User Interfaces

EECS 3461 – Sections A & B
Fall 2021

R-Technosocial-I

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Intellectual Property Notice

Dependencies

This resource pack assumes that you are already familiar with:

- R-Humans-II (and all previous)

- R-Design-VI (and all previous)

- R-Interaction-II (and all previous)

Key Questions

1. design contexts?

2. What is a market vs a commons?

3. What is a proprietary vs a non-proprietary interactive system?

4. The StoryGraph vs Goodreads case study

5. How do ideas spread? How do technologies get adopted?

1. design contexts?

Situated Contexts

"On one level, design is a general human process that we use to understand and to shape our world. …**we meet the challenges of design in specific challenges, addressing problems or ideas in a situated context**. The challenges we face as designers today are as diverse as the problems clients bring to us. We are involved in design for economic anchors, economic continuity, and economic growth. We design for urban needs and rural needs and for social development and creative communities. We are involved with environmental sustainability and economic policy. agriculture competitive crafts for export, competitive products and brands for micro-enterprises, developing new products for bottom-of-pyramid markets and redeveloping old products for mature or wealthy markets." [1]

[1] Friedman and Stolterman, series forward, Adversarial Design, Carl DiSalvo, 2012 **emphasis added**

Recap of Key Points…

- Recall some of the key points from R-Design-III:
    - design is a basic human activity
    - UX design is an umbrella term for design practices that seek to (positively) intervene in user experience
    - user experience captures sense-making; it is about 'inner' experience
    - design is problem-solving (deficit thinking) and design is opportunity-generating (asset thinking)

    - the ideas that emerge from design have **value**
    - what is the shape and form of this value?

Design Contexts, Idea Valuation

- Where do ideas go?

- There are many different design contexts and we can distinguish among them in many different ways

- Example (entity vs individual):
    - the context of an entity: to support business (for-profit) or other organizational (not-for-profit, public) function
    - personal contexts: personal problem solving, individual, grass-roots, entrepreneurial, creative practice

Design Contexts, Idea Valuation

- "design for good", ideas for positive social change
    - to be of service, to contribute positively
    - frameworks: societal benefit, human rights, UN Sustainable Development Goals (SDGs), design for socio-economic development (e.g., ICT4D)
    - to contribute to knowledge production:
        - e.g., for scholarly or research activities (e.g., design to support scholarship, to create experimental apparatii for data collection, to implement proof-of-concept);
        - for open science, citizen science, for open pedagogy

Design Contexts, Idea Valuation

- for advocating change…
- "critical design"
    - a form of research aimed at leveraging designs to make consumers more critical about their everyday lives
    - aims, in particular, to make consumers more critical about how their lives are mediated by assumptions, values, ideologies, and behavioral norms inscribed in designs
        - e.g., Bardzell and Bardzell, Dunne and Raby
    - aims to foreground the ethics of design practice
- "speculative design"
    - the practice of addressing big societal issues with design processes and systems, looking towards the future and creating products and services for those scenarios
- "adversarial design"
    - technology design that provokes and engages the political, activism
    - e.g., DiSalvo

2. What is a market vs a commons?

Starting Point

- the design of interactive systems takes place in **situated contexts**

- there are many situated contexts, only one of which is based in **product development** for **consumer markets**

- another situated context is a **commons**; commons are different from consumer markets

- the **open source movement** is an entry point

- to get to the concept of the open source movement, we will first follow **a sequence of introductory concepts**

Digital ecosystem

"A digital ecosystem is a distributed, adaptive, open socio-technical system with properties of self-organisation, scalability and sustainability inspired from natural ecosystems."[1][2]

- we'll use this concept to frame issues of production and consumption with respect to interactive systems
  - who is engaged in **producing** (designing, implementing, distributing) interactive systems? and why?
  - who is engaged in **consuming** (buying, adopting, using) interactive systems? and why?

Ecosystem

- the concept of digital ecosystem derives from the more-basic concept of an ecosystem, which was first developed in the 1930's in context of ecology

- in ecology, an ecosystem is typically defined as:
  - "a community of living organisms in conjunction with the nonliving components of their environment, interacting as a system"[1]

[1] definition from Wikipedia, which cites: Tansley (1934); Molles (1999), p. 482; Chapin *et al*. (2002), p. 380; Schulze *et al*. (2005); p. 400; Gurevitch *et al*. (2006), p. 522; Smith & Smith 2012, p. G-5

Ecosystems as Dynamical Systems

- ecosystems are dynamical systems that:
    - have a sense of balance (balance of population: producers and consumers)
    - a capacity to respond to perturbation
        - to resist disturbances and stay close to its equilibrium
        - to be perturbed but then to return to its equilibrium
        - gain a new state of equilibrium with a different composition of components
    - there is much more to the conceptualization of an ecosystem, but we'll won't delve into further detail here

- the sustainability of an ecosystem refers to the ecosystem's capacity to continue to exist

[1] definition from Wikipedia, which cites: Tansley (1934); Molles (1999), p. 482; Chapin *et al.* (2002), p. 380; Schulze *et al.* (2005); p. 400; Gurevitch *et al.* (2006), p. 522; Smith & Smith 2012, p. G-5

The "Task-Artifact Cycle"

"Human activities implicitly articulate needs, preferences and design visions. Artifacts are designed in response, but inevitably do more than merely respond. Through the course of their adoption and appropriation, new designs provide new possibilities for action and interaction. Ultimately, this activity articulates further human needs, preferences, and design visions."

(Carroll, 2009)
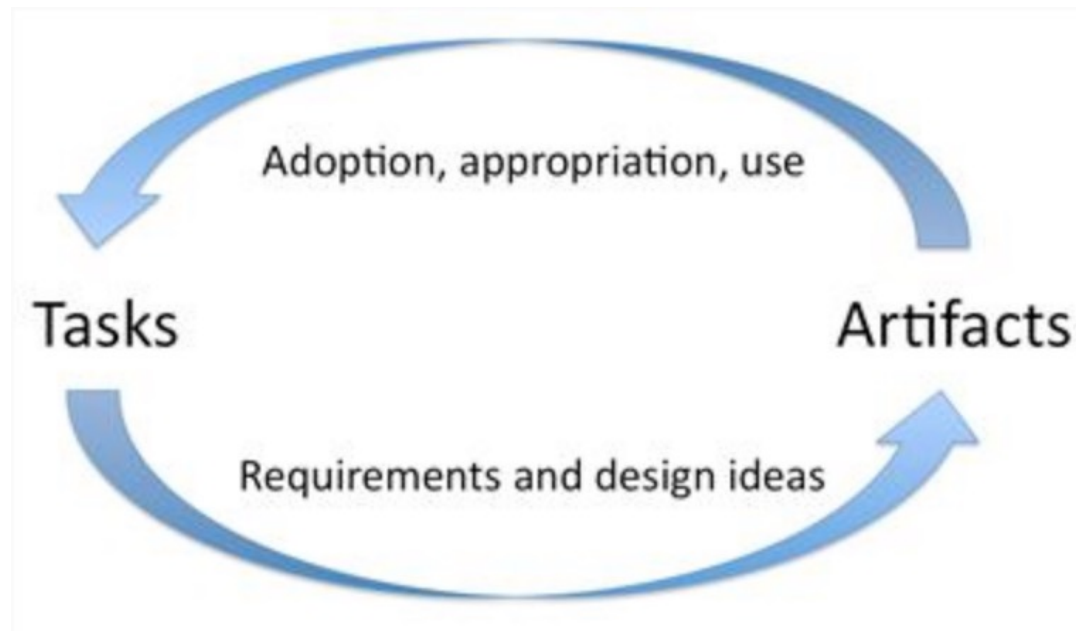
Adoption, appropriation, use

Tasks   Artifacts

Requirements and design ideas

Commons

- a commons is
  - a set of resources held in common, managed for individual and collective benefit, accessible to all members of a society
  - governed by social practice within its community of users, not by the state or a market

Types of Commons

- environmental commons
  - common land for grazing, for hiking, etc
  - connected to the concept called the 'tragedy of the commons'

- cultural and intellectual commons
  - e.g., Wikipedia, literature, music

- digital commons
  - e.g., github, sourceforge

- information commons
  - e.g., the York library and other libraries, the WWW

- knowledge commons
  - e.g., open educational resources (OERs), open-source research

*intellectual, digital, information, knowledge commons are overlapping, not distinguished very clearly

Tragedy of the Commons

- a situation in which
    - individual users have open access to a resource
    - the individuals are unhampered by shared social structures or formal rules that govern access and use
    - the individuals act independently according to their own self-interest
    - through individual action, depletion of the resource is caused through their uncoordinated action
    - the acts of the individuals are contrary to the common good of all users

- first coined in the 1800's – grazing land in Great Britain is was called a 'commons' – if everyone grazes their livestock in an uncontrolled fashion, the grazing land is destroyed and becomes unusable for everyone

- Ostrom (Nobel prize winner) found the tragedy of the commons is not as prevalent and not as difficult to solve some maintained

Commons-Based Peer Production

- commons-based peer production (CBPP)
  - is a form of socio-economic production via collaborative work
  - often (but not always) the contributors are not financially compensated
  - different from economic production under traditional business models
  - e.g., thingiverse, fan fiction, open source software

Markets

- a market is
    - a composition of systems, institutions, procedures, social relations or infrastructures whereby parties engage in exchange

- markets have producers and consumers

- consumer:
    - "a person or a group who intends to order, orders, or uses purchased goods, products, or services"

- the exchange is typically in fungible goods (currency)

- there also can be the 'double coincidence of wants' – each party holds an item that the other wants, exchange without monetary medium

Types of Markets

we can distinguish design contexts in terms of **the 'market'** within which the outcome will be deployed

- consumer markets, business to consumer (B2C)
    - bottom-of-pyramid, mid-pyramid, top-of-pyramid markets refer to consumers grouped by socioeconomic status, from poorest to wealthiesr
    - consumer market is divided into different sectors: discretionary/non-discretionary or by industries (auto, leisure, household, apparel, etc)
    - planned obsolescence can be a business strategy

- business to business (B2B)
    - designing products and services for business clients/customers

- business to government (B2G)
    - design for government/public sector,
    - procurement processes can implement social policy
    - some educational institutions are public, others are private

- "captive market":
    - design done 'in house' within an organization for the organization

Market and Consumerism Effects

- much of interactive system production is connected to consumer markets:
  - creating new competitive products and brands, for different markets (e.g., bottom-of-pyramid markets)
  - redeveloping extant products, for mature or wealthy markets (e.g., interactive refrigerators)

- consumerism is:
  - encouragement of the acquisition of goods and services
  - a social and economic order
  - connected to capitalism
  - the gist of the idea: *getting people to buy new stuff even if they don't need it or want it, even if the production of the new stuff is harmful to the environment or exploits workers*

- however, the production and consumption of interactive systems does not only take place solely within the framework of consumer markets

Industrial Design and Mass Production

- industrial design has its roots in mass production; it is a design process applied to products that are intended to be manufactured (as opposed to hand crafted)

- thus, industrial design also has connections to consumer market

Assetization of Interactive Systems

- Companies can and do make profit via the production and distribution of interactive systems, deployed via their own or other distribution platforms

- Companies can assetize their interactive systems as products and services in different ways

- We'll next look at the distinction of **proprietary** vs **non-proprietary** software, which will illustrate:
  - the **payware — freeware** continuum
  - the **closed-source — open-source** continuum

3. What is a proprietary vs a non-proprietary interactive system?

Proprietary Software

- has a publisher or owner

- the publisher or owner **retains** intellectual property rights

- the intellectual property rights typically are in the form of copyright of the source code or patent rights
    - intellectual property rights can be upheld legally
    - infringement of IP can result in damages, for which there is legal recourse

- in addition to legal means, owners protect their intellectual property rights via controlling access (closed-source software, confidentiality, etc)

- owners capitalize on their intellectual property rights in different ways:
    - license their technologies to others (for profit)
    - decline to license their technologies to others (to establish and maintain market position; to have a competitive edge)

Copyright

- copyright is a legal instrument, put into force by *the Copyright Act*, a federal statute of Canada (1921, 1988, 1997, 2012)
    - other legal instruments: patents, trademarks, trade secrets

- copyright is a type of intellectual property that gives its owner the exclusive right to make copies of a creative work
    - exclusive rights are usually not given in perpetuity, though
    - an interactive system (and its various facets, including its UI, techniques, algorithms) counts as a creative work

- copyright attaches automatically upon the creation of the creative work
    - copyright does not need to be explicitly 'claimed'

- a copyright owner may decide what to do with the copyrighted work:
    - to monetize, but also may decide not to
    - to put their work into the public domain, uncopyrighted
        - But then others can take the work and convert it into proprietary software and then distribute it as a proprietary product.

Non-Proprietary Software

- This is a complicated space

- One dimension: do consumers need to pay?
  - upfront? after a while? never?
  - this is the **payware — freeware** continuum

- Another dimension: can I take the software and riff on it?
  - yes without conditions? yes but subject to some conditions? yes but not legally? no not even if you wanted to and tried?
  - this is the **closed-source — open-source** continuum

- Both dimensions are at play:
  - zero-price vs zero-restrictions (in the sense of freedom of use)
  - for example: Free and Open Source Software (FOSS) combines both dimensions – free and open-source

The Payware — Freeware continuum

Payware:

- software that is sold (can be for profit or to cover costs)
- the consumer needs to pay as a condition of use
- a key issue is enforcement:
    - a provider can offer software for sale, but payment can be circumvented
    - e..g., cracked software

Freemium:

- software is provided free initially, but payment is subsequently required (for ongoing use or for additional features)

Free:

- do not have to pay; does not imply that the source code is available

The Closed-source—Open-source continuum

- the **payware — freeware** continuum relates to *pricing and distribution*

- the **closed-source — open-source** continuum relates to *intellectual property rights*
  - open-source may, at the outset, appear to be an issue of the availability of the source code
  - however, the issue does boils down to *what one can do with the source code that has been made available*

Copyleft

- copyleft is *set of practices*
    - these practices make use of various legal instruments, but copyleft is not itself a legal instrument
    - e.g., there is no *"Copyleft Act"* federal statute in Canada (or in any other nation state, to my knowledge)

"Copyleft is a general method for making a program (or other work) free (in the sense of freedom, not "zero price"), and requiring all modified and extended versions of the program to be free as well." [1]

- there are different entities in the business of crafting suitable licenses for people to use:
    - the Creative Commons (a not-for-profit), provides CC-0 and other licenses
    - the Free Software Foundation (a not-for-profit), provides the Gnu General Public License (GPL)

[1] What is Copyleft?, https://www.gnu.org/copyleft/

Open Source

- at one time referred to the open source software movement

- open source now includes *open content, open collaboration,* and many practices connected with *knowledge commons*

- open source *stands in tension* with privatization (and capitalism, market-economies)
    - *'stands in tension'* does **not** mean *'is the opposite of'* or *'contradicts'*
    - e.g., some for-profit companies operate using open source products:
        - moodle is open source
        - eThink is a company that provides "implementation, integration, management. and cloud-hosting services for the open source LMS Moodle in the Higher Education" sector

- the open source movement has opened up new spaces for production and consumption

4. The StoryGraph vs Goodreads case study

Case Study

Case Study: The StoryGraph vs Goodreads

"Why Goodreads is bad for books", Sarah Manavis,
newstatesman.com,

https://www.newstatesman.com/science-tech/social-
media/2020/08/better-goodreads-possible-bad-for-books-
storygraph-amazon

The article illustrates, via the lens of UI/UX design, some of
the dynamics of proprietary software in establishing and
holding market share

5. How do ideas spread? How do technologies get adopted?

Diffusion of innovations

- The Diffusions of Innovations (DoI) is a theory that seeks to explain how, why, and at what rate new ideas and technology spread

- DoI was first developed by Rogers (1st ed 1962… 5th ed 2003)

- the theory has its basis in communication studies, and is now used widely in many different fields (knowledge mobilization, innovation studies, entrepreneurship, etc)

The 'S' Curve
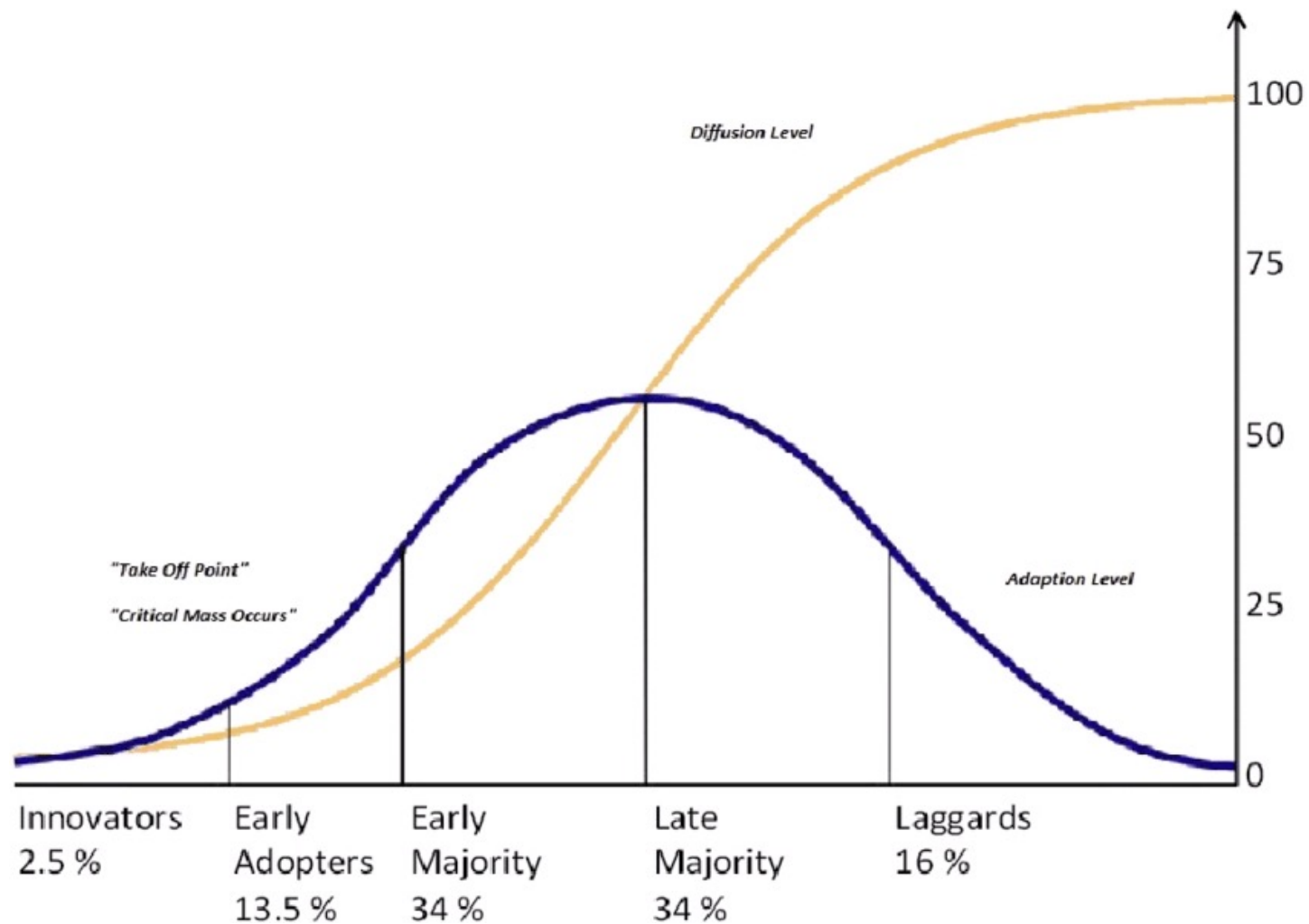
Process of Technology Adoption

- technology adoption occurs in stages

- each stage occurs through a series of communication channels, over a period of time, among the members of a similar social system

- exposure occurs via existing communication channels, many of which are established among the members of a similar social system

Exposure within Social Systems

- the concepts of **homophily** and **heterophily** are used to explain the nature of social systems
    - **homophily** is the tendency of individuals to associate and bond with similar others
    - **heterophily** is the tendency of individuals to collect in diverse groups

- most people have a combination of homophilous and heterophilous ties and behaviours

- diffusion will be easily promoted among homophilous people, and within homophilous groupings

- however, diffusion requires a certain degree of heterophily, for new ideas to be introduced outside of homophilous groupings

Process of Technology Adoption

1. **awareness**:
    - first exposure, lacking information, not yet been inspired to find out more

2. **persuasion**:
    - interest gained, actively seeking more info

3. **decision**: **choice point**
    - **technology gets adopted or not?**

4. **implementation**:
    - start using the technology, determining usefulness

5. **adoption**:
    - confirmation and continuation of use

The Decision Choice Point

- Two factors play into the decision of whether a new technology is adopted
  - the degree of choice (the degree to which a decision can be made freely and implemented voluntarily)
  - who is making the decision

The Decision Choice Point: Types of Decisions

- Optional:
  - made by an individual, who weighs the advantages/disadvantages and decides whether to adopt or reject the innovation
  - this may be a consumer decision (or not)

- Collective
  - decision gets made made collectively by all participants.

- Authority
  - decision gets made by individuals in positions of influence or power for the entire social system

Technology Acceptance, I

- *technology acceptance* is an issue that is:
    - described primarily in organizational contexts (such as companies, which purchase or do in-house design of technologies for their employees to use)
    - primarily in discipline of Information Systems (IS)*

Technology Acceptance, II

- technology acceptance is considered to be an issue

- why? because "white collar performance" gets "often obstructed by users' unwillingness to accept and use available systems" (Grudin, 2012)
  - "we bought this expensive system and now our employees refuse to use it"

- The discipline of Information Systems is concerned with design questions such as these:
  - what factors can influence the acceptance of technologies in these organizational contexts?
  - we know that perceptions of the incoming technology is a key factor, so how can we influence the perceptions of users of technologies that are about to be deployed?

Technology Use vs Technology Acceptance

- we can see that *technology acceptance* is a case of technology use and adoption, with characteristic communication channels, social structure, decision making

- technology use is a broader phenomena

Case Study: technology as a service

- Example:

- think of rural telephone use, particularly in developing regions (e.g. Parikh and Lazowska 2006)

- only one or a few people in a village might own a telephone

- the relaying of telephone messages can become a service performed on behalf of others

- does it make sense to refer to the person who sends and receives phone messages as a user of the telephone?

- they are a user even if they do not press the buttons?

'Displaced User'

- The characteristic picture of the user is of a person sitting in front of a computer or within arm's reach of a computer system (Carroll 2003).

- What if a person has all the capacities of the interactive system available to them, albeit at second hand?

- *Would it make sense to also call this person a user?*

Case Study: Types of Non-Use

- Satchell and Dourish (2009) identified several different types of non-use

- active resistance

- disenchantment

- disenfranchisement

- disinterest