Intelligent Systems and Software Engineering

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Reminder

Please complete within today

- Background Survey
  - Understand your expectations and concerns
  - Team formation
- Join Slack (https://comp585iss2022.slack.com)

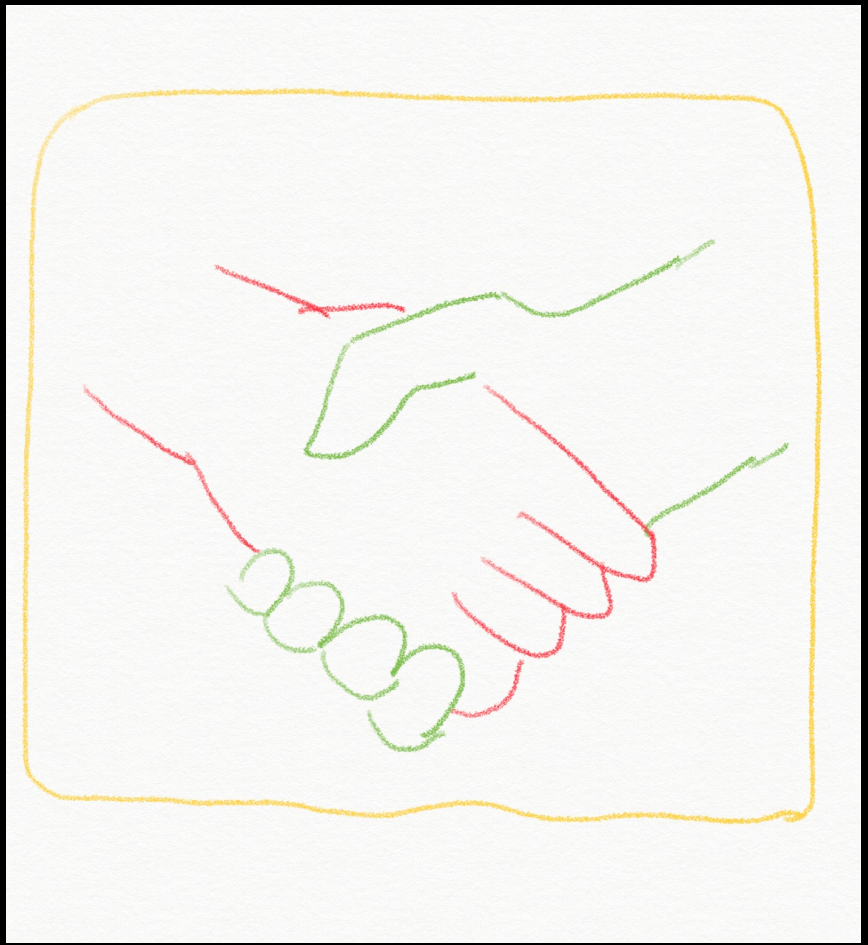
Your Concerns

- Getting engaged in the class activities
  - Contributing perspectives and experiences
- Team Formation
  - More balanced team composition
  - Part of the learning experience
- Research and Industrial Background
  - Emphasize on collaborative learning
- Peer Review Fairness
  - Feedback only, not grading

Activity 1

What is Intelligence?

Draw a sketch to illustrate your understanding of Intelligence.



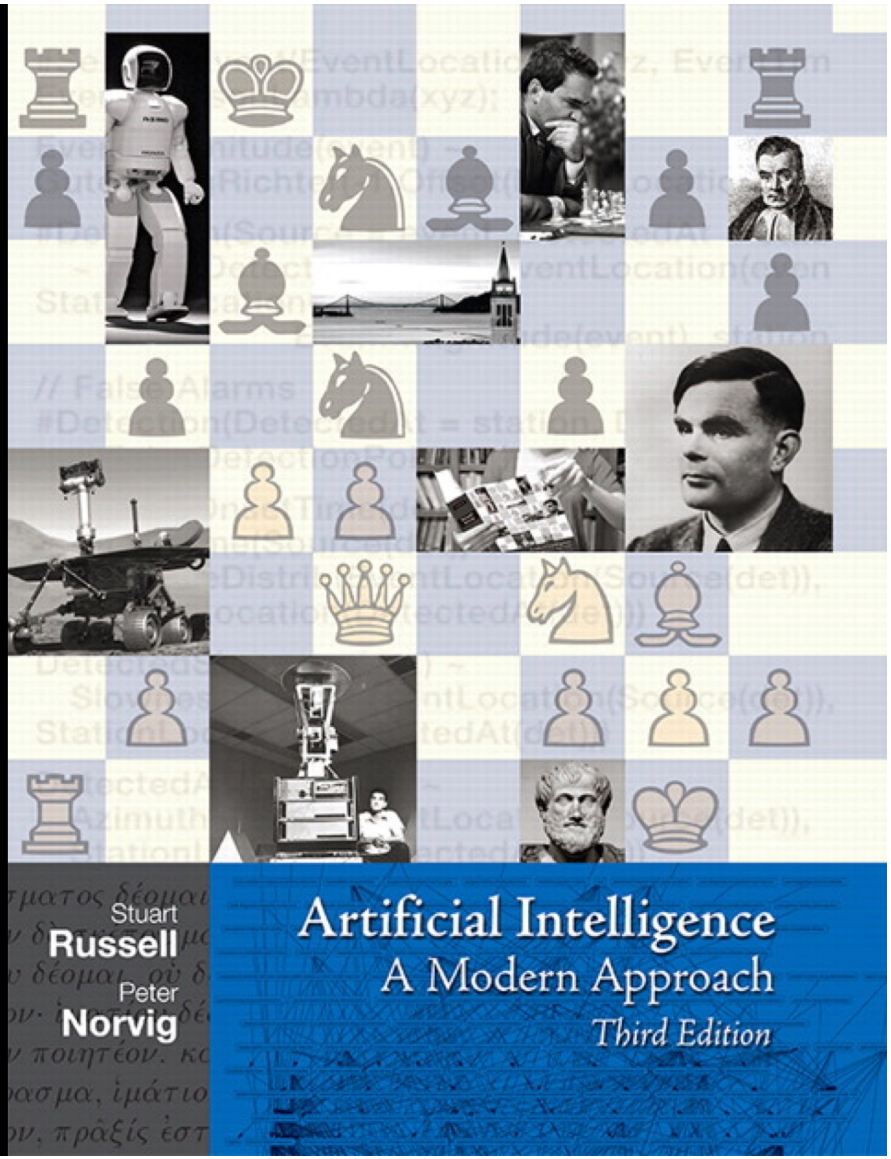
Does your “intelligence” mean

- Think like people?
- Act like people?
- Think/Behave rationally?
- or *1.7 Einsteins, 2 Maxwells, 5 Faradays and .3 Manhattan Projects?*

AI in the Textbook

Study the problem of building agents that can maximize the expected utility given certain constrains.

Perceive and Act



Perceive and Act

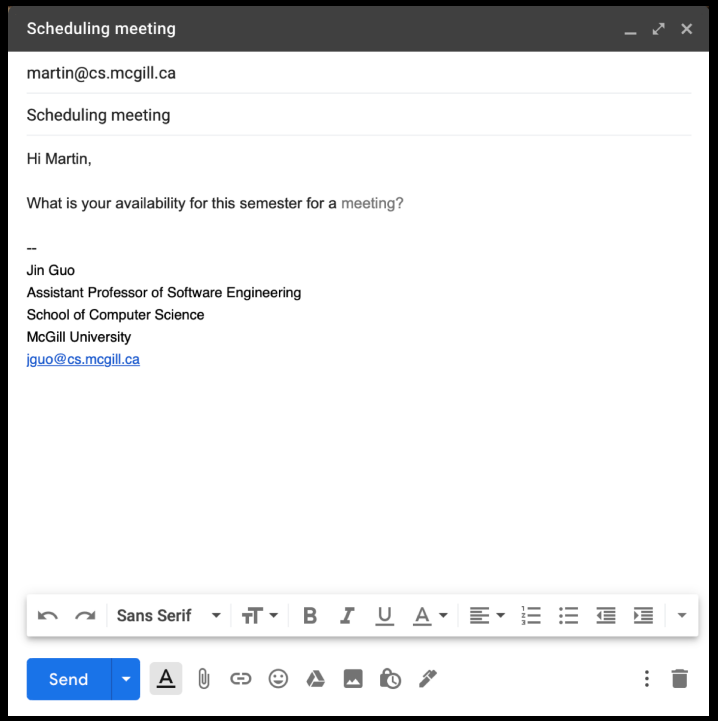


Image from : https://www.bloomberg.com/news/articles/2019-12-05/waymo-s-autonomous-taxi-service-tops-100-000-rides

Considerations

- Nature of the environment
- The observations and actions that connect the agent to the environment
- Agents' objective

AI in the News

SCIENCE

Optimism as Artificial Intell
Reunite

Researchers who in the 1960s tackled a f
scientists come together again.

By John Markoff

PRINT EDITION
December 8, 2009, Page D4

TECHNOLOGY

Google's Computing Power Refines Translation Tool

The company's network pushes the limits of translation technology and has become a favored source for millions.

By Miguel Helft

PRINT EDITION Google Can Now Say No to ‘Raw Fish Shoes,’ in 52 Languages | March 9, 2010, Page A1

TECHNOLOGY

Bringing Data Mining Into the Mainstream

A leading data-mining expert explains what will be needed to bring the field into the mainstream of business.

By Steve Lohr

AI in the News

PERSONAL TECH

Amazon Echo, a.k.a. Alexa, Is a Personal Aide in Need of Schooling

The Amazon Echo is an artificially intelligent personal assistant answering to the
could one day be

By Farhad Manjoo

PRINT EDITION Ama
Schooling | June 2

TECHNOLOGY

A Facebook Project to Beam Data From Drones Is a Step Closer to Flight

The company said its unmanned aerial vehicle, intended to bring Internet access to remote areas, is ready for tests in the upper atmosphere, most likely in the United States.

By Vindu Goel and Quentin Hardy

PRINT EDITION A Facebook Project to Beam Data From Drones Is a Step Closer to Flight | July 31, 2015, Page B3

AI in the News

OPINION

How Do You Know a Human Wrote This?

Machines are gaining the ability to write, and they are getting terrifyingly good at it.

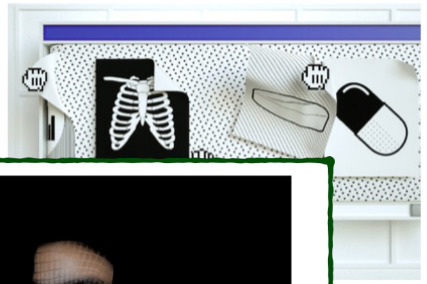
By Farhad Manjoo

PRINT EDITION

July 30, 2020, Page

TECHNOLOGY

How A.I. Steered Doctors Toward a Possible Coronavirus Treatment

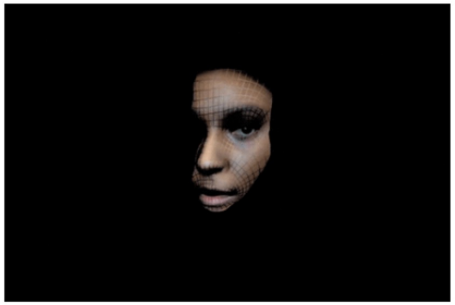


TECHNOLOGY

A Case for Banning Facial Recognition

A Google research scientist explains why she thinks the police shouldn't use facial recognition software.

By Shira Ovide



PRINT EDITION

June 10, 2020

AI in the Research Frontier

Latent Variable Modelling with Hyperbolic Normalizing Flows
Avishek Joey Bose, Ariella Smofsky, Renjie Liao, Prakash Panangaden, William L. Hamilton

Laplacian Change Point Detection for Dynamic Graphs
Shenyang Huang, Yasmeen Hitti, Guillaume Rabusseau, Reihaneh Rabbany

Algorithmic Improvements for Deep Reinforcement Learning Applied to Interactive Fiction.
Vishal Jain, William Fedus, Hugo Larochelle, Doina Precup, Marc G Bellemare

A Cross-Domain Transferable Neural Coherence Model
Peng Xu, Hamidreza Saghir, Jin Sung Kang, Teng Long, Avishek Joey Bose, Yanshuai Cao, Jackie Chi Kit Cheung

How To Evaluate Your Dialogue System: Probe Tasks as an Alternative for Token-level Evaluation Metrics
Prasanna Parthasarathi, Joelle Pineau, Sarath Chandar

Building reproducible, reusable, and robust machine learning software
Joelle Pineau

Software Engineering

an engineering discipline that is concerned with all aspects of software production from initial conception to operation and maintenance.

Software Applications

Embedded control systems

Stand-alone applications

Entertainment systems

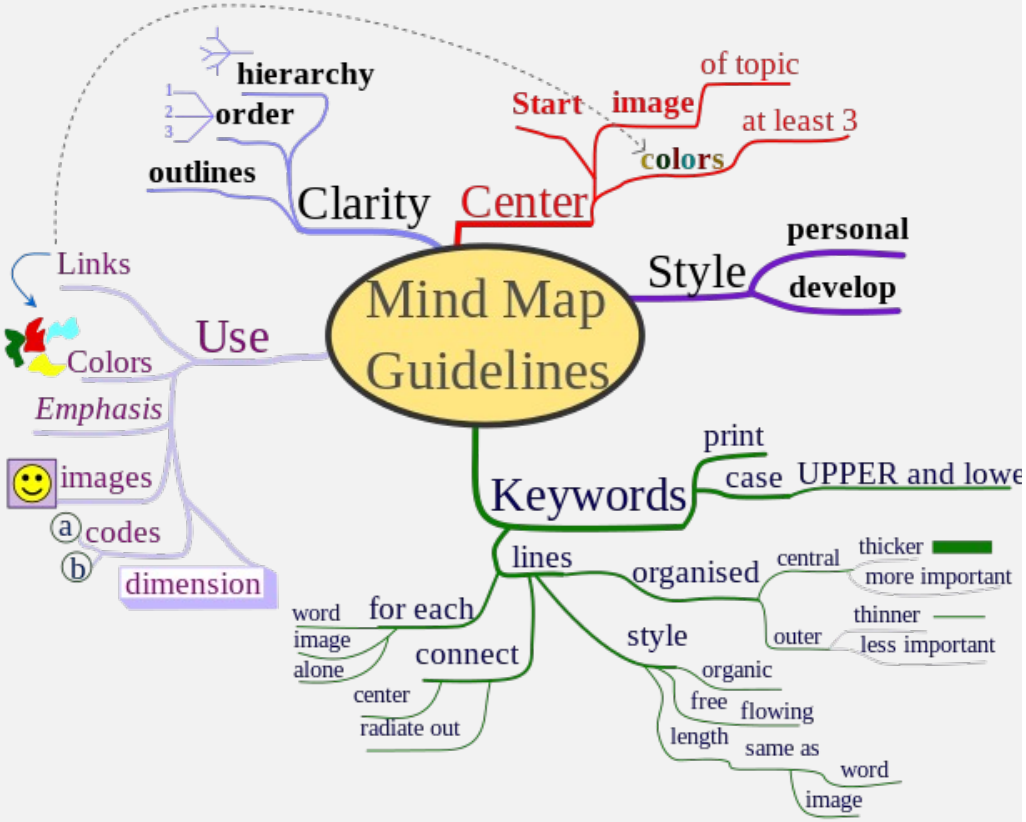
Interactive transaction-based applications

Systems of Systems

...

Activity 2

- Choose one problem from your reading report. Consider what type of software application it is.
- List five key quality considerations for the application you choose.
- Draw a mind-map (on Mira) to organize the considerations and add related concept to explain the quality and how to achieve them.

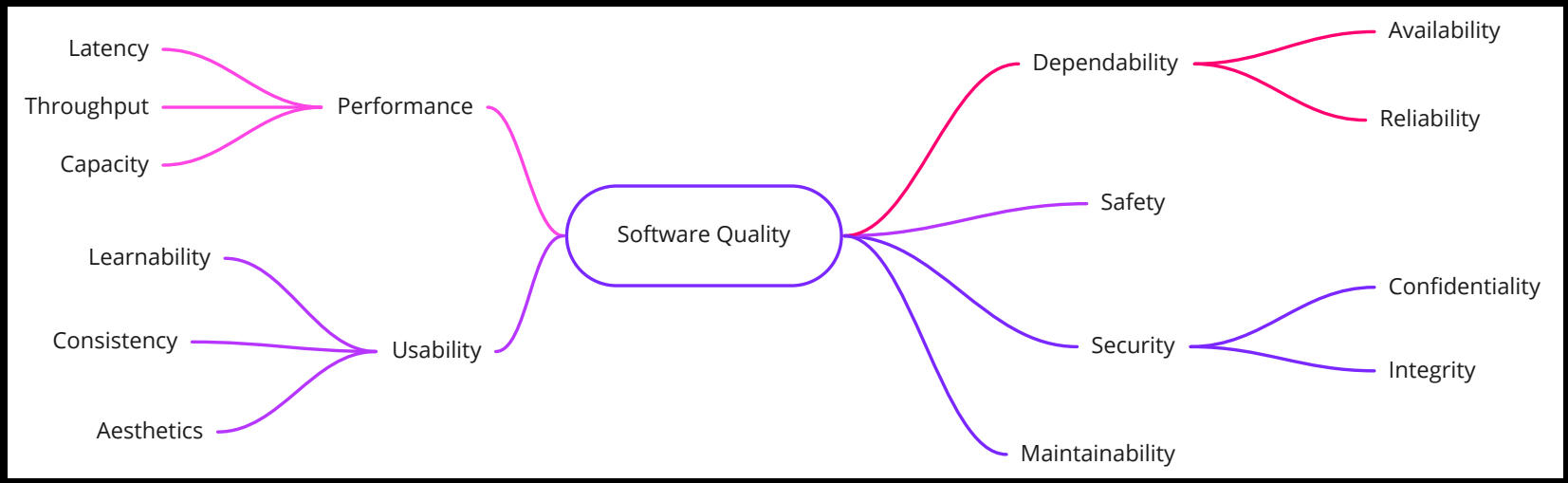


Mind-map by Nicoguaro on Wikipedia

Quality Attributes

What's missing?

- Relations between some attributes
- Methods to achieve those attributes
- Values that can be delivered

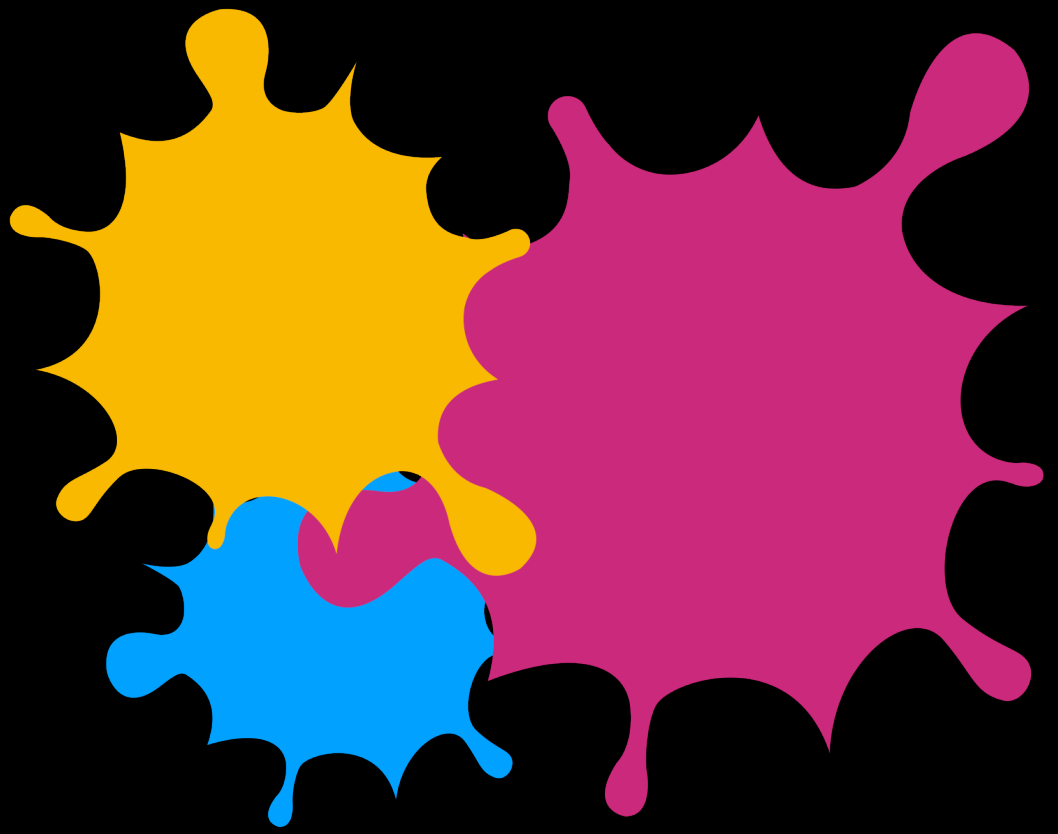


Foundational Software Activities

- Do the software activities you have listed fall into those categories?
  - Specification, design and implementation, validation and evolution
  - If not, where is it situated?

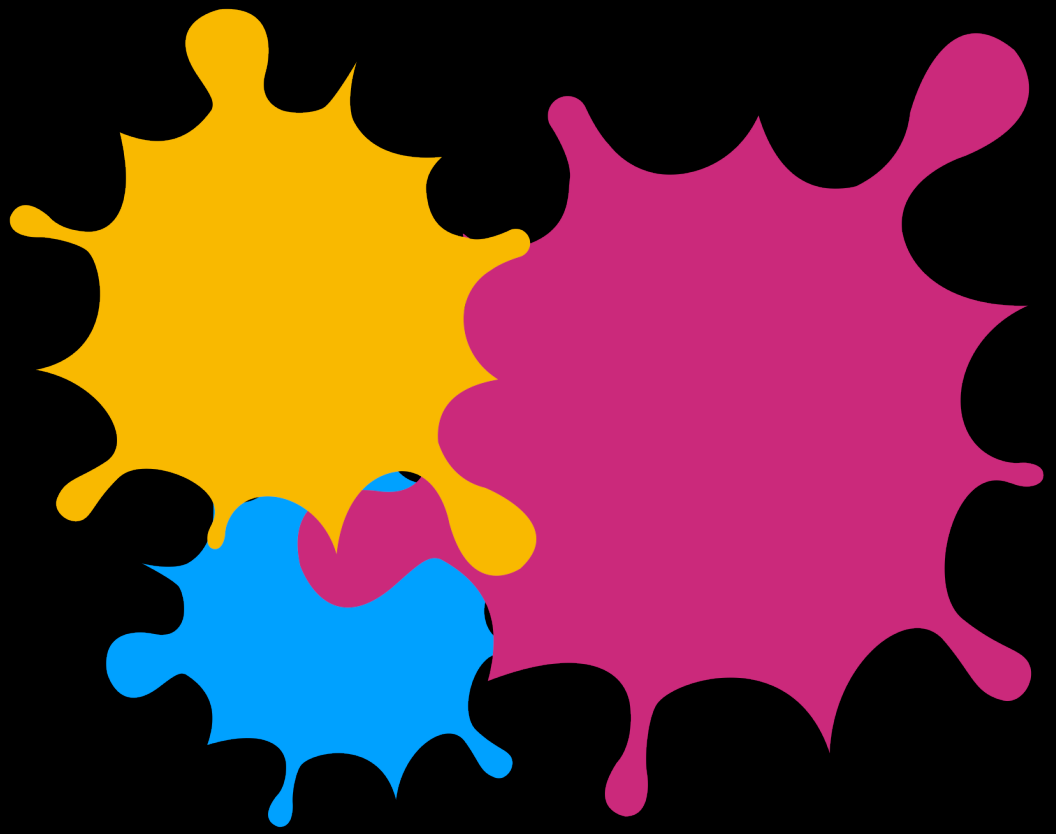
Activity 3

- Two round of Pictionary
  - 2 mins each
- Roles in each group
  - Drawer: no numbers nor letters
  - Timer: control and record the time
  - Guesser: guess the word



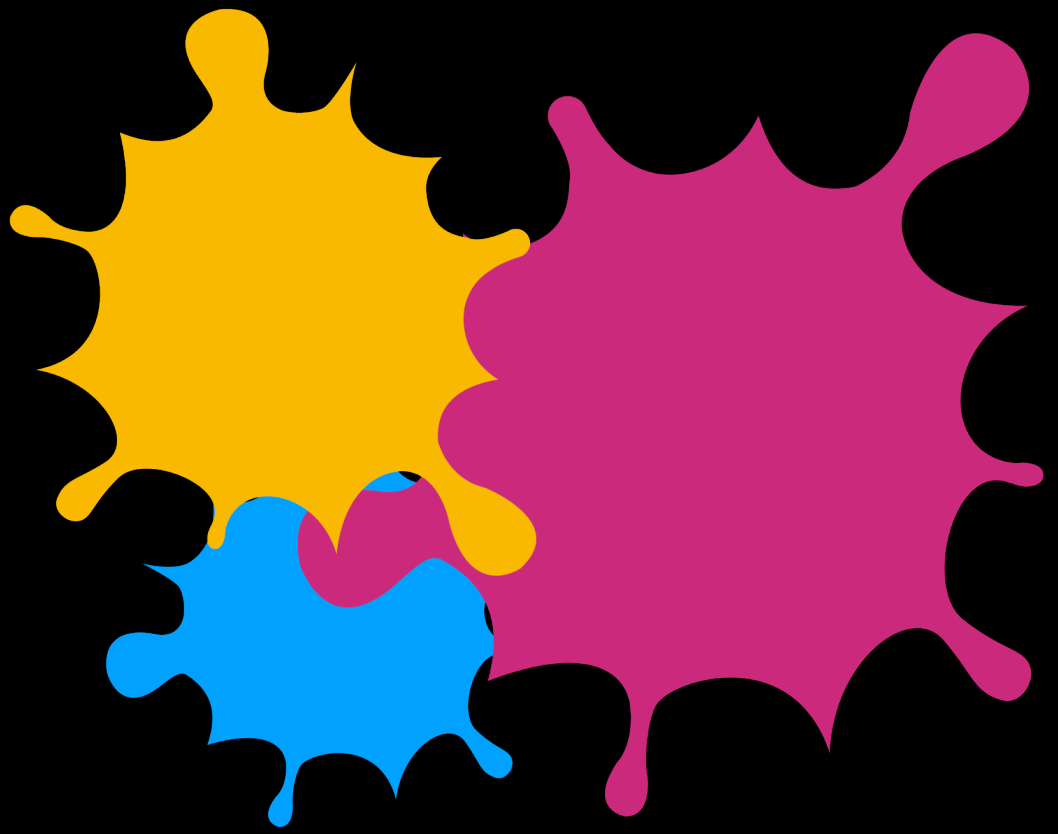
Activity 3

- First round
  - 1.5 mins drawing (no interaction)
  - 30 sec guessing
- Second round
  - 2 mins drawing and guessing



Activity 3

- Discuss
  - Which rule works better?
  - What are the challenges for drawer?
  - What are the challenges for guesser?



Agile Software Development

The Agile Manifesto

We are uncovering better ways of developing software by doing it and helping others to do it. Through this work, we have come to value:

- individuals and interactions over processes and tools;
- working software over comprehensive documentation;
- customer collaboration over contract negotiation;
- responding to change over following a plan.

While there is value on the items on the right, we value the items on the left more.

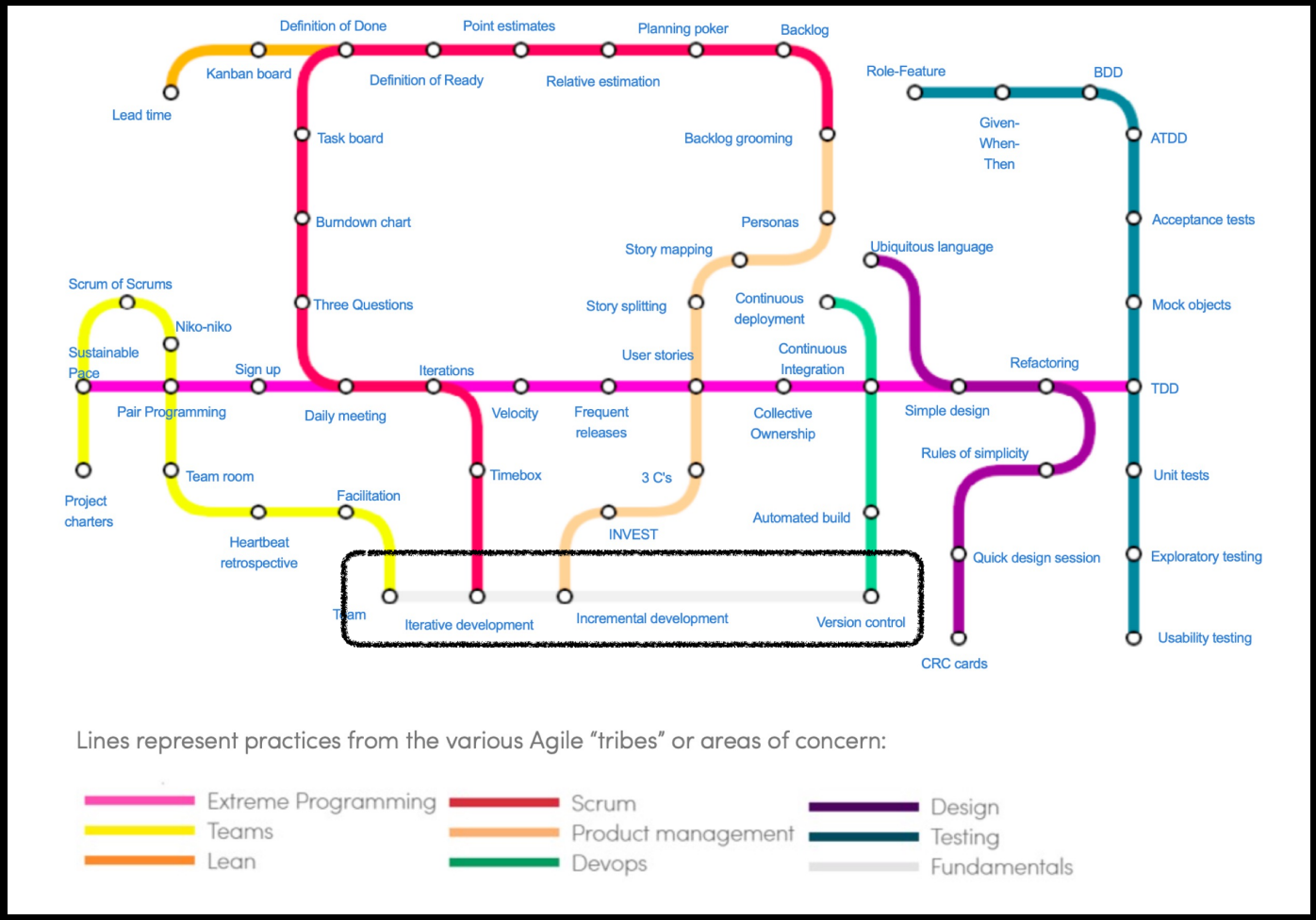


Image Credit: https://www.agilealliance.org/agile101/subway-map-to-agile-practices/

Software Engineering Ethics

Code of Ethics

IEEE-CS/ACM Joint Task Force on Software Engineering Ethics and Professional Practices

1. PUBLIC – Software engineers shall act consistently with the public interest.

2. CLIENT AND EMPLOYER – Software engineers shall act in a manner that is in the best interests of their client and employer consistent with the public interest.

3. PRODUCT – Software engineers shall ensure that their products and related modifications meet the highest professional standards possible.

4. JUDGMENT – Software engineers shall maintain integrity and independence in their professional judgment.

5. MANAGEMENT – Software engineering managers and leaders shall subscribe to and promote an ethical approach to the management of software development and maintenance.

6. PROFESSION – Software engineers shall advance the integrity and reputation of the profession consistent with the public interest.

7. COLLEAGUES – Software engineers shall be fair to and supportive of their colleagues.

8. SELF – Software engineers shall participate in lifelong learning regarding the practice of their profession and shall promote an ethical approach to the practice of the profession.

Ethics For Computing professionals

Code of Ethics

ACM Code of Ethics and Professional Conduct

General Principles

1.1 Contribute to society and to human well-being, acknowledging that all people are stakeholders in computing.

1.2 Avoid harm.

1.3 Be honest and trustworthy.

1.4 Be fair and take action not to discriminate.

1.5 Respect the work required to produce new ideas, inventions, creative works, and computing artifacts.

1.6 Respect privacy.

1.7 Honor confidentiality.

Ethics For Computing professionals

Code of Ethics

ACM Code of Ethics and Professional Conduct

Professional Responsibilities

2.1 Strive to achieve high quality in both the process and products of professional work.

2.2 Maintain high standards of professional competence, conduct, and ethical practice.

2.3 Know, respect, and apply existing rules pertaining to professional work.

2.4 Accept and provide appropriate professional review.

2.5 Give comprehensive and thorough evaluations of computer systems and their impacts, including analysis of possible risks.

2.6 Have the necessary expertise, or the ability to obtain that expertise, for completing a work assignment before accepting it. Once accepted, that commitment should be honored.

2.7 Improve public awareness and understanding of computing, related technologies, and their consequences

2.8 Access computing and communication resources only when authorized to do so.

2.9 Design and implement systems that are robustly and usably secure

Recap

- Characterize Intelligent Systems in practice
- Identify software application categories and their quality attributes
- Understand basic software engineering practice and activities

Next Monday:

Machine Learning Model Quality

Project Introduction

Deeksha Arya