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INTELLECTUAL PROPERTY; SOFTWARE PROTECTION; LIMITING LIABILITY;

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Based on material developed and delivered by Dr Bran Knowles

Additional slides added by Phillip Benachour

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What you will learn today

- Intellectual property
  - How it differs from property rights
  - How to protect it (and the issue of piracy)
- Software protection
  - Different models for protecting software
- Limiting liability
  - How do you protect yourself as a computing professional

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Intellectual Property

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Definition: Intellectual Property

- Intellectual Property is….
  - Any unique product of human intellect that has commercial value
  - Examples include: Books, songs, movies, paintings, drawings, inventions, designs, chemical formulas, **computer software**
- Value of the idea > value of physical medium
  - 1st copy: expensive, time-consuming
  - 2nd copy: cheaper, less time-consuming
- Intellectual property != physical manifestation

Property Rights

- Natural right: the right to own property
- John Locke's theory of property rights…
  - People have a natural right to:
    - Things which they remove/create through labour

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Extending Property Rights to Intellectual Property

- If you 'steal' intellectual property, you don't deprive the owner of using it
  - you "steal" the revenue derived from use rather than the item.
- This has caused issues with downloading content and piracy!

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Protection of Intellectual Property

- Protecting intellectual property:
  - You can protect IP by keeping it secret
  - But then you cannot benefit from the IP
- Benefits of grant intellectual property rights to:
  - encourage the creation of valuable ideas or
  - encourage trade based on ideas
- Intellectual Property Rights compromise:
  - Give authors/inventors exclusive rights
  - But only for a finite period of time

Intellectual Property Rights (IPR)

- Intellectual property rights (IPR) is the name given to legal rights that protect:
  - Creative works
  - Inventions
  - Intangible assets of a business
- Intellectual property rights include the following:
  - Copyright
  - Patents
  - Law of confidence
  - Design rights
  - Trademarks

Copyright Law

- Modern copyright law extends to:
  - Literary works, artistic works, musical works
  - Governed by Copyright, Design and Patents Act 1988 (CDPA)
- Copyright infringement: violation of copyright law (i.e. unauthorised use of work)

- **Copyright protects the expression of an idea, not the idea itself.**
  - (Provides the owner with exclusive rights to use the work)

Patent Law

- Strong form of intellectual property rights
  - Gives the owner the **exclusive right** of an invention for up to 20 years
- **Protects against independent development of something based on the same idea**
- Patents are not granted automatically
  - Application process = long and expensive
  - Inventions must:
    - Be new
    - Involve an inventive step
    - Must be capable of industrial application
    - Fully disclosed
      - when the patent expires, others should be able to implement it

Patents

CRUNCH NETWORK

How expiring patents are ushering in the next generation of 3D printing

*Posted May 15, 2016 by **Filemon Schoffer** (@filemonschoffer)*

Filemon Schoffer
CRUNCH NETWORK CONTRIBUTOR

Filemon Schoffer is the head of community at 3D Hubs.

More posts by this contributor:
- 3D printing technologies explained
- Metal 3D printing takes flight

How to join the network ▶

The year 2016 is quickly shaping up to be one of the hottest years on record for 3D printing innovations. Although there is still a lot of hype surrounding 3D printing and how it may or may not be the next industrial revolution, one thing is for certain: the cost of printing will continue to drop while the quality of 3D prints continues to rise.

This development can be traced to advanced 3D printing technologies becoming accessible due to the expiration of key patents on pre-existing

Law of Confidence

- Useful supplement to copyright and patents:
  - Protect ideas before they become copyrighted / patented.
- Protects information, with a very wide scope
  - Trade secrets, business know-how, lists of clients and contacts
  - Ideas not yet expressed in a tangible form

- **To inform in confidence: Non-disclosure Agreement (NDA)**

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Intellectual PropertyRights (IPR) Overview

Right	Works protected	IT example
Copyright	Original literary, artistic or musical work Sound recordings, films, broadcasts, cable programs	Programs, preparatory design materials, databases treated as literary works Computer-generated work (e.g. computed weather forecast)
Patent	Inventions: products and industrial processes	New hardware, new method of making hardware, software with technical effect (e.g. software controlled industrial process)
Confidence	Anything of confidential nature	Idea for new hardware or software (prior to patent), secret algorithm, contents of databases, research proposals
Design right	Original designs, any aspect of shape or configuration	Hardware design, e.g. ergonomic keyboard or mouse
Trademark	Sign capable of being represented graphically to distinguish goods/services	Apple logo, ‘Intel inside’, etc.

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AI and Intellectual Property

- Patent law is written assuming a human inventor
  - Precedent: genes cannot be patented
- Costs of not granting IPR to AI:
  - Companies cannot profit from inventions by AI (reduce incentive to innovate)
- Costs of granting IPR to AI:
  - Who is responsible for that idea?
  - Breakdown of patent system
- Recent ruling: AI cannot be granted IPR
- A way forward: AI-IP
  - Not modify existing Intellectual Property law
  - Make new laws specific to AI-generated inventions

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Defining Piracy

- Piracy: the act of unfairly trading on a person's creation
- Online Piracy: the act of unfairly trading (downloading) on a person's creation

  Copyright holders claim: 1 download = 1 lost sale

Environmental costs:

- BitTorrent: peer-to-peer file sharing
  - 43%-70% of all internet traffic
  - 150 million tonnes of CO_2 per year

Combatting Piracy

- Digital Rights Management (DRM)
  - Access control mechanisms used to restrict medium usage (inhibits usage by multiple parties)

- Digital Economy Act 2017
  - Increases maximum jail term for internet piracy to 10 years (modifies Copyright, Designs and Patent Act 1988)

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Software Protection

Why Protect Software?

- Utilitarian (consequentialist) argument against copying of software:
  - Copying software reduces software purchases …
  - Leading to less income for software producers …
  - Leading to lower production of new software …
  - Leading to fewer benefits for society!!

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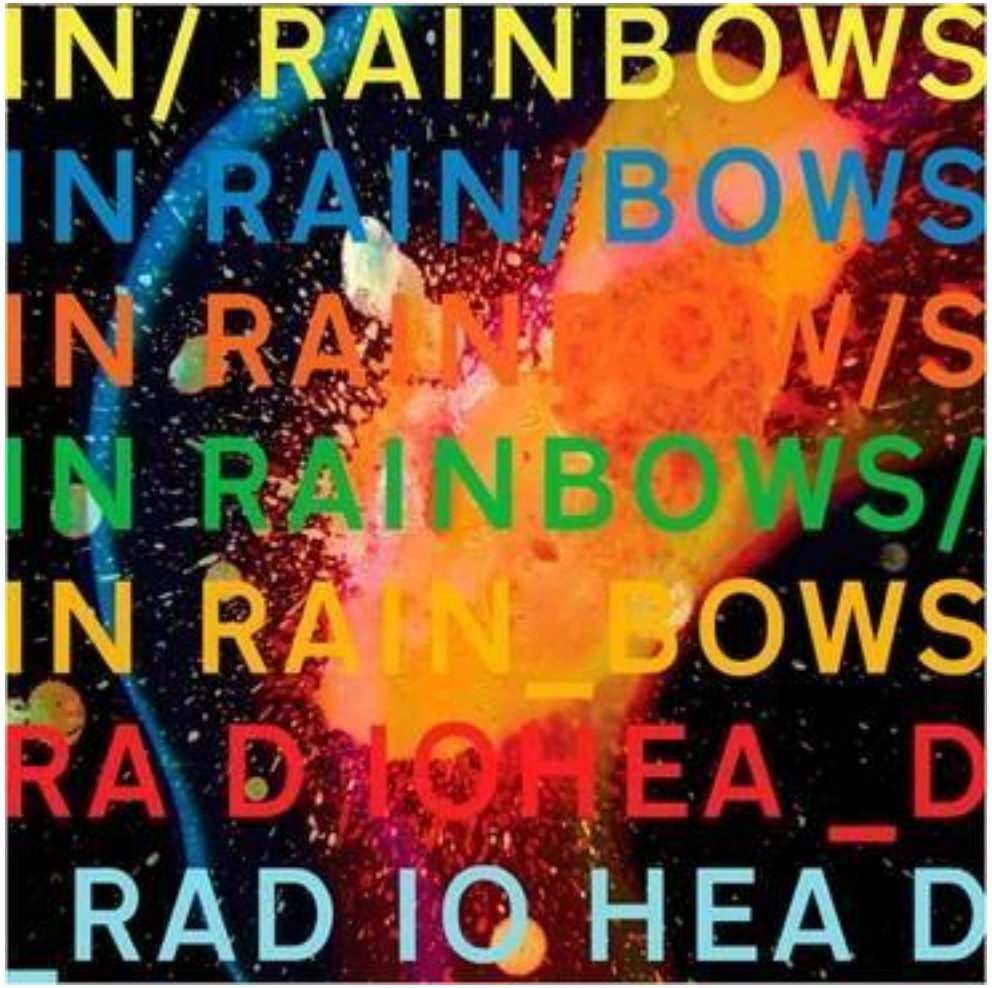
Free Software: Open Source

- Free Software movement:
  - Freedom to run the program, for any purpose
  - Freedom to study how the program works, and adapt it
  - Freedom to redistribute to help your neighbour
  - Freedom to improve the program and release improvements
- Open Source idea:
  - Programmers develop software in return for credit
    - i.e. analogue = researchers working on publications
  - Enhance reputation and make grants easier to acquire
    - Assuming somebody is giving out grants for software writing

Shareware

- Not everybody believes that software protection is required in order to spur development of new software.
- Some argue:
  - People will pay for software because they need it to continue to be supported for their own purposes
- Shareware idea:
  - Programs can be freely obtained
  - If you like it you pay the developer a small 'reward'.

Released: 2007 (for free)
Average price paid = £2.80



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Copyright for Computer Software

- Pre-1985:, uncertain whether computer programs were protected by copyright in the U.K.
  - Court view: source code listings were protected as they resembled written English
- But what about object code and databases?
  - Apple Computer vs. Computer Edge Pty Ltd (Australia 1984)
    - Computer Edge Pty used Applesoft object code in the ROM of their "Wombat" computers
    - Apple's claim of infringement of copyright was rejected
    - Demonstrates law can struggle with new technology
- Software copyright is now covered by the Copyright, Designs and Patents Act 1988 (CDPA)

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Copyrights, Designs and Patent Act 1988 (CDPA)

- The act covers:
  - Software
  - Preparatory design materials (flow charts, etc.)
  - Databases (provided they are original and recorded)
- Restricted acts important for software
  - to copy the work
  - to issue copies of the work to the public
  - to make an adaptation of the work
- Infringement of copyright
  - Performing a restricted act without permission of the copyright owner
  - Some exceptions, for backup and decompilation

CDPA: Authorship and Ownership

- CDPA distinguishes between two types of computer-produced work:
  - Generated by a human author
  - Computer-generated works
- Owner of copyright in a work is:
  - Author of the work
  - Unless by employee in the course of his employment
- Author of computer-generated works is:
  - "the person by whom the arrangements necessary for the creation of the works are undertaken"

- It also restricts copying:
  - including loading a program onto a computer without a license

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Implications of Software Copyright

Key points to remember when you go into the workplace

1. Do not copy non-literal parts of computer software (screen displays, menus, db structures)
2. You should prepare, date and keep preparatory materials for development
3. Insert deliberate mistakes or redundant code
4. Be aware: copyright extends to compilations of programs
5. Ensure that employees do not use materials or confidential information from previous employment.
6. Honour confidentiality.
7. Give credit if adapting Open Source code.

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Liability

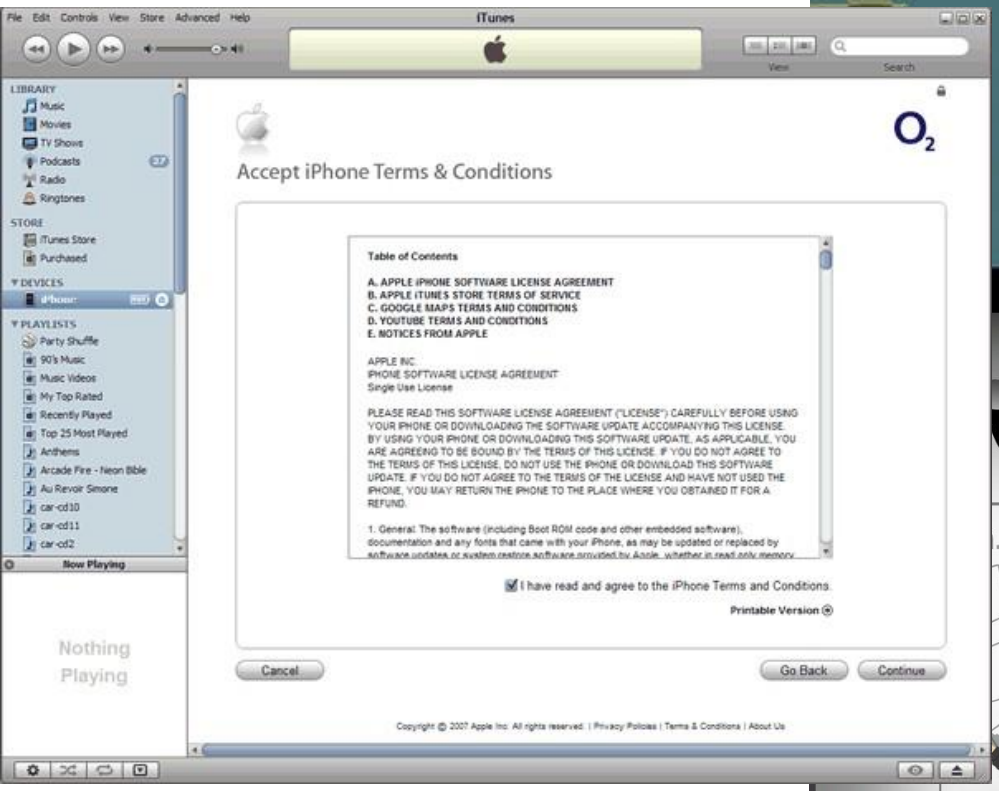
Product Liability

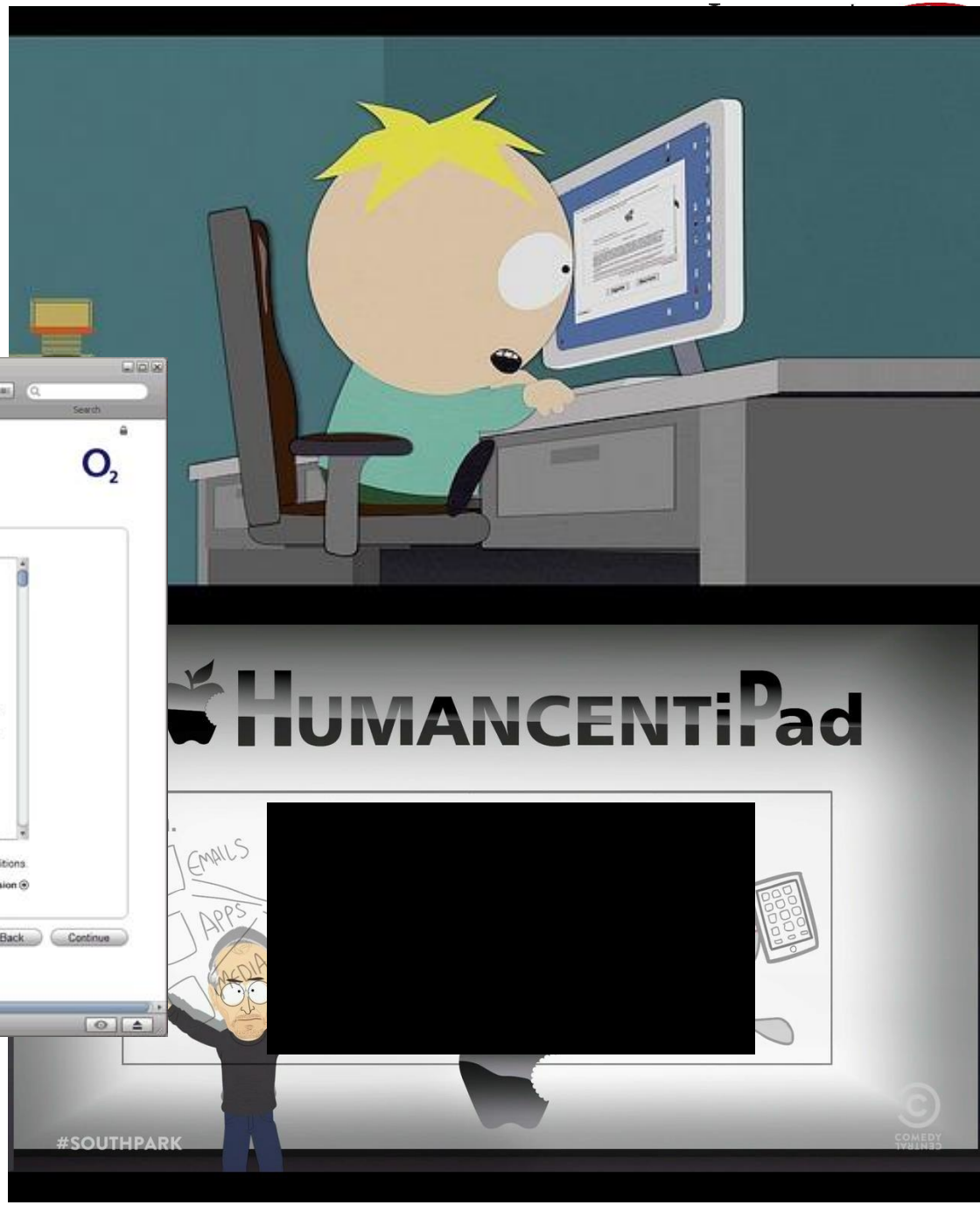
- Consumer Protection Act 1987 (CPA) imposes a liability on the producer of a defective product
- CPA applies to computer hardware:
  - Customer buys a disk containing the software
  - The disk is deemed to be a 'product' and is protected
- CPA does not apply to computer software:
  - Customer downloads the software then the producer is providing a 'service'
  - Same applies for supplier installing the software at the customer's premises

Contractual Liability

- Contract for supply of service: where a supplier writes software for a client
  - Covered by Supply of Goods and Services Act (SGSA) 1982
- SGSA does not apply to software sold without some form of contract
  - Contract here means the licence agreement
- SGSA binds the software supplier to provide a service with reasonable care
  - If the supplier fails he could be liable for damages
  - User is bound to the terms of licence
    - E.g. Not copying the software and redistributing

Who actually reads the license agreement's terms?





Negligence (Personal Liability)

- Imposes liability on a person who has acted carelessly under common law
- Liability for negligence in software development can be significant:
  - Health-system failure
  - Security-system malfunction
  - E-commerce system security loophole

Professional conduct:

Professional Competence and Integrity

- Continuous professional development.
- Being familiar with legislation:
  - When Building a Web-based e-commerce application for a retail company, software developers are required to be conversant with legislation such as the Consumer Contracts (Information, Cancellation and Additional Charges) Regulations 2013
  - A software engineer working on a railway signalling system should be familiar with the regulations laid down by the Rail Safety and Standards Board.

Professional conduct:

Professional Competence and Integrity

- Undertake project work with professional competence.
  - Example: “Failure of the London Ambulance Service’s Computer Aided Dispatch System”
  - https://www.youtube.com/watch?v=NT3VU4B5Dsc

Oct. 26, 1992: Software Glitch Cripples Ambulance Service

OCT. 26, 1992: SOFTWARE GLITCH CRIPPLES AMBULANCE SERVICE

1992: A software error causes London’s brand new computer-aided ambulance-dispatch system to fail. The ensuing snafu is blamed for anywhere between 30 and 45 deaths.

High costs of computer-based information systems

"Even the simplest computer systems have the potential to impact all aspects of society when integrated with everyday activities such as commerce, travel, government, healthcare, and education. When organizations and groups develop systems that become an important part of the infrastructure of society, their leaders have an added responsibility to be good stewards of these systems."

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Being a good steward

- Establishing policies for fair system access
- Monitoring the level of integration of a system
- Monitoring how society uses a system
  - Developing appropriate standards of care if they do not exist

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Negligence and Ethics…

- Although the notion of ethics is fuzzy, there are clear examples of what is considered negligent:
  - Sharing personal data
  - Flaw in algorithm/service provided
  - Voicing opinion on social media platforms
    - *@celebrity: 'Opinions are my own'*

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Limiting Liability

- For products and services:
  - Specify a warranty period
  - Specify 'appropriate use'
  - Specify maximum reasonable liability
  - Get liability insurance!
- For you:
  - Ensure that you follow employer's standards and guidelines
  - Ensure thorough and rigorous testing
    - Consider 'bug bounties'

Question

Should computer scientists be held liable for failing to adhere to the Code of Ethics and Professional Conduct?

bcs
The Chartered Institute for IT

ethics.acm.org
Professional Ethics in Computing
acm

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Key takeaways

- Good practice for computing professionals
  - Things that can go wrong – and protecting yourself
  - Being a steward
- Various definitions, relevant laws
  - Challenges to the law by computer-based systems