# literature reviews and analyses

Ian Ruthven

# introduction

- this seminar is about the first stage of the project:
  - deciding what you are doing
  - and why…
- it's the part that is often done most poorly
- and the part that gets less explanation in the report
- it's also the bit that you should be spending most time on in first semester

# what we assess

- “This aspect of the project is evaluated on the **depth of background study and analysis of the problem**, the clarity and the quality of the specification, the **extent to which the background study informs the rest of the project development**, the quality of the design both at the architectural and detailed design level and with respect to best practice, the consideration of alternative designs, and the justification of any choices made.”
- so how well you understand the problem, how you translate that understanding into a design and demonstrate you have made good choices
- worth between 20%-25% of your final mark for the project
- this is 5% of your overall degree mark
- two parts:
  - background study and analysis of problem
  - how the background study informs the solution

# today

- going to concentrate on the **first** part
  - working out what has already been done
  - what (if possible) is best practice
  - motivates your solution/system/problem/evaluation
  - review also covers technology and can also inform evaluation
- the motivation aspect is particularly important in determining the requirements for your project

# 3 main approaches

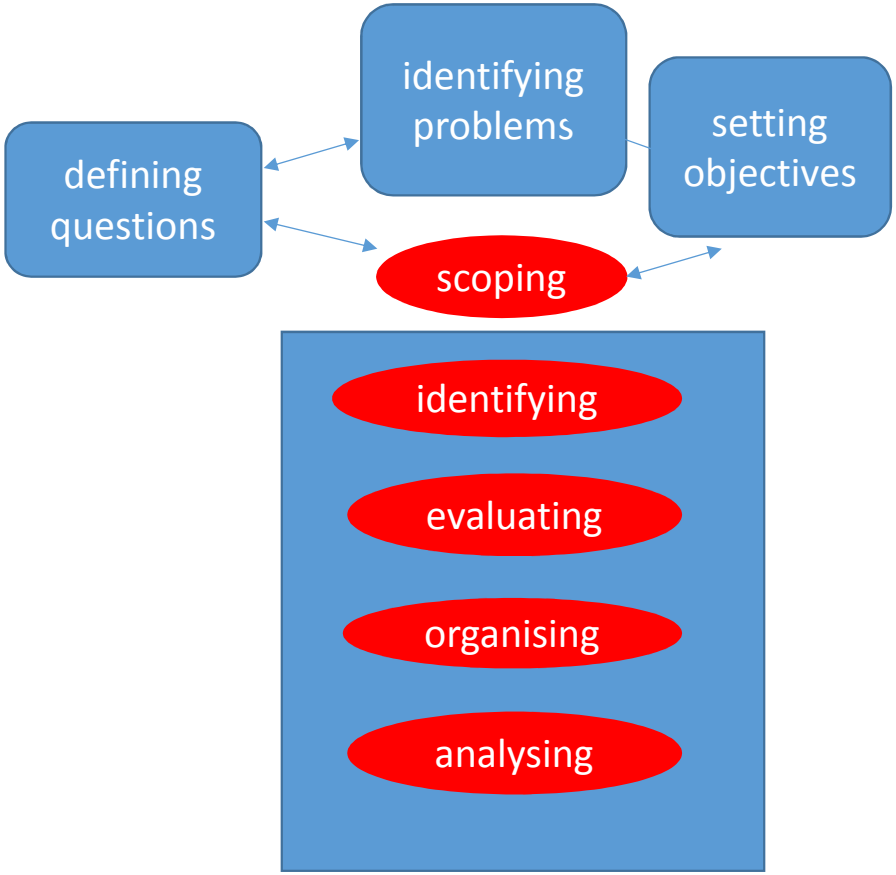
1. **literature review**
   using literature, in form of academic papers, to understand state-of-the-art and motivate what is new/better about your approach
2. **market analysis**
   using existing systems, in form of documentation, system analysis and customer data, to understand the customer base for your product, state-of-the-art in solutions and motivate what is new/better about your approach
3. **review of needs**
   using people to understand the problem and what is required from a solution

# 3 main approaches

- can use a mixture of these approaches
  - every project is different
  - and you might want different approaches for different parts of the project
- most likely in consultation with your supervisor
- better projects will explain **why** a particular approach or approaches was taken, not just describe what was done
  - lack of an explained process for how you approached this phase is the reason for poorer marks
  - although easy to gain

# literature reviews

- for some projects most of what you need to know is in the form of academic papers published in journals and conferences
- most literature reviews are narrative reviews
- interpretative
- synthetic
- aims is understanding of field and identification of knowledge gaps
- building a picture of an area
  - maybe historical
  - leads to state of the art
  - can be open to claims of being opportunistic, selective and therefore biased



# How to do it badly

- type the title of your project into Google and summarise the first five papers you find
- don’t try to integrate your findings, just write a paragraph about each one with no logical connection between them
- don’t both with the dates of articles
  - ignoring that ideas can be developed over time, algorithms can change, etc.
- hope that showing you have found papers is enough

# identifying the literature

- don’t just rely on Google
- use subject gateways
  - Computer and Information Sciences Resources
    - http://www.strath.ac.uk/library/eresources/ (general resources)
    - http://guides.lib.strath.ac.uk/cis (specialist resources for CIS)
  - Google Scholar https://scholar.google.co.uk/
    - also allows citation chaining
  - ACM Digital Library http://dl.acm.org/
    - For background articles, use keywords such as ‘review’ or ‘survey’ in your
    - Can also limit ranges of searches, e.g. to last 5 years to cut down number
- clear search parameters
  - search terms employed
  - search engines utilised
  - inclusions/exclusion criteria

http://www.darvillsrareprints.com/Images/images/Darvill%20Legal%20Scenes/Darvill%20Legal%20Scenes/lost-color.jpg

# organising and analysing the literature

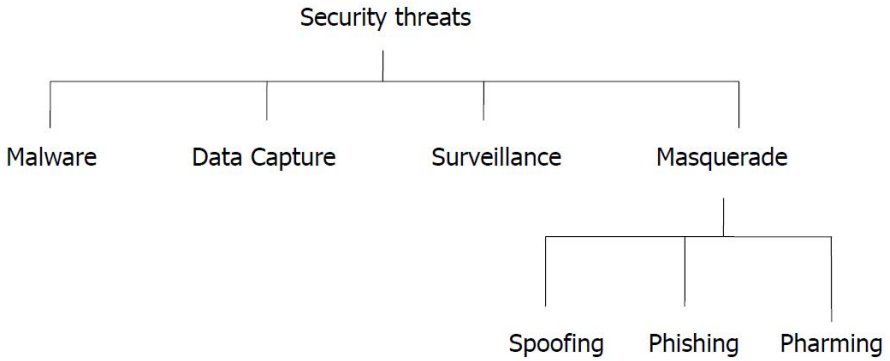
- develop a framework for the review
- simplest approach is to use key themes
- a chronological or geographical perspective may also be useful
- material should be critiqued
  - strengths/ weakness
  - errors
  - relationships with other works
  - consensus and coherence and disagreement


- a literature review is not just a summary of what other people have said
- need to identify patterns, trends, relationships etc.

http://old-classes.design4complexity.com/7701-S14/weekly-work/literature-review-intro.html

# organising the literature

**taxonomic approaches**




**matrix approaches**

National Approaches to Information Legislation

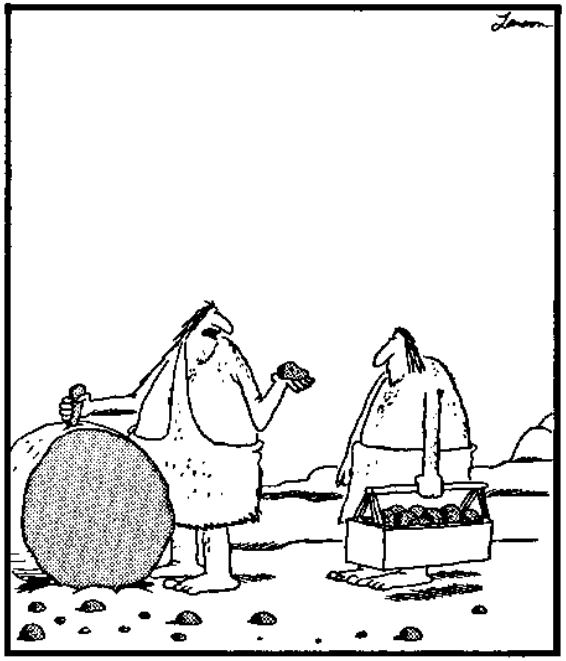
| | US | UK | China |
|---|---|---|---|
| Freedom of Information | | | |
| Data Protection | | | |
| Intellectual Property | | | |

# market analysis

- some bodies of knowledge are not expressed in the academic or practitioner literature
- particularly case when designing a new product
- these projects may have few academic papers but lots of existing systems
  - there might be academic papers, depending on area, but often the documentation is hidden and the only observable are the systems themselves
- a common, but poor, approach, is to
  1. Google a few systems
  2. list all their features
  3. put them all together as your requirements
- you might develop something different than already exists (more features) but not something better
- building something that already exists is unlikely to be successful

# market analysis

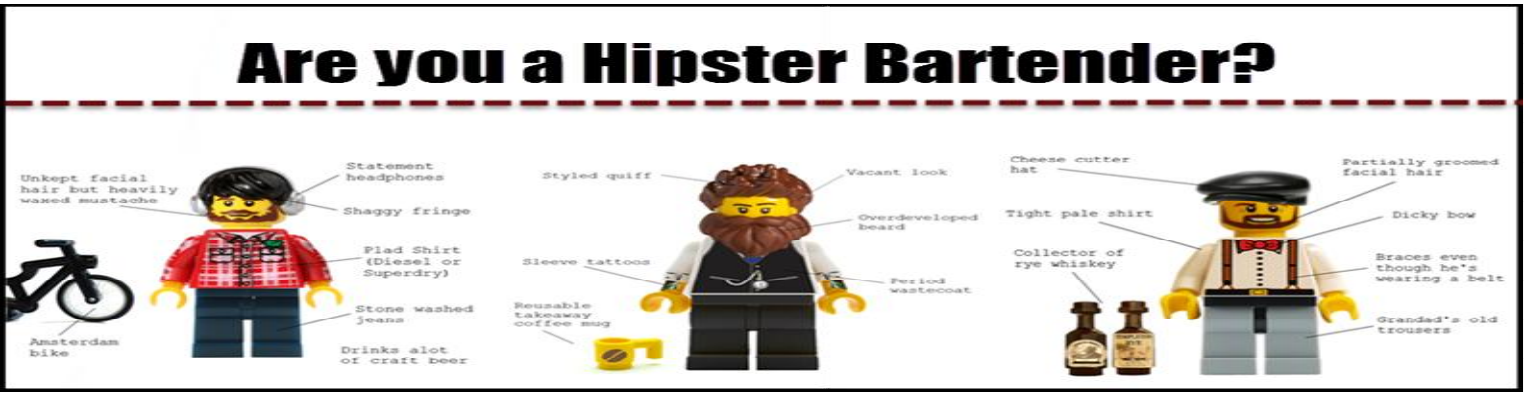
- better approach
- like a literature review, we need to present an analysis of existing knowledge and document this analysis
- two main parts:
  - (1) analysing the market – who is the customer base for your product
    - this is not the same as describing what users will do with your system
  - (2) analysing what already exists in the market to motivate the need for your product and ensure it is distinctive



"So what's this? I asked for a *hammer*! A hammer! *This* is a crescent wrench! ... Well, maybe it's a hammer. ... Damn these stone tools."

# market analysis

- who is your user base?
- think about profiling your typical users
  - age – what age ranges are your most likely users, how might this affect your design?
  - usage – is the product to be in continual use (like a diet app), occasional use (like a hotel booking system), infrequent use (like a GP appointment system), how might this affect criteria you set for ease of use, data storage, security
  - habits – are your users heavy users of new technology, are they people like to make frequent changes in technology, what might they care about in terms of design and use, etc.
  - these criteria can affect what non-functional requirements are important
- some of these things can be guessed from the type of application you are building, some may need trends analysis (Pew Internet Surveys etc.) to provide some solid data on lifestyle choices, trends in technology use, etc.
- you don't necessarily need to build a product or service for all users
- for some products it is better to have a clear demographic and design to them




http://www.distillerytrail.com/blog/the-definitive-lego-guide-to-the-hipster-bartender-infographic/

# market analysis

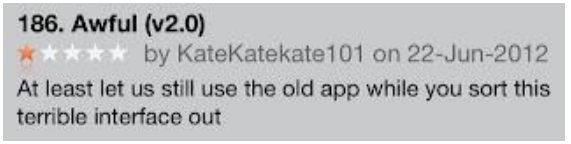
- analysing what is already available
- for some ideas there are already existing products that are similar if not identical
  - can compare/contrast features
  - but what will your customers perceive about your product that is more value than these?
- what do you assess that is weak about these competitors
  - what will be distinctive about your approach to your customers
    - quality, ease of use, fashion, speed, etc.?

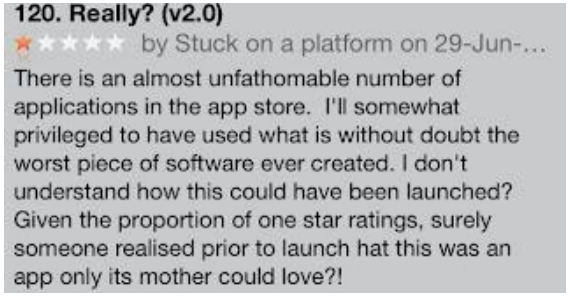


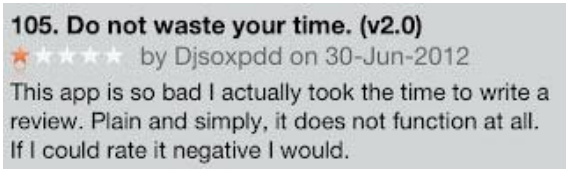

http://officerhush.com/11-of-the-worst-bacon-products-ever-produced/

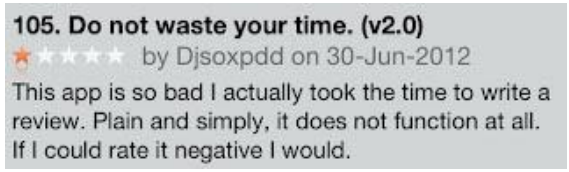
# market analysis

- when describing your approach
  - start with customer needs
  - customer profile
    - even if you are giving away product they are still important
    - but if it's the type of product that has commercial value then think about how you might judge its value
  - then describe current product range if alternatives exist
- to motivate why your product will be better
  - again not just having a couple more features

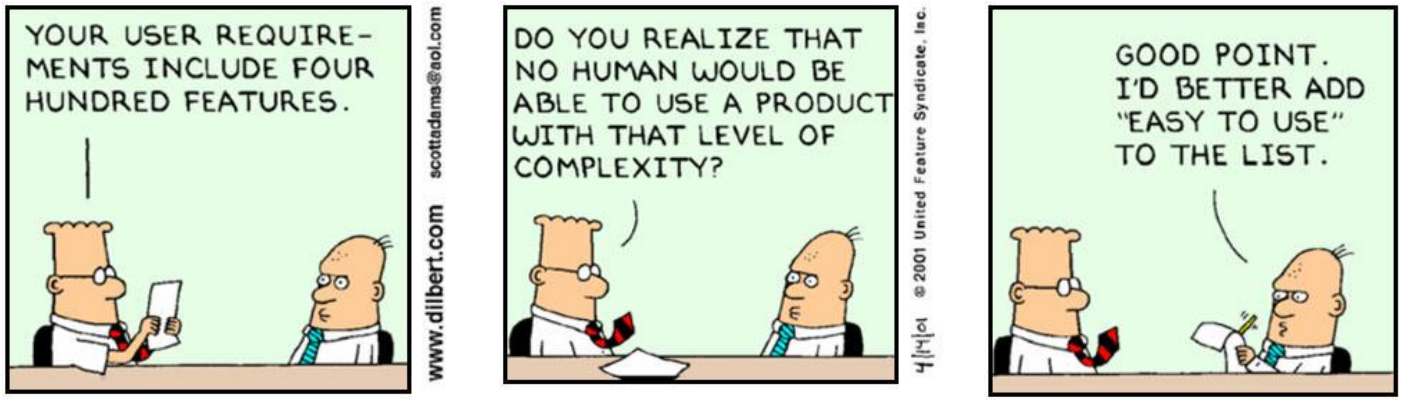
# SWOT analysis

- one way to structure your analysis is a SWOT analysis
  - core strengths of existing solutions?
  - current weaknesses of them?
  - what opportunities exist to develop something new and distinctive?
  - what threats do you face in doing this?


https://thumbs.dreamstime.com/z/swot-concept-strengths-weaknesses-opportunities-threats-analysis-illustration-colourful-notes-81221853.jpg

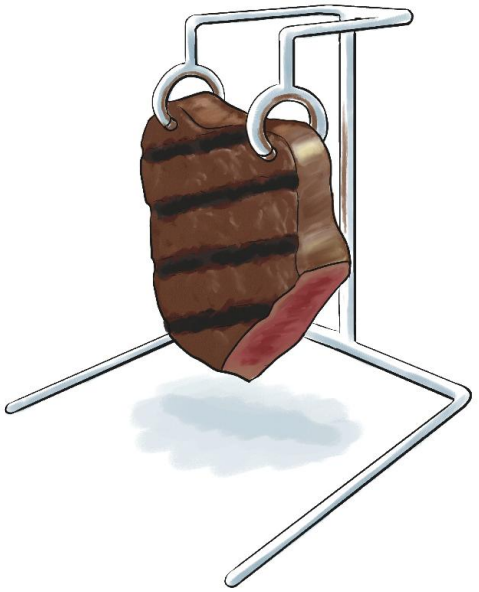
# review of needs

- final approach is to work closely with a target group
- this can be best approach when
  - there is no literature that describes best practice or state of the art
    - but literature might be useful for reading about the group itself
  - the user group is known and distinct
    - e.g. designing a system for Rose to allocate 4th year projects
  - existing approaches are manual so there are no current systems to examine



# review of needs

- need to understand
  - who are the stakeholders (may be multiple)
    - e.g. developing an app to monitor chronic pain
      - healthcare providers who want to be able to understand different types of pain, severity of pain, time and changes of pain
      - patients who want to be able to describe their pain accurately and may have less experience of technology
      - technical staff who will have to integrate your system into their infrastructure
  - what are their needs and requirements
  - what flexibility is available
    - e.g. are there standard ways of measuring pain or can you create a new one with patients?

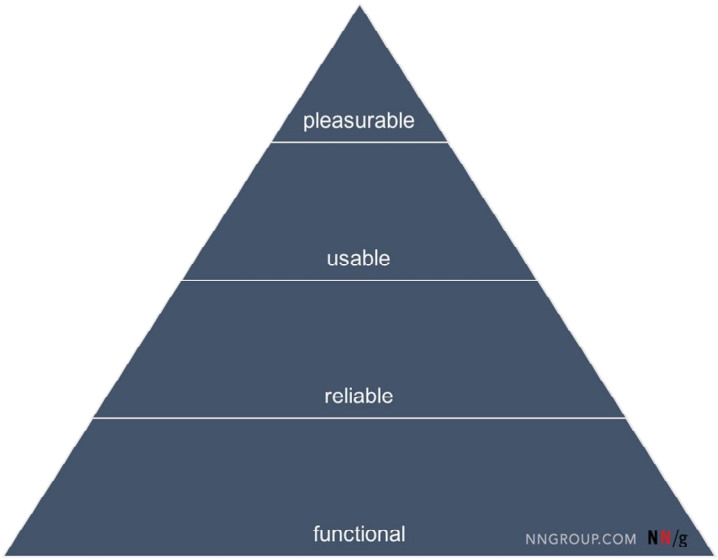


http://forums.moneysavingexpert.com/showthread.php?t=5423816

# review of needs

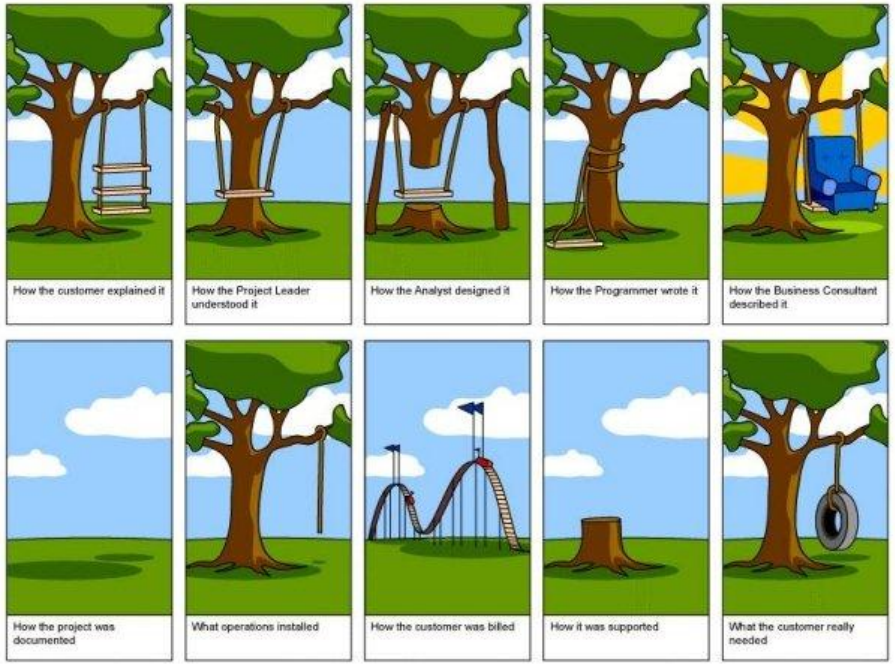
- need samples of these stakeholders
  - and to decide what information you need from each
  - surveys, interviews, focus groups can all be used
  - interviews best for small groups
    - and where you have less understanding of the problem or needs
  - if user groups are large (and possibly diverse) then surveys can be best
    - especially if you have a clearer understanding of the problem and can ask clearer questions
- you have to be able to translate these understanding into requirements, not just build what they ask for

Aarron Walter's Hierarchy of User Needs



# review of needs

- dealing with some people, e.g. patients in this case, may need ethical approval from the department
  - see https://local.cis.strath.ac.uk/wp/teaching/ethics/
- dealing with other people, e.g. interviewing the person who suggested the project or technical staff will generally not
- when writing the needs analysis be careful to describe
  - who was involved
  - when you met or gathered data in a survey
  - what you discussed and learnt
  - how you decided what to ask
  - how you resolved any conflicts




https://ux.stackexchange.com/questions/13674/how-to-discover-what-users-need-and-not-what-they-want

# summary

- different approaches for understanding
  - what is the problem being tackled
  - what is the current state of knowledge
  - what is new about what you are doing
  - how you will know what a good solution is
  - ideas for technical design and evaluation
- which then lead to your specification and requirements and then to design
- this part is about 10% of your project
  - the design part is the other 10% of this ‘background’ part
  - equal to about one week of project work (40 hours)