges of information overload
- Is unexplainable because it is far from open about what data it is based on or how it works
- Privacy is at risk if you share your data with it – many companies blocking use due to fear of loss of data
- Violates copyright by using our text and data on the Internet
- Threatens jobs, eg journalists, editors and marketing
- Is available to people with money to subscribe, disadvantages those without
- Was developed by exploiting very low paid Kenyan workers to detoxify content
- May not be environmentally sustainable
- Reveals the disruptive power in the hands of big Tech companies

It is both about

- How to use it ethically?
- But more broadly ask questions about how ethical was its creation?

- Critical IL has never been more needed!

We need a balanced, constructive response as a profession

Pessimism

- Bias and impact on social equality and inclusion
- Impact on trust in information and content overload
- Power of BigTech companies beyond control of society

Optimism

- Importance of AI to future economy; productivity gains
  – AI in health … etc
- Enhanced access to knowledge
  – Easier information creation
- Potential regulation
- Relevance of professional skills around data and commitment to information literacy

Need for greater agility?

AI and libraries/ information profession

Many applications of AI for libraries

- Descriptive AI to describe collections in new ways, and at scale
  - Support of TDM
- Chatbots (or AI assistants) for 24/7 enquiry response, support to processes, buddying
- AI in everyday knowledge work, eg Generative AI drafting policies, reports, communications…
- AI for routine data processing… Robotic Process Automation
- Supporting AI applications by users, eg ResearchRabbit, elicit etc
- Supporting emerging data science communities, eg to find, use, preserve data
- Promoting AI literacy (including data and algorithmic literacies) for users
- Building smart spaces (even Automated Storage and Retrieval Systems)
- Robots for shelving or user information
- Analysing and predicting user behaviours

- Across functional teams
- Sometimes fundamental, other times not
  - Generative AI not central?
- Emphasis different by library sector

Which drivers of AI use seem to you most important?

Post your answers to wooclap.com AAMQCB

What types of uses are most relevant to your work?

Post your answers to wooclap.com AAMQCB

Which of these barriers to using AI are the most challenging in your context?

Post your answers to wooclap.com AAMQCB

AI and information professional jobs: Coder, supporter, trainer or manager?

AI's impact on jobs

- "Generative AI will upend the professions" Susskind and Susskind – FT 18.06.2023
- Some scholars predict the replacement of professionals (Susskind and Susskind, 2015)… others emphasise the vulnerability of "routine" jobs (Frey and Osborne, 2017)…

- OECD (2023): high skilled workers more likely to be affected, but wont lose jobs because also have skills cannot be automated. While low skill workers are more vulnerable. Harder to predict new forms of work than old.

- Willcocks (2021): it's a slow process & not just AI – consider SMACIT

- Replaced
- Dominated
- Divided
- Complemented
- Augmented
- Rehumanized

(GPAI, 2020)

Differences by sector

Where do information professionals position themselves in relation to AI?

- Directly writing code

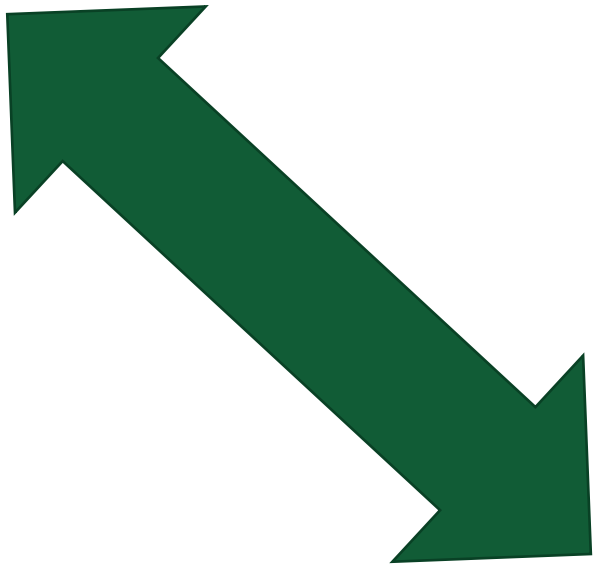
- RPA with backend processes

Relates to admin

- Managing collections as data
- Creating training data

Relates to collection management

Spectrum of roles and so competencies



Relates to liaison work

- Creating communities around AI

Relates to IL

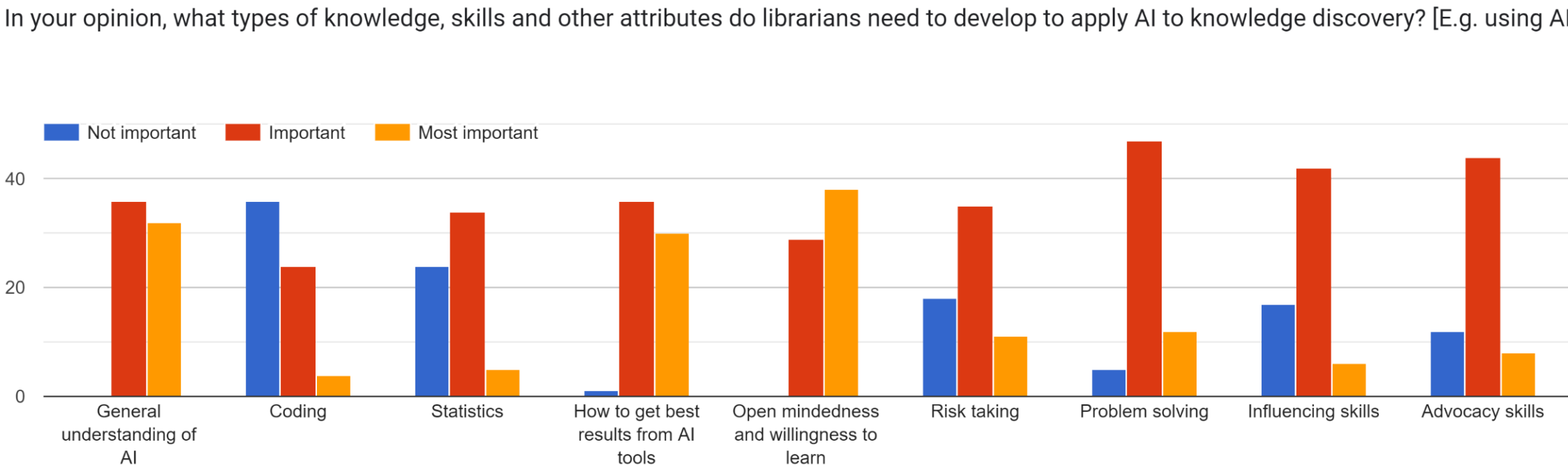
- Educating users

- Capturing user requirements
- Managing a responsible AI project

- Developing a vision for AI

Relates to strategy

Competencies we need to develop



Competencies we need to develop

Problem: do libraries have AI capability?

- Material resources
  - Data, infrastructure, time and money
- Human resources
  - Technical skills and business skills
- Intangible resources
  - Ability to coordinate a response, ability to change, willingness to take risk

(Mikalef and Gupta, 2021)

- National libraries – yes
  - Remaining problems: eg developing at scale
- Other libraries – doubtful, but can contribute to wider institutional capability
- Alternative focus on AI literacy promotion

How AI is increasing access to knowledge

BigTech driven AI is increasing access to knowledge:

- Search
- Recommendation and other forms of personalisation
- Translation
- Summarisation

- Generative AI

- Immediate informational issues, eg inaccuracy and made up references
- Bias
- Information overload; misinformation; homogenisation
- IPR issues
- Lack of transparency and explainability
- Privacy
- Digital divides and inequities in access
- Exploitative and extractive nature of automation
- Environmental impact

Roles for educational libraries

- Inputs to institutional capability
  - Supporting multidisciplinary communities of researchers using AI
  - Data skills to support institutional use of AI

- Educational libraries focus on AI literacy, because
  - Lack AI capability
  - Professional identity and existing practices oriented towards literacies

Current AI is data driven – so data knowledge/ attitudes are relevant to institutional capability

- How to find data in a complex information landscape
- Understanding of data quality and data governance
- The emphasis on the value of sharing, openness and interoperability
- How to understand the provenance, validity and quality of that data to evaluate its uses
- What data can be used for and what not (copyright etc)
- How to describe data using standards
  - Maybe need to supply richer data about provenance
- How to pick tools to do analysis
- How to store, preserve (or destroy) derived data

AI literacy Long and Magerko (2020)

1. Recognizing AI	Distinguish between technological artifacts that use and do not use AI.
2. Understanding Intelligence	Critically analyze and discuss features that make an entity "intelligent", including discussing differences between human, animal, and machine intelligence.
3. Interdisciplinarity	Recognize that there are many ways to think about and develop "intelligent" machines. Identify a variety of technologies that use AI, including technology spanning cognitive systems, robotics, and ML.
4. General vs. Narrow	Distinguish between general and narrow AI.
5. AI's Strengths & Weaknesses	Identify problem types that AI excels at and problems that are more challenging for AI. Use this information to determine when it is appropriate to use AI and when to leverage human skills.
6. Imagine Future AI	Imagine possible future applications of AI and consider the effects of such applications on the world.
7. Representations	Understand what a knowledge representation is and describe some examples of knowledge representations.
8. Decision-Making	Recognize and describe examples of how computers reason and make decisions.
9. Machine Learning Steps	Understand the steps involved in machine learning and the practices and challenges that each step entails.
10. Human Role in AI	Recognize that humans play an important role in programming, choosing models, and fine-tuning AI systems.
11. Data Literacy	Understand basic data literacy concepts such as those outlined in Prado and Marzal (2013).
12. Learning from Data	Recognize that computers often learn from data (including one's own data).
13. Critically Interpreting Data	Understand that data cannot be taken at face-value and requires interpretation. Describe how the training examples provided in an initial dataset can affect the results of an algorithm.
14. Action & Reaction	Understand that some AI systems have the ability to physically act on the world. This action can be directed by higher-level reasoning (e.g. walking along a planned path) or it can be reactive (e.g. jumping backwards to avoid a sensed obstacle).
15. Sensors	Understand what sensors are, recognize that computers perceive the world using sensors, and identify sensors on a variety of devices. Recognize that different sensors support different types of representation and reasoning about the world.
16. Ethics	Identify and describe different perspectives on the key ethical issues surrounding AI (i.e. privacy, employment, misinformation, the singularity, ethical decision making, diversity, bias, transparency, accountability).
17. Programmability	Understand that agents are programmable.

AI literacy hard to define and hard to achieve

- AI is very broad
  - In different contexts may be given different emphasis
- AI is changing
- AI is hidden

- AI is based on hard to understand concepts from stats/ computation
- AI is not necessarily explainable
- BigTech does not want to build explainable AI

What roles and skills are needed

1. For boosted AI capability of wider institution
2. For ability to deliver AI literacy training

Existing skills

- Business skills to run AI projects
- *Leadership to manage organisational change*
- *LIS service focus and values*
- Pedagogic knowledge

New skills

- Knowledge of LIS specific AI applications
- AI literacy
  - Data literacy

- *Leadership to define a vision for new technologies*

- Probably not:
  - Coding?
  - Statistics?

What about soft skills, attitudes, values and vision needed for AI?

WEF (2020) – 10 skills to thrive in the 4th Industrial revolution

1. Complex Problem Solving
2. Critical Thinking
3. Creativity
4. People Management
5. Coordinating with Others
6. Emotional Intelligence
7. Judgement and Decision Making
8. Service Orientation
9. Negotiation
10. Cognitive Flexibility

Attitudes

- Service focus / balanced with sense of institutional agendas
  - Cf Technological solutionism
- Collaborative skills / Influencing skills

- Commitment to professional development and learning
- Professional knowledge sharing

Values

Example: CILIP's ethical statement

1. **Human rights, equalities and diversity,** and the equitable treatment of users and colleagues
2. The public benefit and the advancement of the wider good of our profession to society
3. Preservation and continuity of **access to knowledge**
4. **Intellectual freedom**, including freedom from censorship
5. Impartiality and the **avoidance of inappropriate bias**
6. The **confidentiality** of information provided by clients or users and the right of all individuals to privacy
7. The development of **information skills** and information literacy

Offers a distinctive perspective on AI ethics

More challenging dimensions:

- Understanding of how inequality reproduced?
- Relevance of sustainability, eg need for green AI
- Consideration of global South perspectives, eg issues around language and operating in low resource environments
- The ultimate drivers for datafication lie beyond our control

A vision

The *paradigm of the intelligent library*

From searching to find a text to read

To interacting with the full text of the library collection

Cox, Pinfield and Rutter (2019)

OR *The living systematic review*

What is your vision of a library or information service powered by AI?

IFLA Special Interest Group
Artificial Intelligence

IFLA SIG on AI: 23 resources to get up to speed on AI in 2023

https://www.ifla.org/g/ai/23-resources-to-get-up-to-speed-on-ai-in-2023/

IFLA Special Interest Group
Artificial Intelligence

Generative AI for library and information professionals (draft)

https://www.ifla.org/generative-ai/

Call for papers

"Artificial Intelligence and Academic Libraries"

- https://www.sciencedirect.com/journal/the-journal-of-academic-librarianship/about/call-for-papers

Key publications

- Cox AM (2021) The impact of AI, machine learning, automation and robotics on the information professions: A report for CILIP. https://www.cilip.org.uk/general/custom.asp?page=researchreport
- Cox, AM (2022). The ethics of AI for information professionals: Eight scenarios. *Journal of the Australian Library and Information Association*, 71(3), 201-214.
- Cox, AM (2023). How artificial intelligence might change academic library work: Applying the competencies literature and the theory of the professions. *Journal of the Association for Information Science and Technology*, 74(3), 367-380.
- Huang Y, Cox AM, & Cox J (2023). Artificial Intelligence in academic library strategy in the United Kingdom and the Mainland of China. The Journal of Academic Librarianship, 49(6), 102772
- Report for JISC forthcoming in next few weeks: “Developing a library strategic response to Artificial Intelligence”.

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Q&A

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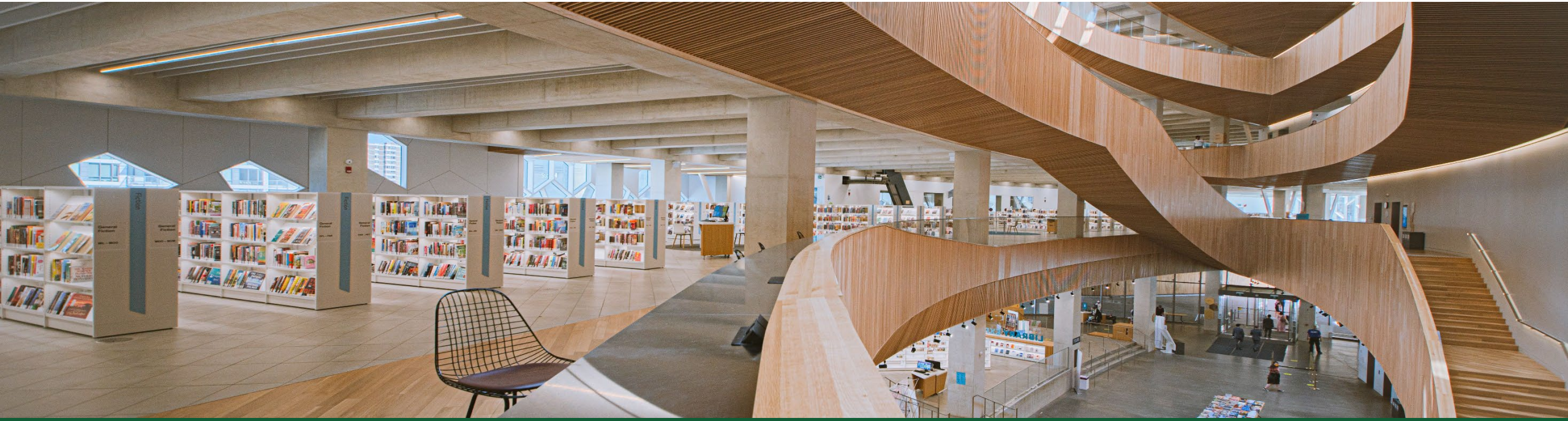

Thank you.

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