Week 20 lecture – Recap and revision

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Today's lecture

- Reflecting on what has been learnt over the second term
- Drawing out the key crosscutting themes from weeks 11-19
- Answering your questions about term 2 content
- What to expect from the exam in the summer

What was this term all about?

We focused on covering some best practices

- Security design principles

We mostly considered some of the complexities and challenges that currently exist when we think about computing in society

- Malware and malevolent online practices
- Digital exclusion and inequalities
- Privacy, censorship and surveillance
- Sustainability
- AI and Ethics

Reflection on the module so far

Discussion exercise

Talk to the person next to you for 5 minutes, responding to the following questions:

- Have the topics covered in Term 2 change the way you think about them?
- Which of these topics captured your imagination or influenced the way you think about them?
- How would you, as a computing professional, make an impact to change some of these challenges?

Cross-cutting themes

Discussion exercise

- Talk for 5 minutes to the person next to you (a different person if possible!)
- What themes can you identify that cut across multiple lectures?

A few cross-cutting themes

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1) Importance of minimizing defects and vulnerabilities in software development practices

2) Importance of designing systems that mitigate existing digital inequalities

3) Valuing privacy; critically reflecting on surveillance and censorship practices with respect to privacy

4) Emergent key social, ethical and legal challenges and future practices for computing professionals

1: Minimizing defects and vulnerabilities in software development practices

- Almost every aspect of our modern lives depends on trustworthy software
- Security threats and attack occur almost daily and cost organisations time and money
- Software defects are present in complex-systems:
  - Manifested by design flaws or implementation bugs
  - Exposed under natural-accidental or deliberate conditions

1: Minimizing defects and vulnerabilities in software development practices

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- Software development practices
  - Lack the rigorous controls required to minimize defects into software
  - It is very difficult to produce a bug-free software especially when the software is non-trivial.
- Because security is often:
  - Not a priority (Time to market pressure)
  - A financial burden
  - An afterthought

The goal is to make a hacker's job as tough as possible to avoid becoming a victim

1: Minimizing defects and vulnerabilities in software development practices

- Identify malware threats when designing software and information systems
- Malevolent online practices such as social engineering target vulnerable groups
- Evolving risks to the formerly excluded (older adults) through phishing attacks (2021 the year of breach)
- Digital divide and the pandemic:
  - What impact did this have on users who were not familiar with these technologies?

2: Importance of designing systems that mitigate existing inequalities

- Inequities between different groups of people may result from the use or misuse of information and technology
- Exclusion: Being locked out of technologies needed to fully participate in society (not reaping economic and social rewards of technology)
- Factors in digital exclusion: ability, affordability and accessibility
- Digital exclusion: recognises differences in technology use as inequity (injustice)
- Digital divide: recognises differences in technology use as inequality only

2: Importance of designing systems that mitigate existing inequalities

- Gap between young and old
- Older adult digital exclusion factors
- Inequality vs. Inequity
- Questioning stereotypical views of older adults (aging is not a disease; older adults are not necessarily disabled)
- How digital technologies may reinforce existing inequalities (17)
  - Unequal access (digital exclusion)
  - Unequal outcomes (algorithmic decision-making)

2: Importance of designing systems that mitigate existing inequalities

- Algorithmic bias examples (case studies)
  - Medicine and health & criminal justice
- AI and ML increasingly used in medicine and healthcare, often for diagnostic purposes. Often accurate but not for everyone
  - Racial and gender bias examples
  - Why does the gender gap in accuracy exist?
- Predictive policing uses historic crime data to allocate resources geographically
  - Bias in what data is recorded, records are not exact measure of true crime rates, predicts patterns more than it does crime
  - Statistical flaws and social consequences

2: Importance of designing systems that mitigate existing inequalities

- Predictive recidivism (criminal reoffending)
  - COMPAS tool provides a risk score to predict likelihood of reoffending
  - Risk score helps determine who is incarcerated and for how long
- Why are these algorithms used? And why are systems designed that way?
  - Accurate and less biased than human decision-making, boost efficiency, aid resource allocation
- What's at stake here?
  - Different understandings of fairness
  - Can't satisfy all definitions of fairness simultaneously
  - Fairness vs. predictive accuracy

3: Valuing privacy; critically reflecting on surveillance and censorship practices with respect to privacy

- Privacy paradox: when people disclose personal information in ways that are inconsistent with the high value they claim to have in privacy.
- Stated aim of GDPR: to empower people to more easily and effectively manage their personal data
- Privacy harms: Exposure, Aggregation, Distortion, Exploitation, Exclusion
- Threats to privacy:
  - Surveillance capitalism
  - Data colonialism
  - Behaviour modification

3: Valuing privacy; critically reflecting on surveillance and censorship practices with respect to privacy

- The slow erosion of privacy.
  - "Privacy is rarely lost in one fell swoop. It is usually eroded over time, little bits dissolving almost imperceptibly until we finally begin to notice how much is gone."
- Do you agree with the definitions given in the lecture on privacy? (How would you define it?)
- Is privacy dead?
  - Yes/No?
  - What would computing systems looks like if we valued privacy?
  - What would software developers and computing professionals (you) need to do to ensure users are protected?

4. Future practices for computing professionals

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Social Challenges in Computing:

- Digital Divide – Unequal access to technology worldwide
- AI & Job Displacement – Machines replacing human jobs
- Misinformation & Fake News – The challenge of trust online
- Mental Health & Screen Time – Impact of technology on well-being

Future Practices:

- Promote digital literacy
- Develop inclusive and accessible technology
- Encourage responsible social media use

4. Future practices for computing professionals

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Ethical & Legal Challenges

- Privacy & Data Protection – How companies handle personal data
- Bias in AI & Algorithms – Unfair treatment due to biased data
- Cybersecurity Threats – Rise of hacking & data breaches
- Regulations & Compliance – GDPR, AI laws, and tech ethics

Future Practices:

- Strengthen cybersecurity frameworks
- Ensure transparency in AI decision-making
- Advocate for stronger data privacy laws

4. Future practices for computing professionals

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Future of Computing & Ethical Leadership

- AI Ethics & Responsible Development – Avoiding misuse of AI
- Sustainability in Tech – Green computing & reducing e-waste
- Human-Centered Design – Tech that serves people first
- Continuous Learning & Ethical Awareness – Staying ahead of ethical challenges

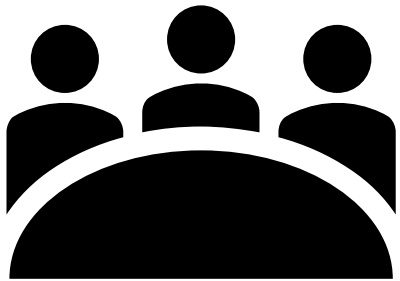
Key Takeaway:

- Computing professionals must be ethical leaders, ensuring technology benefits society responsibly!

Answering your questions!

Will we have seminars in term 3?
Do we have any coursework for this module?

- There is no course work associated with this module in Term 3
- No seminars in Terms 3
- The timetable should only show the lecture slots on Wednesday
- Term 3 lectures will have:
  - Module related lectures
  - Guest speakers (more detail on this will follow)
  - One exam prep and revision lecture



Do we need to remember every case study provided in the lectures?

- No – what is important is understanding the ideas and the concepts
- Being able to discuss a relevant example to the question will be useful – this might be case studies from the literature, or examples you have come across in your own independent research

- More to follow on exams next!

*Use of generative AI in your learning and assessment... before you do so...

- Think about the motivations for using Gen AI tools to support your learning and assessment
- Are you learning from this interaction?
- Are you using Gen AI tools whilst appreciating their limitations?
- Think carefully, academic assessment is based on demonstrating your ability to:
  - Critically think and be reflective
  - Use appropriate academic sources and cite these
  - Use your authentic voice when debating and presenting an argument.

*https://portal.lancaster.ac.uk/ask/study/developing-academic-skills/using-ai-in-your-learning-and-assessment/

*Use of generative AI in your learning and assessment... before you do so...

- Generative AI and academic integrity
- Acknowledging AI in your assessed work
  - Integrity and acknowledgment are detailed in the reference below
  - If you use any material from references, and GenAI you must acknowledge their use

*https://portal.lancaster.ac.uk/ask/study/developing-academic-skills/using-ai-in-your-learning-and-assessment/

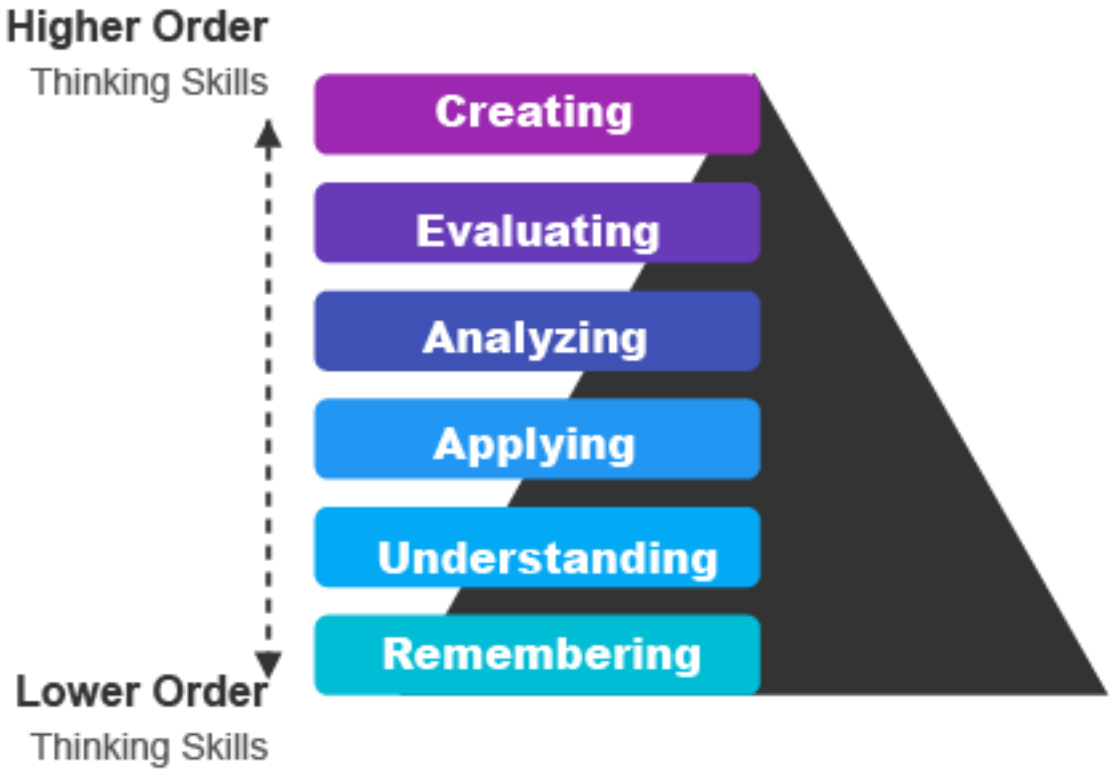
Term 2 Group Work Assignment

- Deadline: 4pm on Friday of Week 20.
- PDFs and saved according to the following naming:
- DayOfSeminar_TimeOfSeminar_OddOrEvenWeeks_GroupNumber
  > for example: **Monday_10_Odd_Group 4**

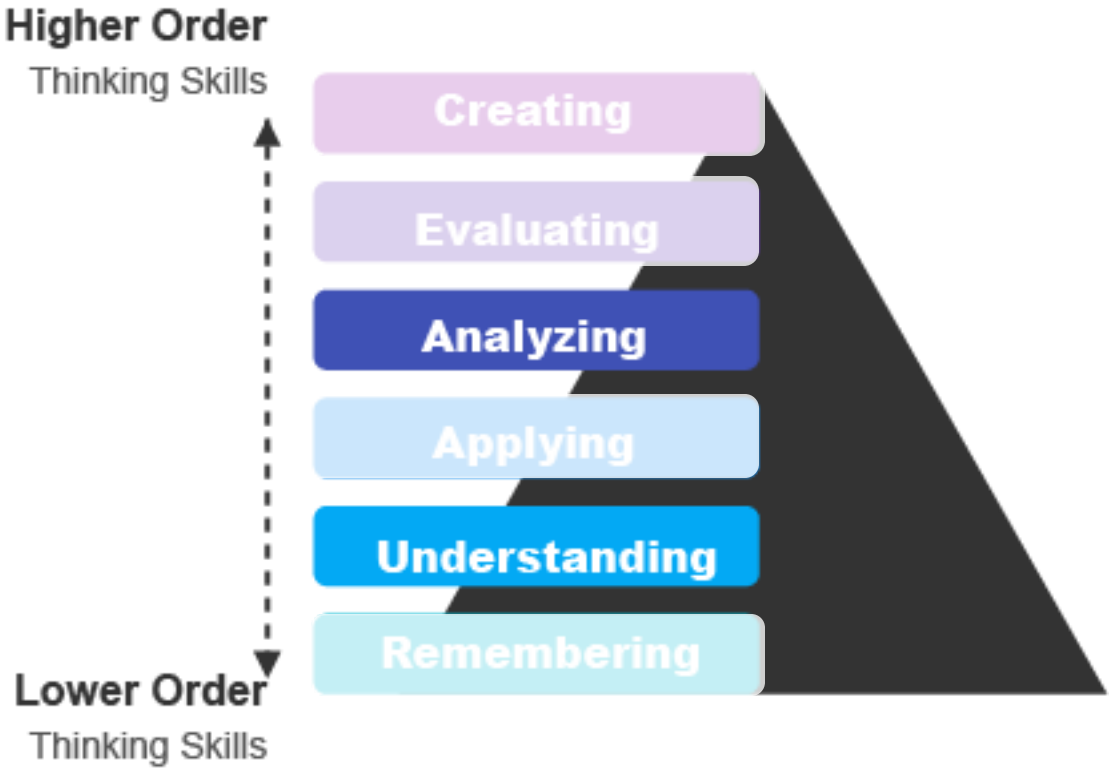
Submission point on Moodle:
https://modules.lancaster.ac.uk/course/view.php?id=42471#section-29

Looking forward (?!) to the exam….

What are we examining?



What are we examining?



The exam

- Will be electronic and in-person
  - Duration: 90 minutes, weighting = 70%

- Will be based on some recall questions “define, state, identify” but will also contain questions that demonstrate understanding “describe, discuss, explain”, analyze “compare, contrast” and evaluate “justify a stand, appraise, argue”.
  - We want you to show that you’ve understood the content
  - And we’d like to see you making connections between different ideas that have been explored across the lectures

Exam question examples – usability focus

The kind of questions you will **not** be asked

- List the four principles for designing accessible digital content
- What are the five W in W5H?

The kind of questions you could be asked

- Why is digital accessibility important?
- Provide practical examples that relate to each of the four principles for designing accessible content.

Thank you! Any further questions?

Wishing you a happy holidays!