Week:
7 of 12

COMP 2120 / COMP 6120

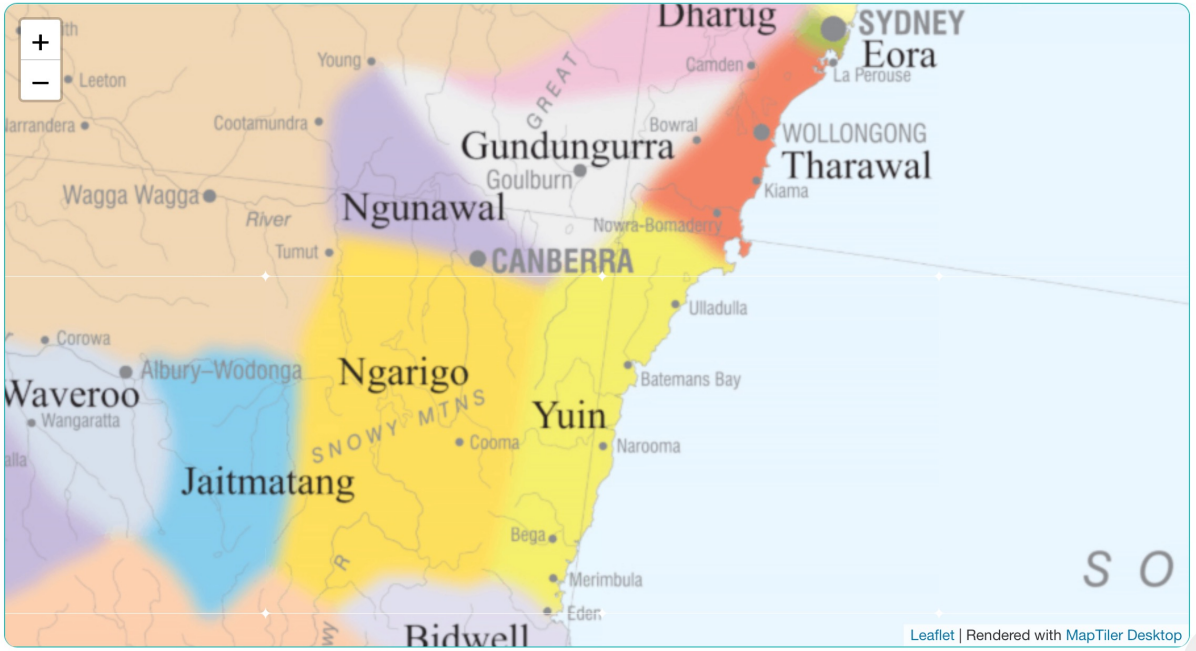
TEAM CULTURE

A/Prof Alex Potanin and Dr Melina Vidoni

ANU Acknowledgment of Country

AIATSIS Explore Family history Collection Research Education What's new About Shop Search

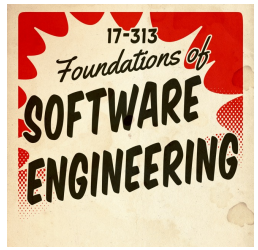
"We acknowledge and celebrate the First Australians on whose traditional lands we meet, and pay our respect to the elders past and present."



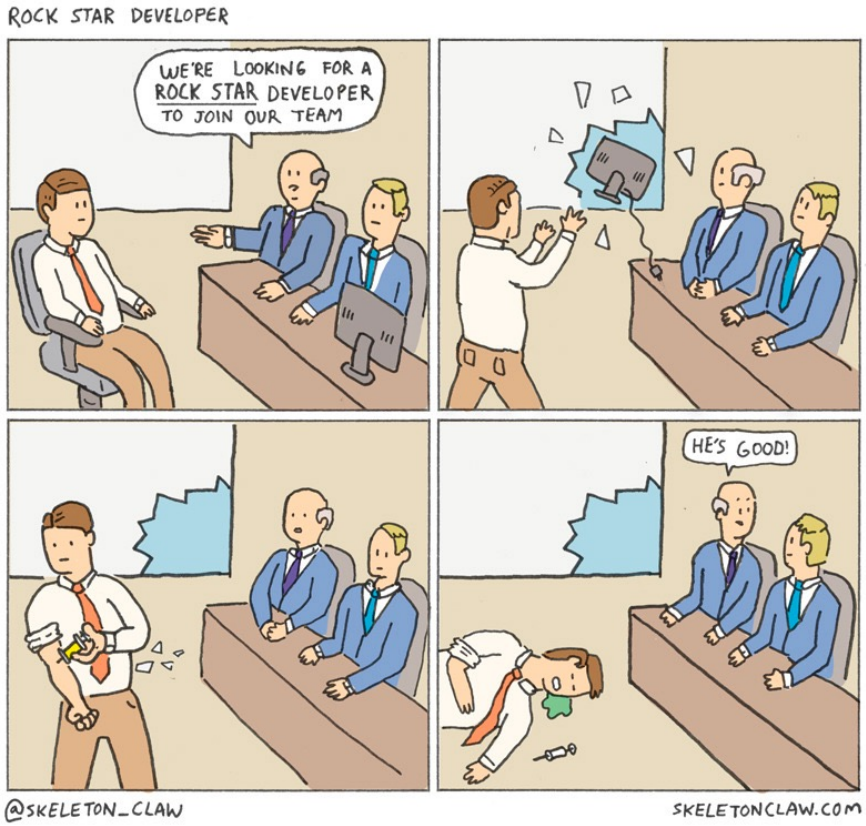
https://aiatsis.gov.au/explore/map-indigenous-australia

10X ENGINEERS

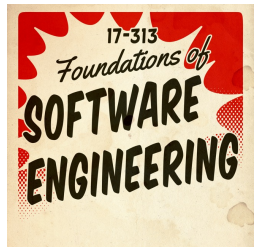
10X Engineers

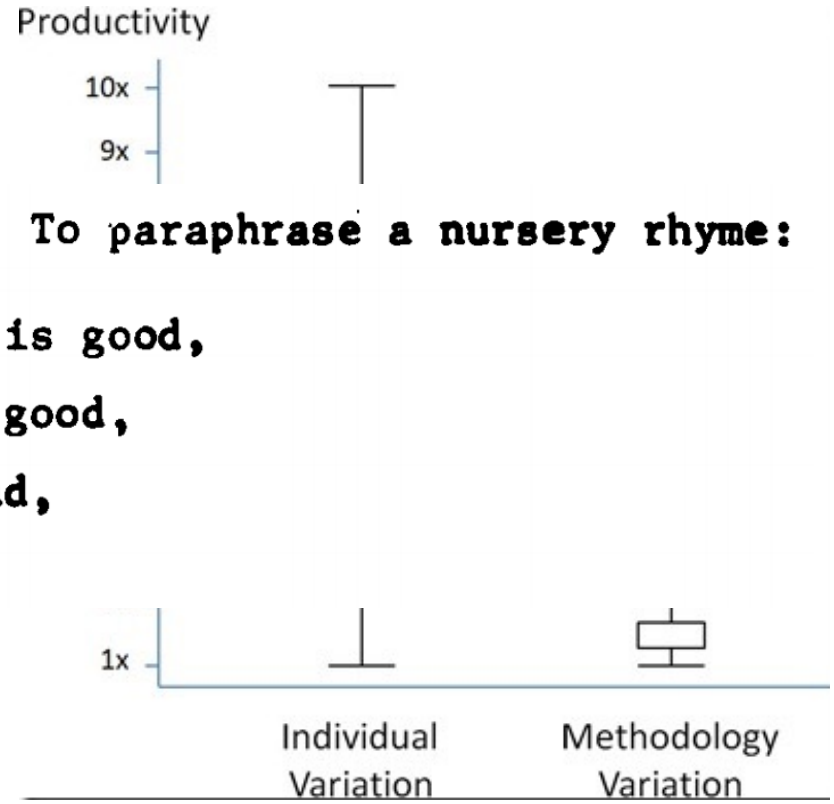


- Aka “rock-star”, “ninja”



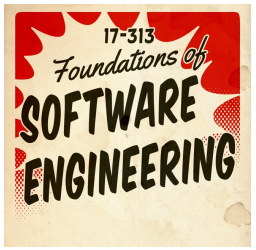
1966 study on online/offline programming performance





https://www.construx.com/blog/the-origins-of-10x-how-valid-is-the-underlying-research/

10x



- Reported as early as 1968 (Sackman, Erickson, and Grant)
  - Coding time 20:1
  - Debugging time 25:1
  - Program size 5:1
  - Execution speed 10:1
  - No correlation to amount of experience
- "order-of-magnitude differences among programmers" repeatedly reported
- Differences not explained by
  - programming language
  - years of experience

TEAMS

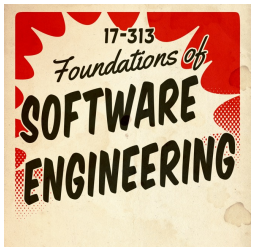
Necessity of Groups

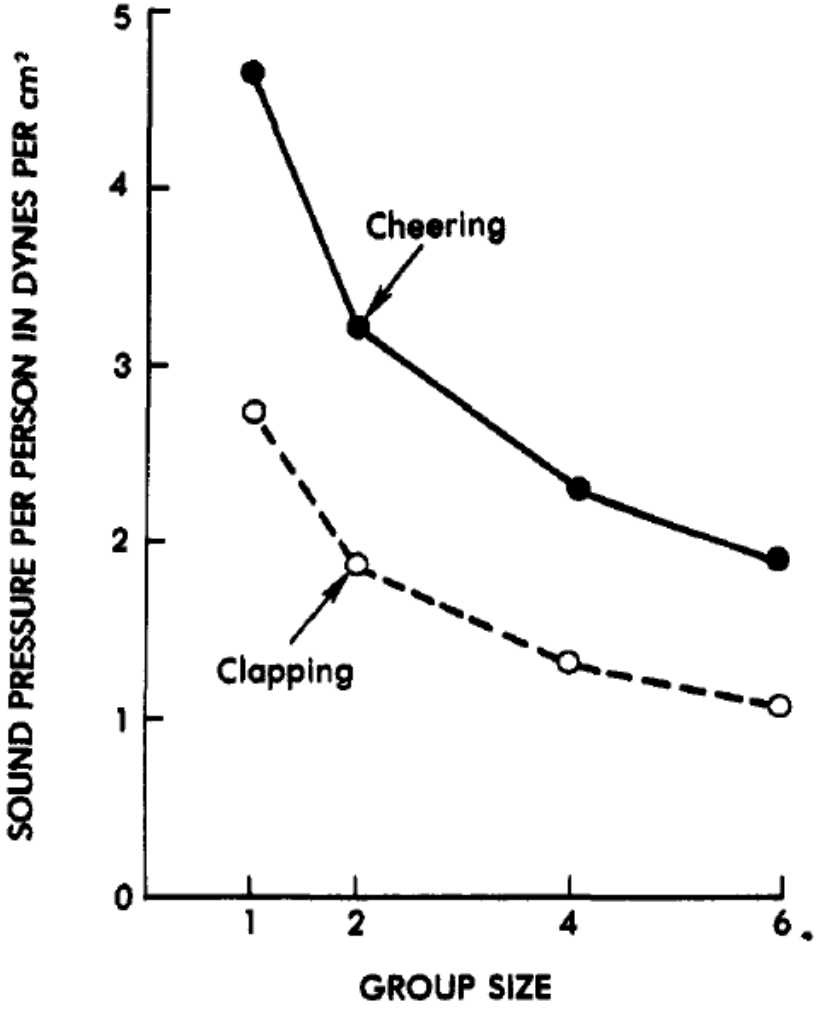
- Division of labor
- Division of expertise (e.g., security expert, database expert)

Team Issues

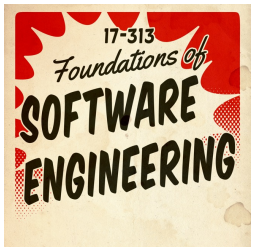
- Social loafing
- Groupthink
- Multiple/conflicting goals
- Process costs

TEAM ISSUES: SOCIAL LOAFING

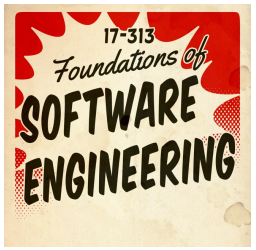




Latane, Bibb, Kipling Williams, and Stephen Harkins. "Many hands make light the work: The causes and consequences of social loafing." *Journal of personality and social psychology* 37.6 (1979): 822.



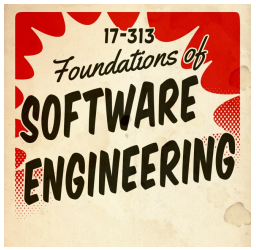
Social loafing



- People exerting less effort within a group
- Reasons
  - Diffusion of responsibility
  - Motivation
  - Dispensability of effort / missing recognition
  - Avoid pulling everybody / "sucker effect"
  - Submaximal goal setting
- “Evaluation potential, expectations of co-worker performance, task meaningfulness, and culture had especially strong influence”

Karau, Steven J., and Kipling D. Williams. "Social loafing: A meta-analytic review and theoretical integration." *Journal of personality and social psychology* 65.4 (1993): 681.

Mitigation Strategies

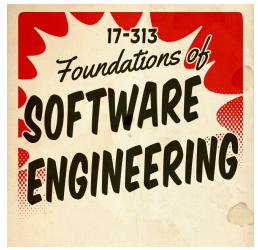


- Involve all team members, co-location
- Assign specific tasks with individual responsibility
  - Increase identifiability
  - Team contracts, measurement
- Provide choices in selecting tasks
- Promote involvement, challenge developers
- Reviews and feedback
- Team cohesion, team forming exercises
- Small teams

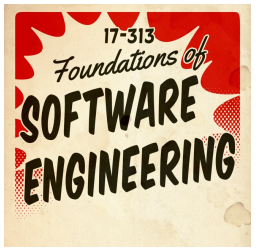
Responsibilities & Buy-In

- Involve team members in decision making
- Assign responsibilities (ideally goals not tasks)
- Record decisions and commitments; make record available

TEAM ISSUES: GROUPTHINK



Groupthink



- Group minimizing conflict
- Avoid exploring alternatives
- Suppressing dissenting views
- Isolating from outside influences
- -> Irrational/dysfunctional decision making

Star Wars: Episode I - The Phantom Menace (1999)

55% 59%

Critics Consensus: Burdened by exposition and populated with stock characters, *The Phantom Menace* gets the *Star Wars* prequels off to a bumpy -- albeit visually dazzling -- start.

Starring: Liam Neeson, Ewan McGregor, Natalie Portman

Director: George Lucas

Star Wars: Episode VI - Return of the Jedi (1983)

80% 94%

Critics Consensus: Though failing to reach the cinematic heights of its predecessors, Return of the Jedi remains an entertaining sci-fi adventure and a fitting end to the classic trilogy.

Starring: Mark Hamill, Carrie Fisher, Harrison Ford

Director: Richard Marquand

Star Wars: Episode V - The Empire Strikes Back (1980)

95% 97%

Critics Consensus: Dark, sinister, but ultimately even more involving than *A New Hope*, *The Empire Strikes Back* defies viewer expectations and takes the series to heightened emotional levels.

Starring: Mark Hamill, Harrison Ford, Carrie Fisher

Director: Irvin Kershner

Star Wars: Episode IV - A New Hope (1977)

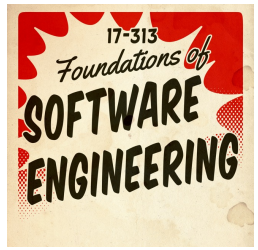
93% 96%

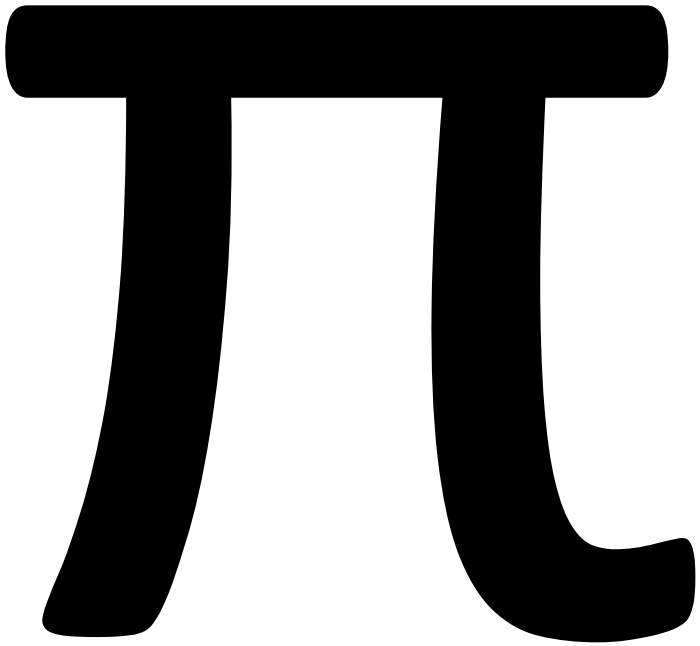
Critics Consensus: A legendarily expansive and ambitious start to the sci-fi saga, George Lucas opened our eyes to the possibilities of blockbuster filmmaking and things have never been the same.

Starring: Mark Hamill, Harrison Ford, Carrie Fisher

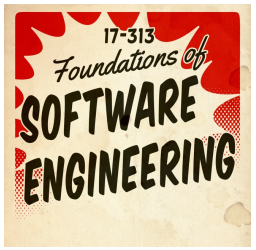
Director: George Lucas

Time and Cost Estimation



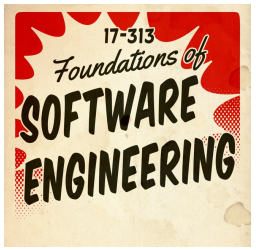


Causes of Groupthink

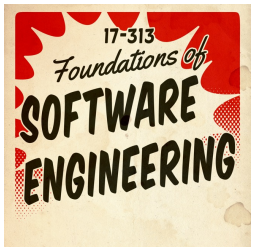


- High group cohesiveness, homogeneity
- Structural faults (insulation, biased leadership, lack of methodological exploration)
- Situational context (stressful external threats, recent failures, moral dilemmas)

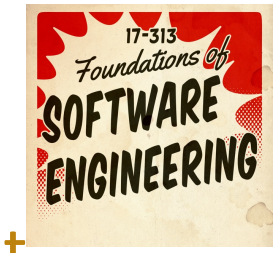
Symptoms



- Overestimation of ability
  - invulnerability, unquestioned believe in morality
- Closed-mindedness
  - ignore warnings, stereotyping
  - innovation averse
- Pressure toward uniformity
  - self-censorship, illusion of unanimity, …



Diversity

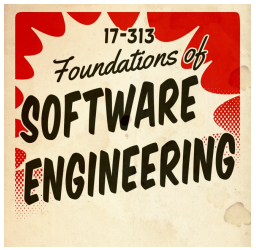


"Men and women have different viewpoints, ideas, and market insights, which enables better **problem solving**. A gender-diverse workforce provides easier **access to resources**, such as various sources of credit, multiple sources of information, and wider industry knowledge. A gender-diverse workforce allows the company to **serve an increasingly diverse customer base**. Gender diversity helps companies **attract and retain talented women**."

"Cultural diversity leads to **process losses** through task conflict and decreased social integration, but to **process gains** through increased creativity and satisfaction."

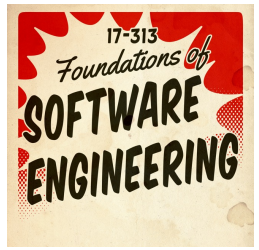
http://www.gallup.com/businessjournal/166220/business-benefits-gender-diversity.aspx
Stahl, Günter K., et al. "Unraveling the effects of cultural diversity in teams: A meta-analysis of research on multicultural work groups." *Journal of international business studies* 41.4 (2010): 690-709.

Studies Show



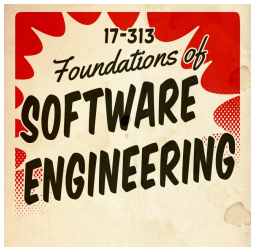
- Gender-diverse management teams showed superior return on equity, debt/equity ratios, price/equity ratios, and average growth. -Rohner, U. and B. Dougan (2012)
- Gender-balanced teams were the most likely to experiment, be creative, share knowledge, and fulfill tasks. -Lehman Brothers Center for Women in Business. (2008)
- Gender diversity on technical work teams was associated with superior adherence to project schedules, lower project costs, higher employee performance ratings, and higher employee pay bonuses. -Turner, L. (2009)

Unconscious Bias



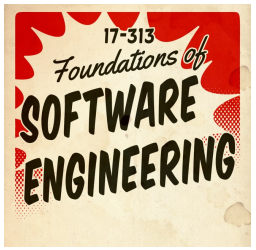
We all have shortcuts, or “schemas,” that help us make sense of the world. But our shortcuts sometimes make us misinterpret or miss things. That’s **unconscious bias**.

Unconscious Bias



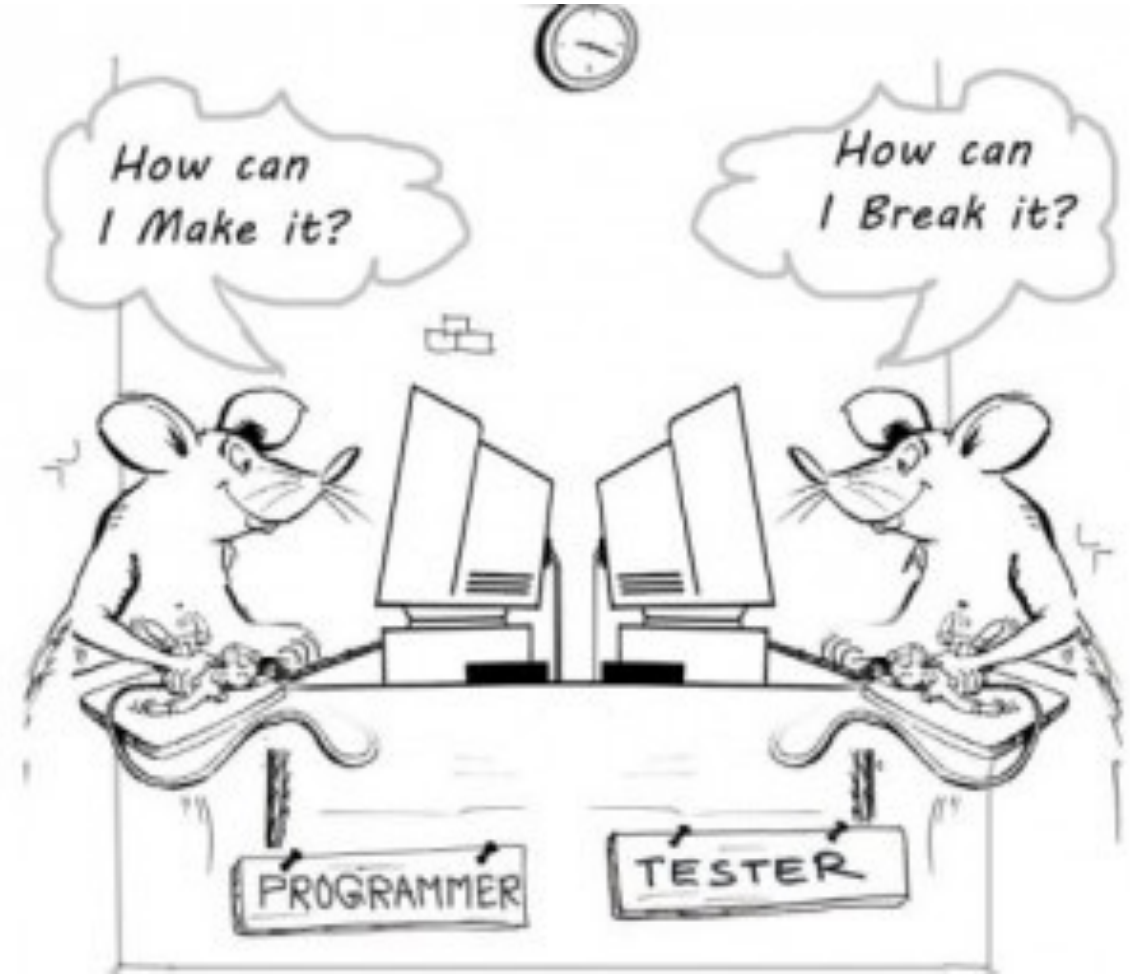
- Pervasive, cultural
- Raise awareness
- Explicit goals
- Measurement

Mitigation Strategies

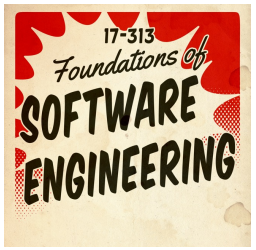


- Several agile techniques
  - Planning poker (https://www.mountaingoatsoftware.com/agile/planning-poker)
  - Tests, continuous integration
  - On-site customers
- Diverse teams
- Management style
- Avoid HR evaluation by metrics
- Separate QA from development
- Outside experts
- Process reflection
- …

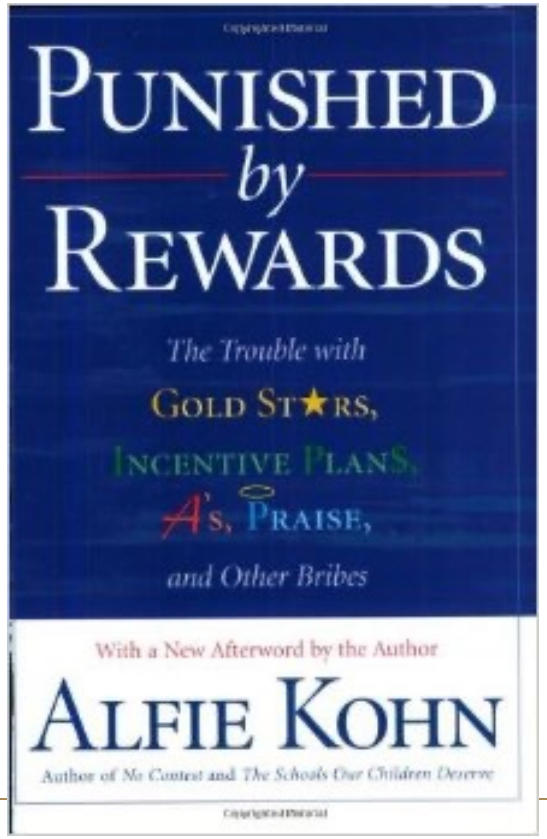
TEAM ISSUES: MULTIPLE/CONFLICTING GOALS



Incentives?

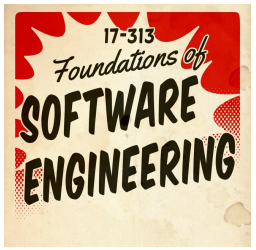


- Team incentives
- vs individual incentives?



TEAM ISSUES: PROCESS COSTS

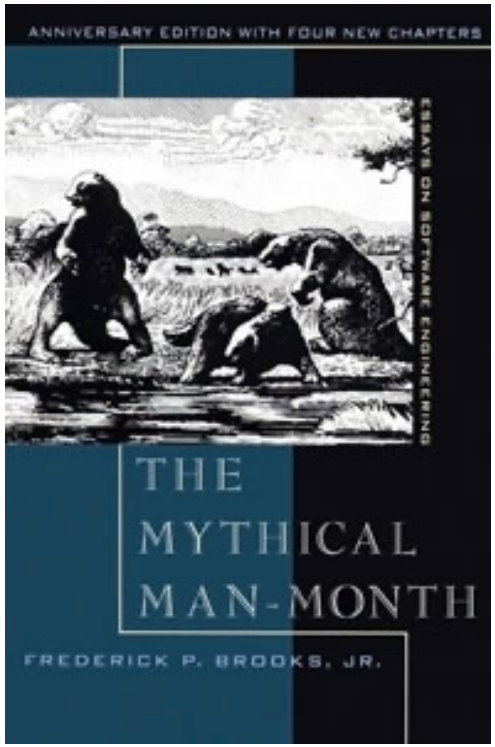
Mythical Man Month



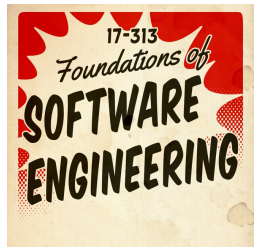
- Brooks's law: *Adding manpower to a late software project makes it later*

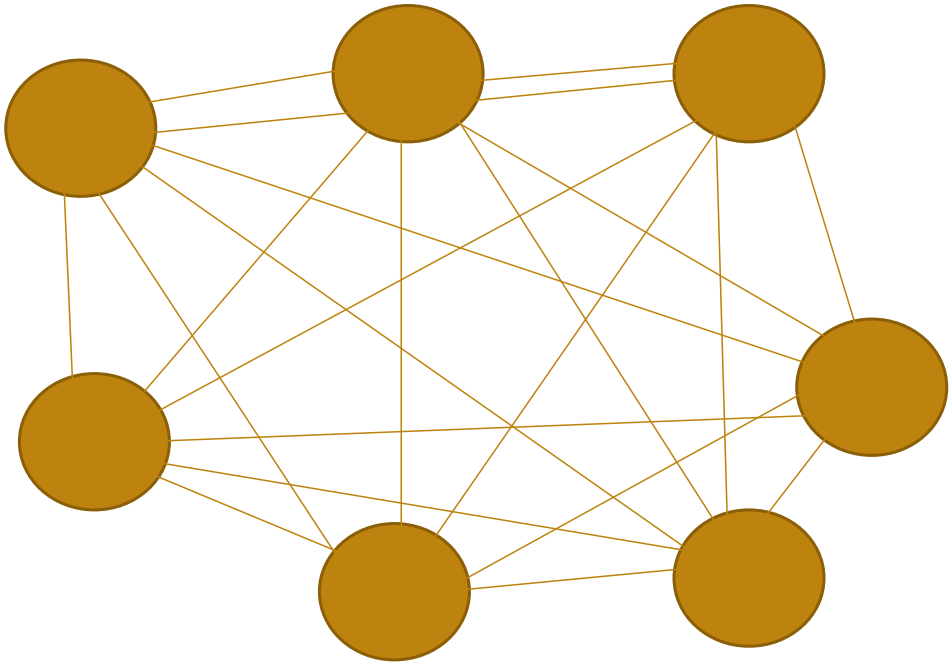
ACTIVITY: Discuss reasons in groups.

1975, describing experience at IBM developing OS/360



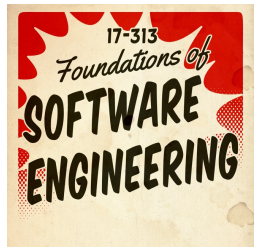
Process Costs

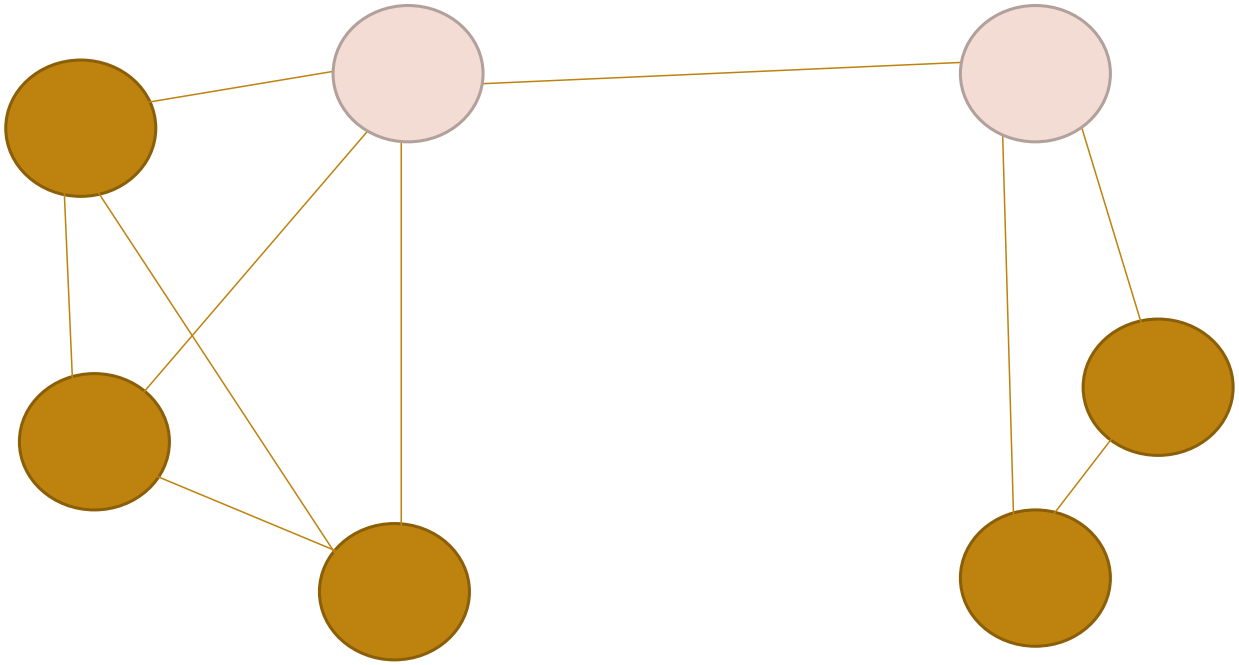




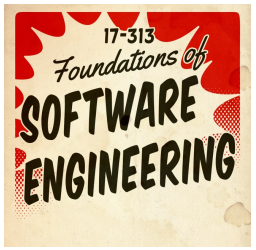
$n(n - 1) / 2$
communication links

Process Costs



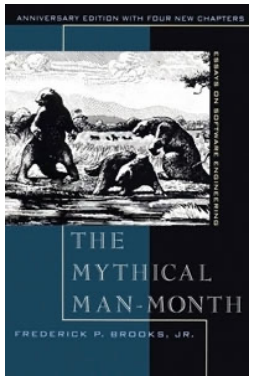


Brook's Surgical Teams

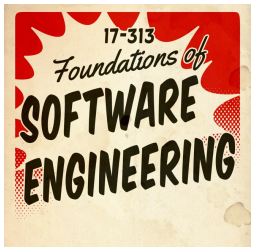


- Chief programmer – most programming and initial documentation
- Support staff
  - Copilot: supports chief programmer in development tasks, represents team at meetings
  - Administrator: manages people, hardware and other resources
  - Editor: editing documentation
  - Two secretaries: one each for the administrator and editor
  - Program clerk: keeps records of source code and documentation
  - Toolsmith: builds specialized programming tools
  - Tester: develops and runs tests
  - Language lawyer: expert in programming languages, provides advice on producing optimal code.

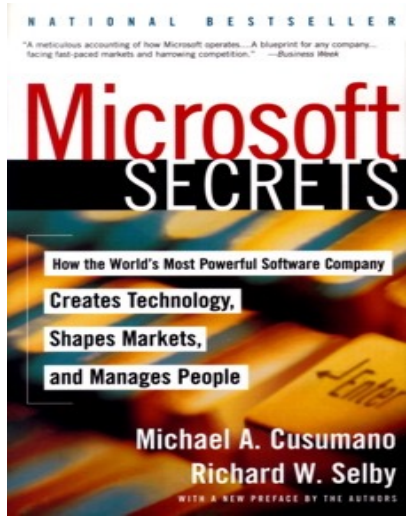
IBM 1971



Microsoft's Small Team Practices

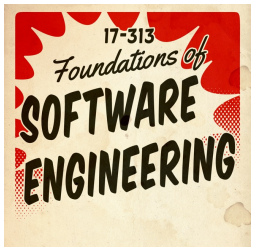


- Vision statement and milestones (2-4 month), no formal spec
- Feature selection, prioritized by market, assigned to milestones
- Modular architecture
  - Allows small federated teams (Conway's Law – slide coming up)
- Small teams of overlapping functional specialists

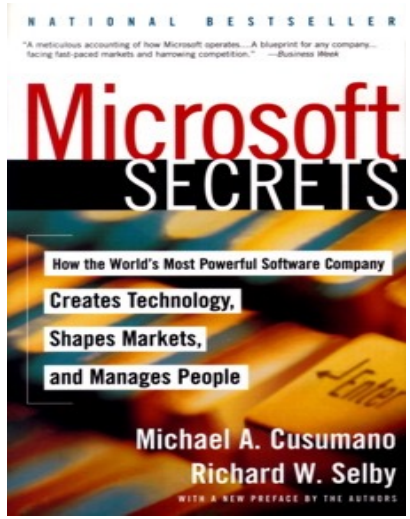


Windows 95: 200 developers and testers, one of 250 products

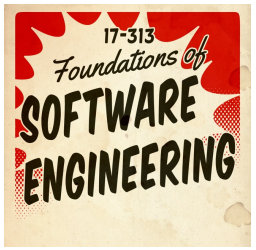
Microsoft's Small Team Practices



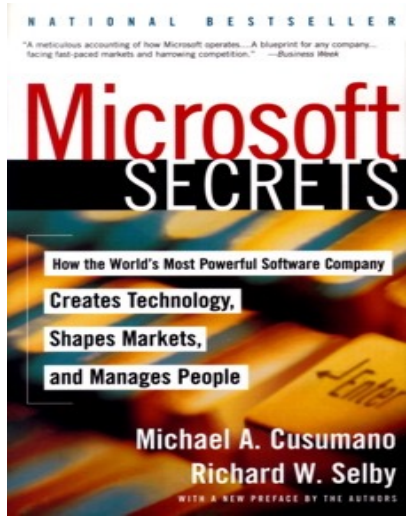
- Feature Team
  - 3-8 developers (design, develop)
  - 3-8 testers (validation, verification, usability, market analysis)
  - 1 program manager (vision, schedule communication; leader, facilitator) – working on several features
  - 1 product manager (marketing research, plan, betas)



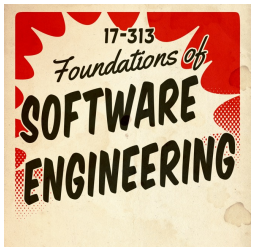
Microsoft's Small Team Practices



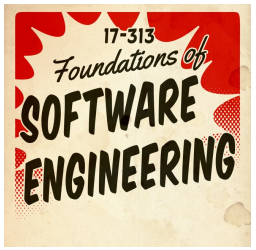
- "Synchronize and stabilize"
- For each milestone
  - 6-10 weeks feature development and continuous testing
    - frequent merges, daily builds
  - 2-5 weeks integration and testing (“zero-bug release”, external betas)
  - 2-5 weeks buffer



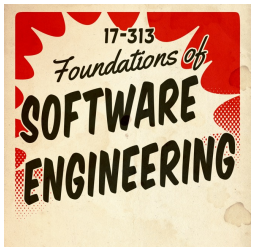
Amazon Teams



Agile Practices (e.g., Scrum)

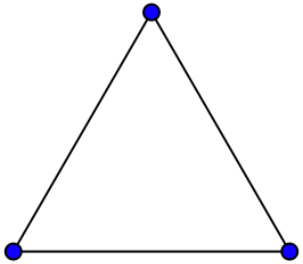


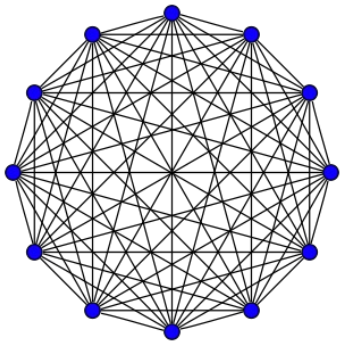
- 7+/-2 team members, collocated
- Self managing
- Scrum master (rotating role)
- Product owner / customer representative



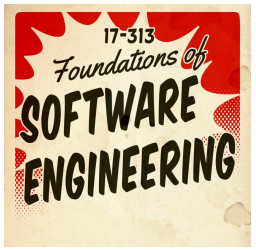
Large teams (29 people) create around six times as many defects as small teams (3 people) and obviously burn through a lot more money. Yet, the large team appears to produce about the same amount of output in only an average of 12 days' less time. This is a truly astonishing finding, through it fits with my personal experience on projects over 35 years.

- Phillip Amour, 2006, CACM 49:9





Establish communication patterns

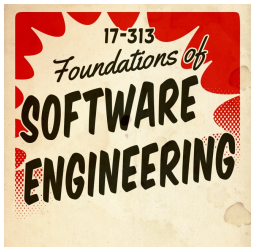


- Avoid overhead
- Ensure reliability
- Constraint latency

- e.g. Issue tracker vs email; online vs face to face

Design opportunity

Awareness



- Notifications
- Brook's documentation book
- Email to all
- Code reviews

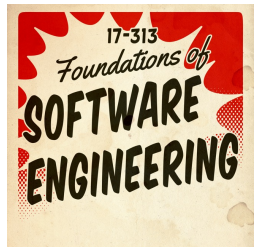
Conway's Law

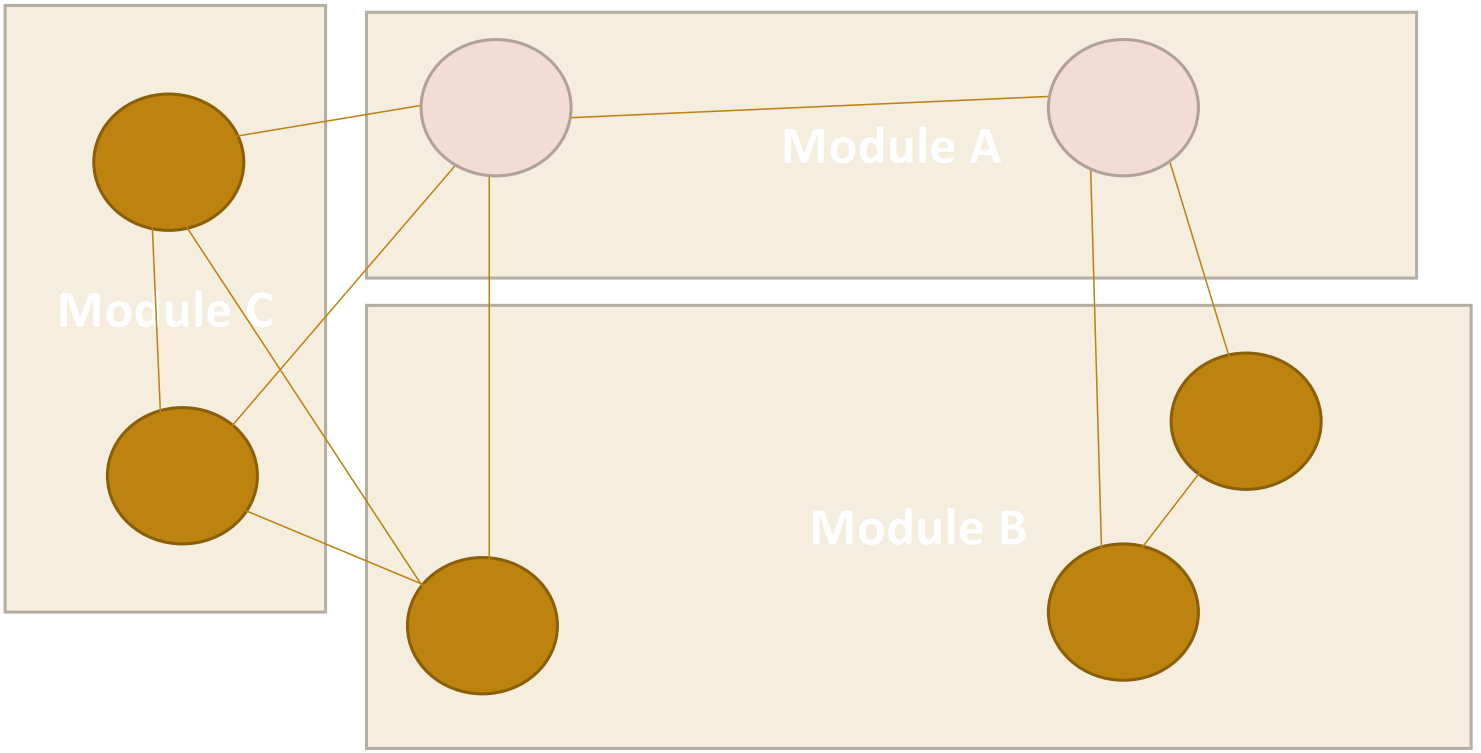
"Any organization that designs a system (defined broadly) will produce a design whose structure is a copy of the organization's communication structure."

— Mel Conway, 1967

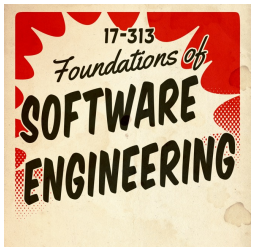
"If you have four groups working on a compiler, you'll get a 4-pass compiler."

Congruence



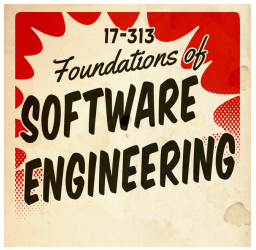


Socio-Technical Congruence



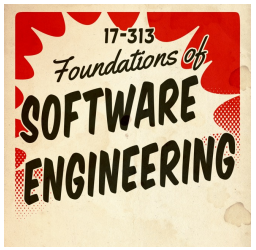
- Structural congruence
- Geographical congruence
- Task congruence
- IRC communication congruence

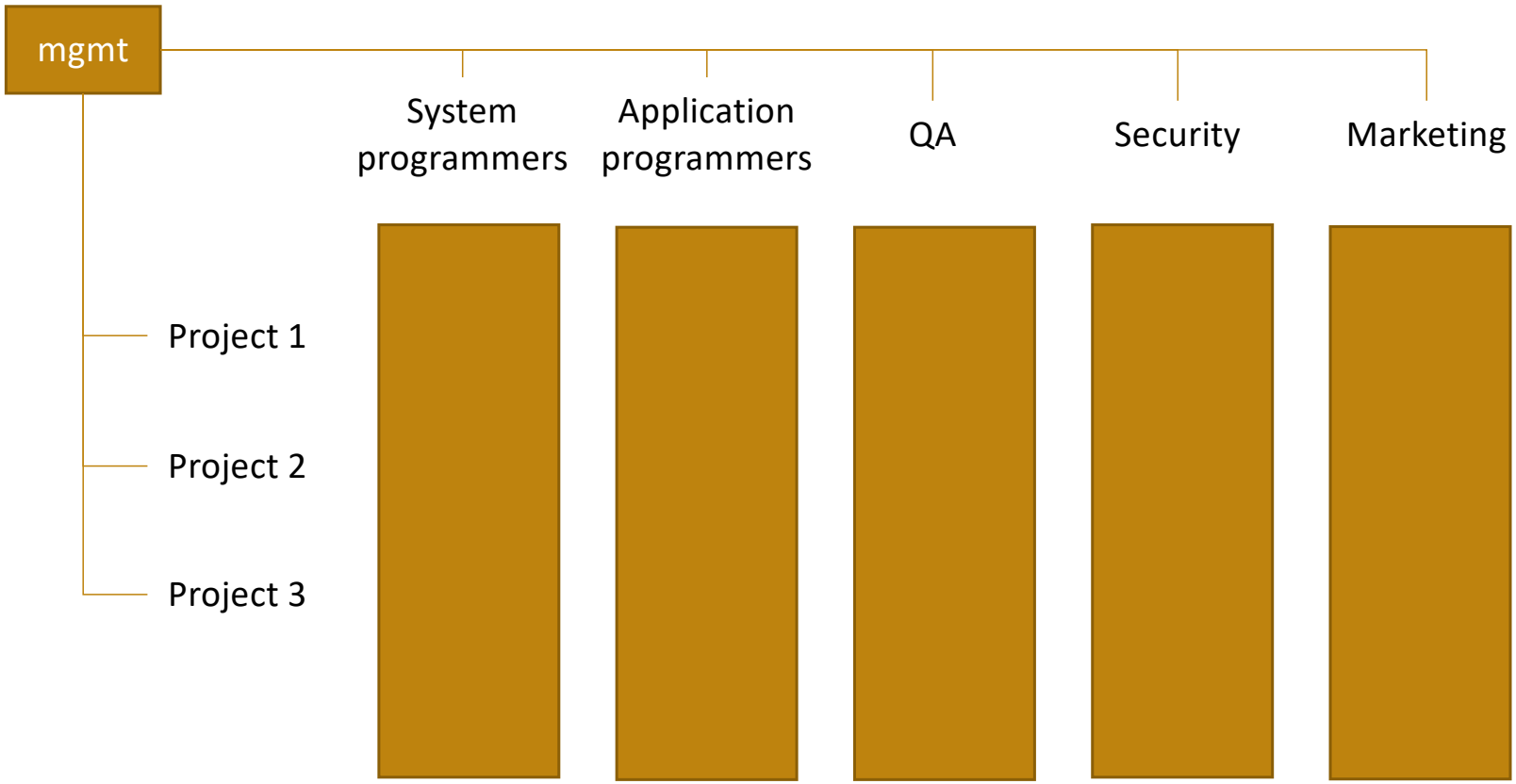
Teamwork Guidelines



- Respect Conway's Law
  - Code structure and team structure should align
- Seek well-defined, stable interfaces

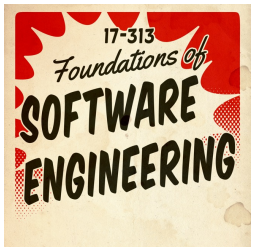
Matrix Organization

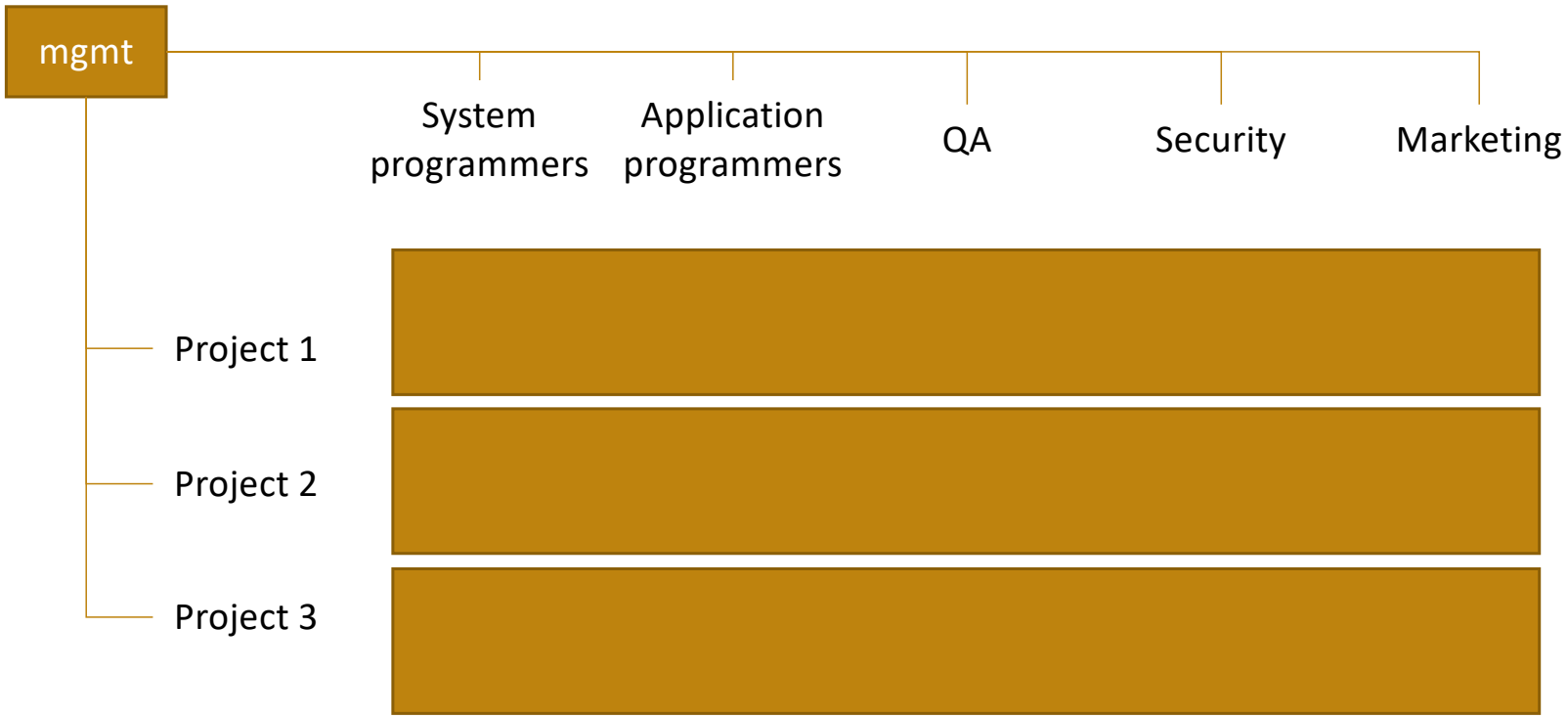




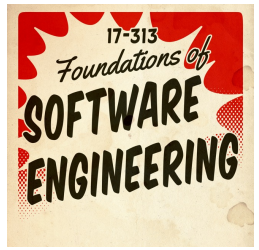
Temporary assignment to projects; flexible staffing

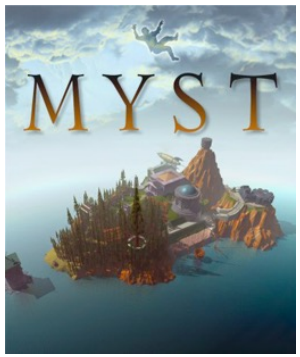
Project Organization

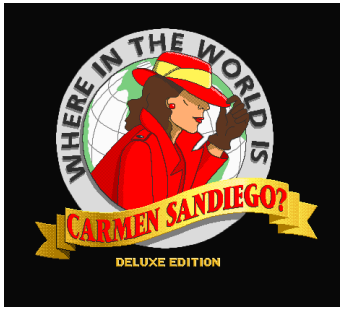




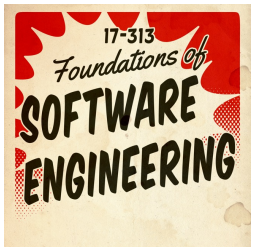
Case Study





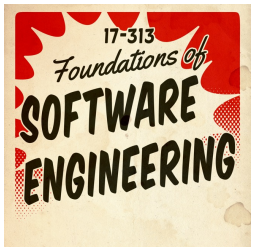


Case Study: Brøderbund



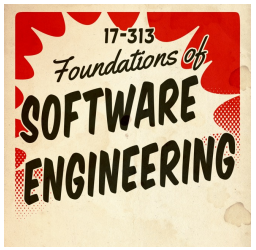
- As the functional departments grew, staffing the heavily matrixed projects became more and more of a nightmare. To address this, the company reorganized itself into “Studios”, each with dedicated resources for each of the major functional areas reporting up to a Studio manager. Given direct responsibility for performance and compensation, Studio managers could allocate resources freely.
- The Studios were able to exert more direct control on the projects and team members, but not without a cost. The major problem that emerged from Brøderbund’s Studio reorganization was that members of the various functional disciplines began to lose touch with their functional counterparts. Experience wasn’t shared as easily. Over time, duplicate effort began to appear.

Commitment & Accountability



- Conflict is useful, expose all views
- Come to decision, commit to it
- Assign responsibilities
- Record decisions and commitments; make record available

Bell & Hart – 8 Causes of Conflict

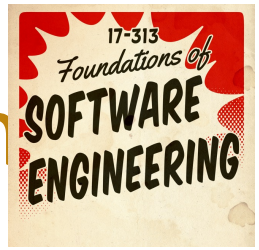


- Conflicting resources.
- Conflicting styles.
- Conflicting perceptions.
- Conflicting goals.
- Conflicting pressures.
- Conflicting roles.
- Different personal values.
- Unpredictable policies.

Bell, Art. (2002). Six ways to resolve workplace conflicts.
McLaren School of Business, University of San Francisco.
https://www.mindtools.com/pages/article/eight-causes-conflict.htm

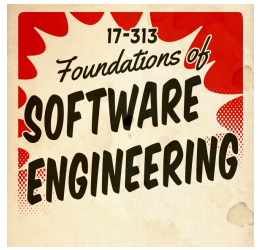
VIRTUAL TEAMS

Computer Supported Collaborative Work (CSCW): Technology-assisted collaboration



- Many failures
- Isolated, but very significant, success
  - Jazz, Github, …

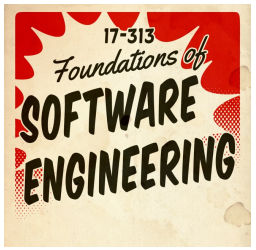
Mini Break in Monday Lecture



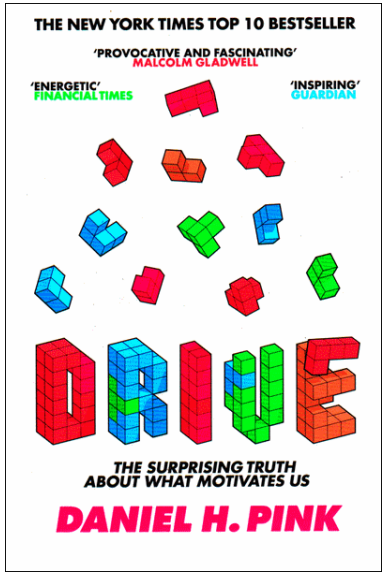
Spotify Squads

https://www.atlassian.com/agile/agile-at-scale/spotify

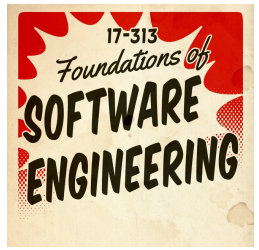
Principles

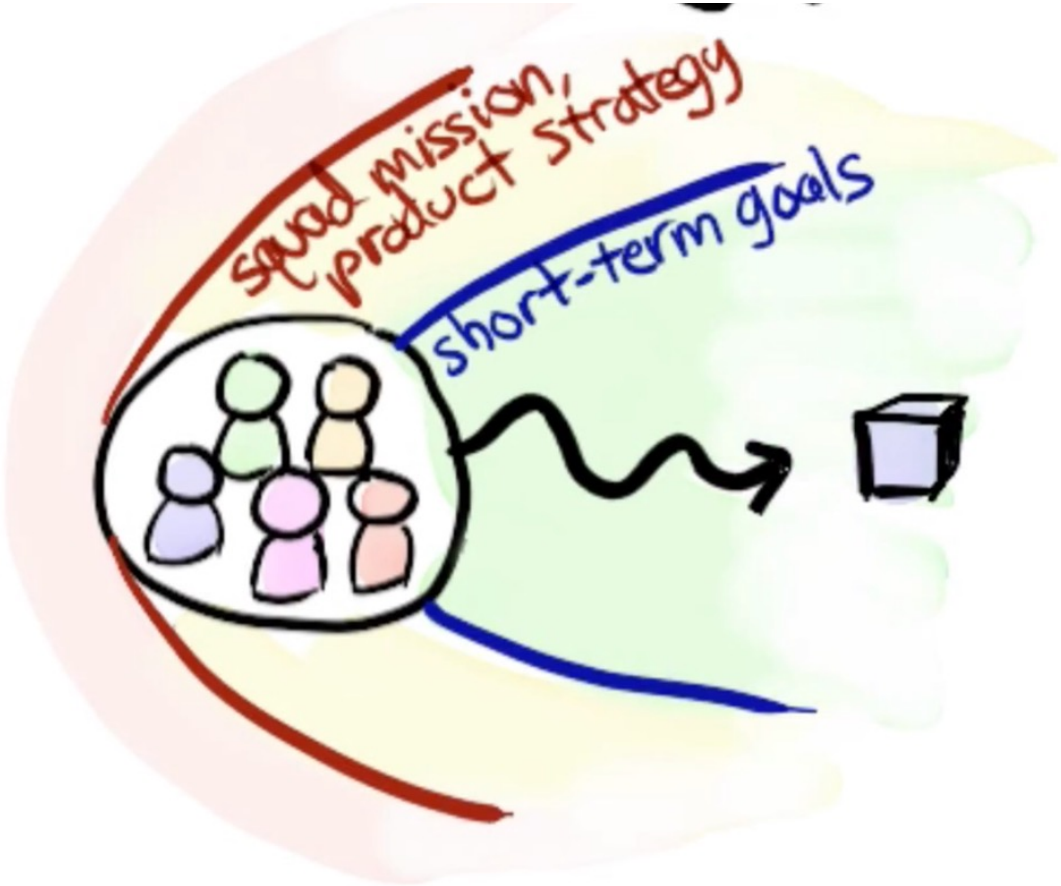


- Rules are a good start, then break them when needed
- Agile > Scrum
- Principles > Practices
- Autonomy, Mastery, Purpose
- *Be autonomous, but don't sub-optimize!*

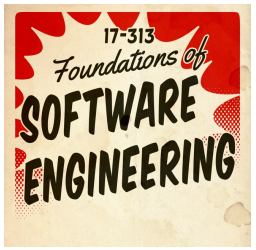


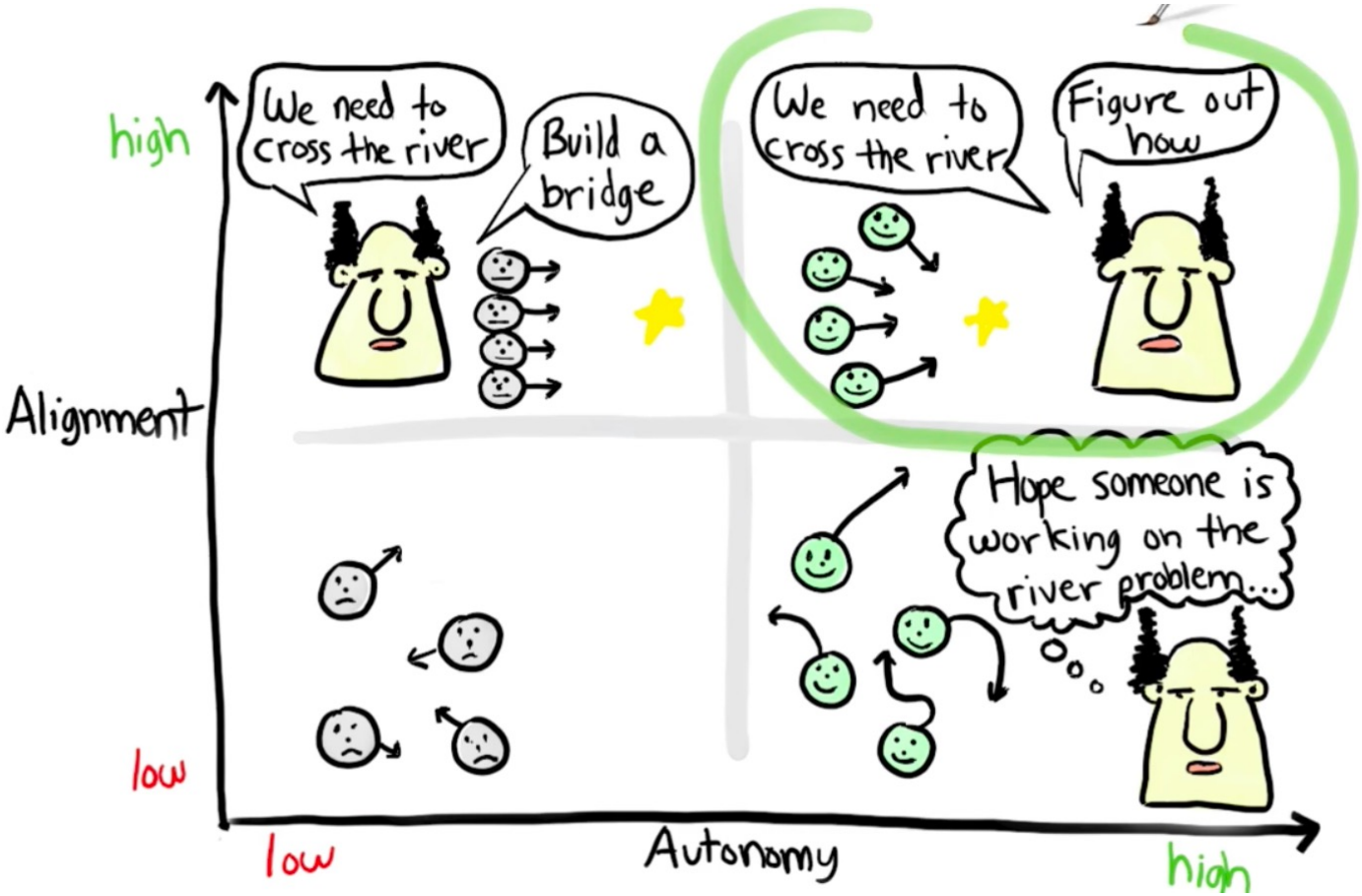
Autonomous Squads



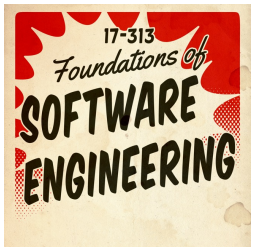


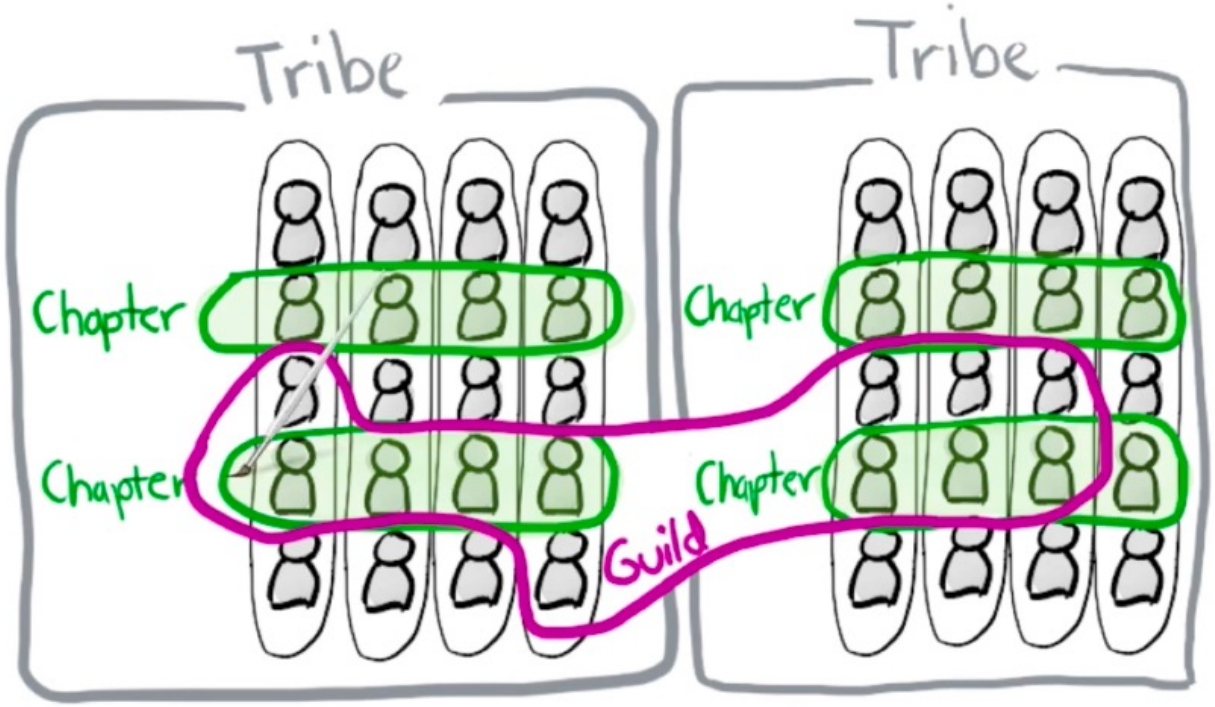
Aligned Autonomous squads



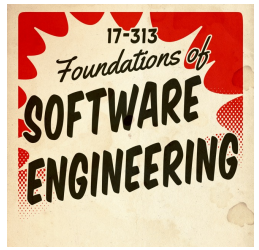


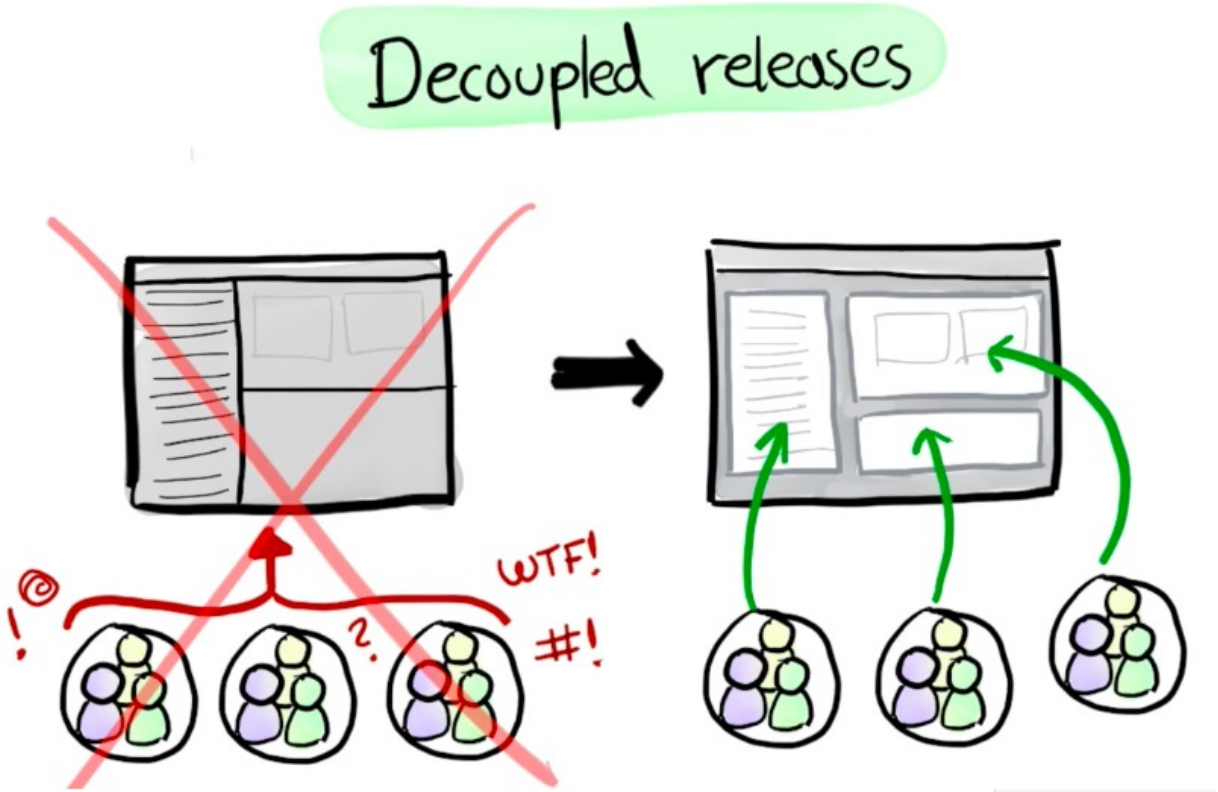
Squads, Tribes, Chapters, Guilds



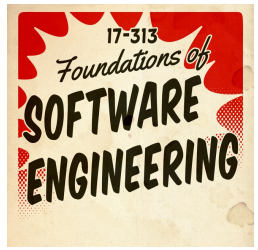


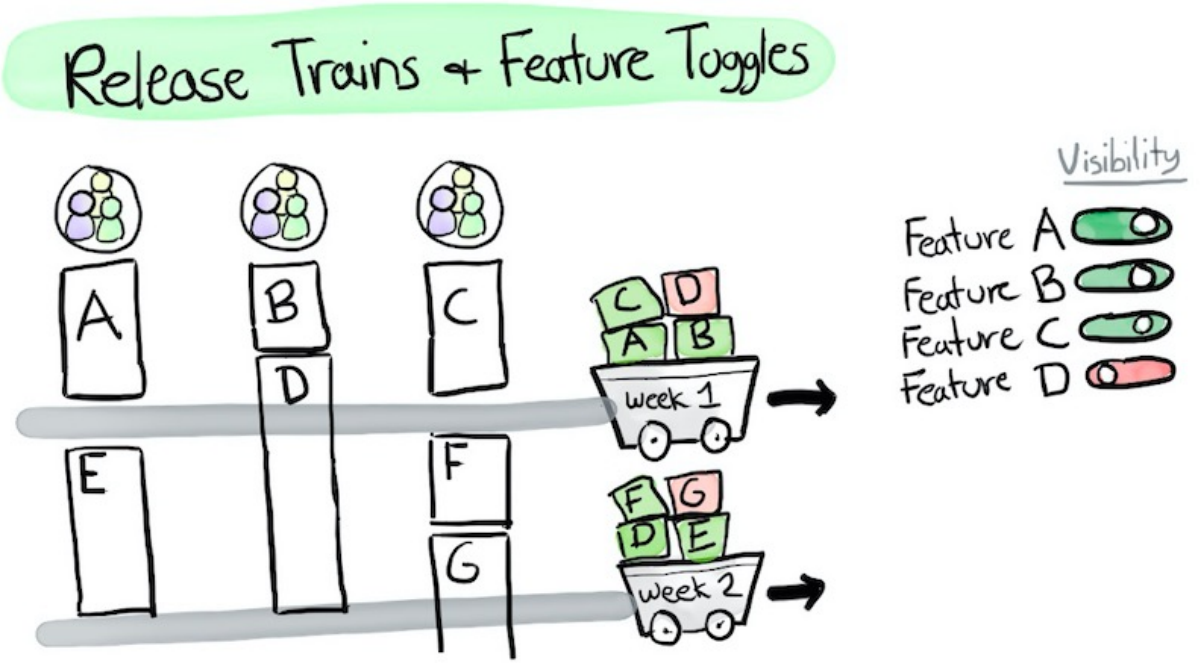
Getting into production



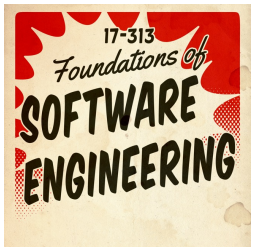


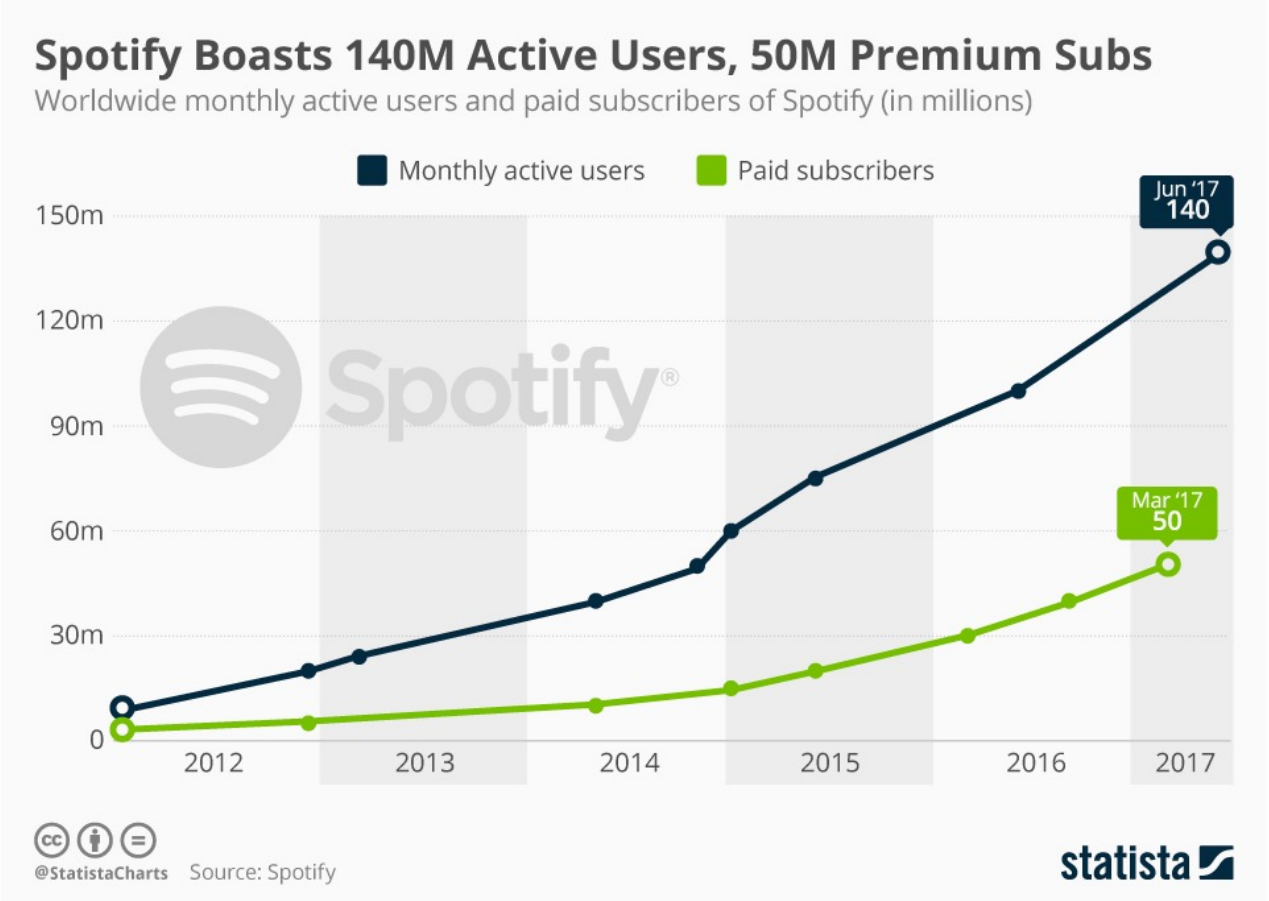
Decouple teams and releases





Context



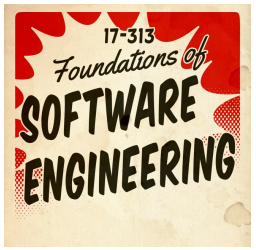


Discussion

- Benefits?
- Challenges?
- Implementation pitfalls?

GENERAL GUIDELINES

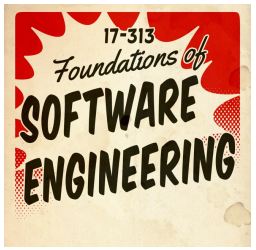
Hints for team functioning



- Trust them; strategic not tactical direction
- Reduce bureaucracy, protect team
- Physical co-location, time for interaction
- Avoid in-team competition (bonuses etc)
- Time for quality assurance, cult of quality
- Realistic deadlines
- Peer coaching
- Sense of elitism
- Allow and encourage heterogeneity

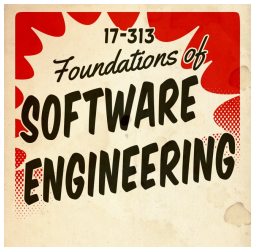
DeMarco and Lister. Peopleware. Chapter 23

Team Fusion



- Forming, Storming, Norming, Performing
- Preserve existing teams, resist project mobility

Elitism Case Study: The Black Team



- Legendary team at IBM in the 1960s
- Group of talented ("slightly better") testers
  - Goal: Final testing of critical software before delivery
- Improvement over first year
- Formed team personality and energy
  - "adversary philosophy of testing"
  - Cultivated image of destroyers
  - Started to dress in black, crackled laughs, grew mustaches
- Team survived loss of original members

DeMarco and Lister. Peopleware. Chapter 22

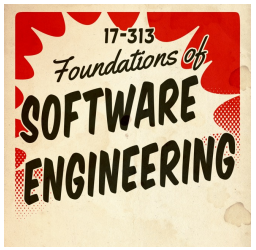
Troubleshooting Teams

- Cynicism as warning sign
- Training to improve practices
- Getting to know each other; celebrate success; bonding over meals
- “A meeting without notes is a meeting that never happened”

LOCAL AND REMOTE TEAMS?
POST-COVID TEAMS?

DEVELOPER TURNOVER

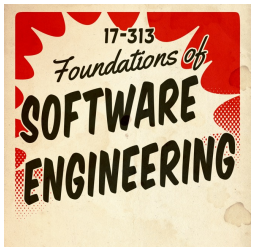
Turnover



Rank	Employer Name	Median Age of Employees	Median Employee Tenure	Median Pay
1	Massachusetts Mutual Life Insurance Company	38	0.8	$60,000
2 - tie	Amazon.com Inc	32	1.0	$93,200
2 - tie	American Family Life Assurance Company of Columbus (AFLAC)	38	1.0	$38,000
4 - tie	Google, Inc.	29	1.1	$107,000
4 - tie	Mosaic	37	1.1	$69,900
6 - tie	Chesapeake Energy Corporation	31	1.2	$60,500
6 - tie	Group 1 Automotive, Inc.	32	1.2	$33,200
6 - tie	Ross Stores, Inc	29	1.2	$23,800
6 - tie	Wellcare Health Plans, Inc.	38	1.2	$49,900
*				
11 - tie	Amerigroup Corporation	39	1.3	$54,800
11 - tie	Brightpoint North America, Inc.	45	1.3	$42,100
11 - tie	Devon Energy Corporation	31	1.3	$63,200
11 - tie	Family Dollar Stores Inc	38	1.3	$23,400
11 - tie	Freeport-McMoRan Copper & Gold Inc	36	1.3	$62,900
11 - tie	Paccar Corporation	33	1.3	$62,200
17	New York Life Insurance Company	33	1.4	$53,800
18 - tie	Berkshire Hathaway Inc	41	1.5	$53,600
18 - tie	Sandisk Corp	34	1.5	$110,000
18 - tie	Tenneco Inc	40	1.5	$69,900

Source: http://www.techrepublic.com/blog/career-management/tech-companies-have-highest-turnover-rate/; payscale.com data

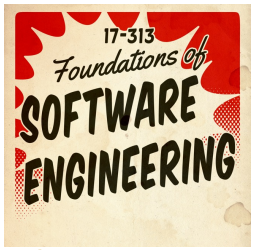
Turnover



- > 20% turnover per year typical
  - average employment 15-36 month

- Costs?
- Reasons?
- Mitigations?

Unfolding Model of Employee Turnover



Organizational Science has studied employee turnover for over 100 years!

One Hundred Years of Employee Turnover Theory and Research

Peter W. Hom
Arizona State University

Thomas W. Lee
University of Washington

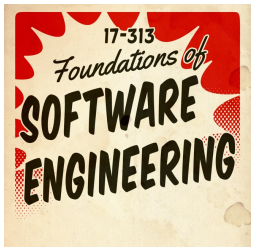
Jason D. Shaw
Hong Kong Polytechnic University

John P. Hausknecht
Cornell University

We review seminal publications on employee turnover during the 100-year existence of the *Journal of Applied Psychology*. Along with classic articles from this journal, we expand our review to include other publications that yielded key theoretical and methodological contributions to the turnover literature. We first describe how the earliest papers examined practical methods for turnover reduction or control and then explain how theory development and testing began in the mid-20th century and dominated the academic literature until the turn of the century. We then track 21st century interest in the psychology of staying (rather than leaving) and attitudinal trajectories in predicting turnover. Finally, we discuss the rising scholarship on collective turnover given the centrality of human capital flight to practitioners and to the field of human resource management strategy.

Keywords: embeddedness, employee turnover, job attitudes, shocks, participation mindsets

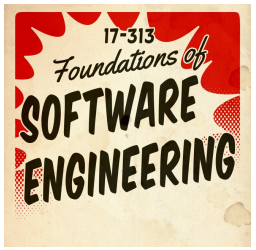
High turnover is expensive



- Hiring overhead
  - Costs (1.5 month salary to agency)
  - Lost productivity (interviews)
- Getting new developers up to speed
  - Unproductive time (~6 month ramp up; 2 years in some estimates)
  - Training overhead
- Overhead for maintaining abandoned code
- Tendency to short-term viewpoints
- Premature promotions
- Young inexperienced staff

see also DeMarco and Lister. Peopleware. Chapter 19

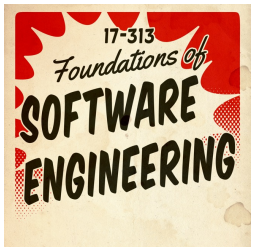
Causes of, mitigations for turnover



- Causes (from literature, caveats for tech companies):
  - Just-passing-through mentality
  - Feeling of disposability
  - “Loyalty would be ludicrous”
  - High turnover encourages turnover
- Mitigations:
  - Environment and culture
    - striving to be "the best"
    - teams
  - Investment in personal growth, via retraining, no dead-end jobs
- *Advice: enable appropriate processes to maintain productivity despite turnover.*

see also DeMarco and Lister. Peopleware. Chapter 19

MOTIVATING PROGRAMMERS

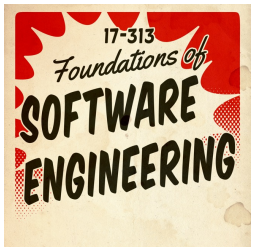


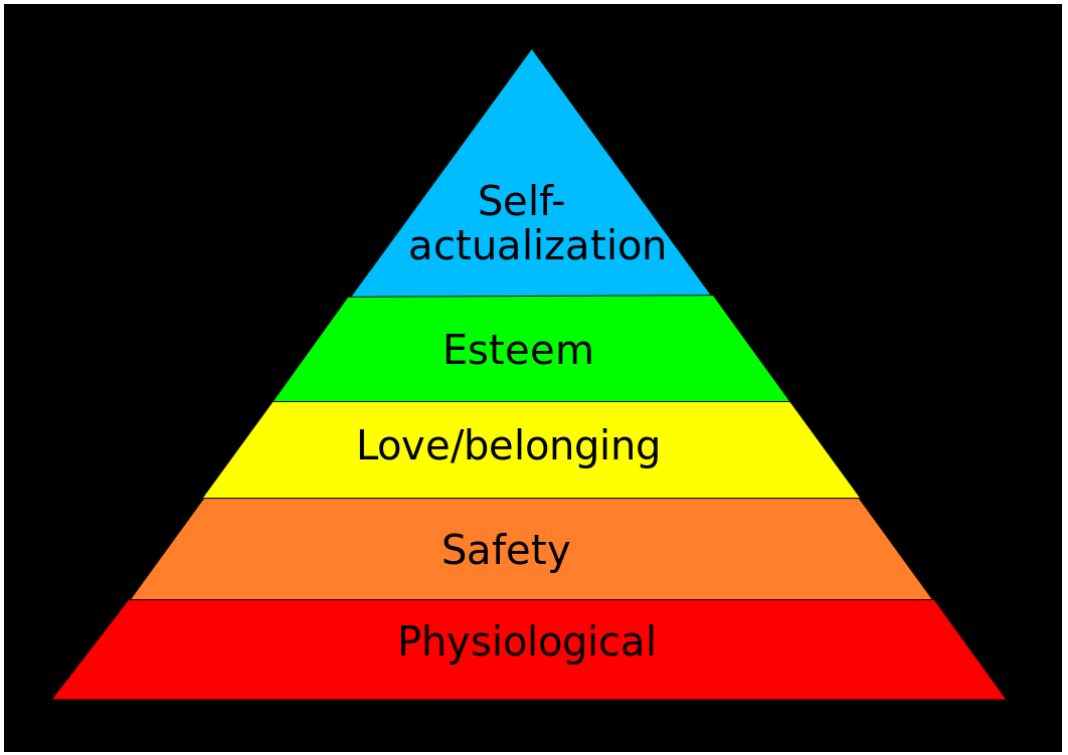
Growth and Challenge

Theories

- Maslow's Hierarchy of Needs
- Herzberg's Motivation and Hygiene Factors
- Daniel Pink, Drive: The Surprising Truth About What Motivates Us.

Maslow's hierarchy of needs (1943)

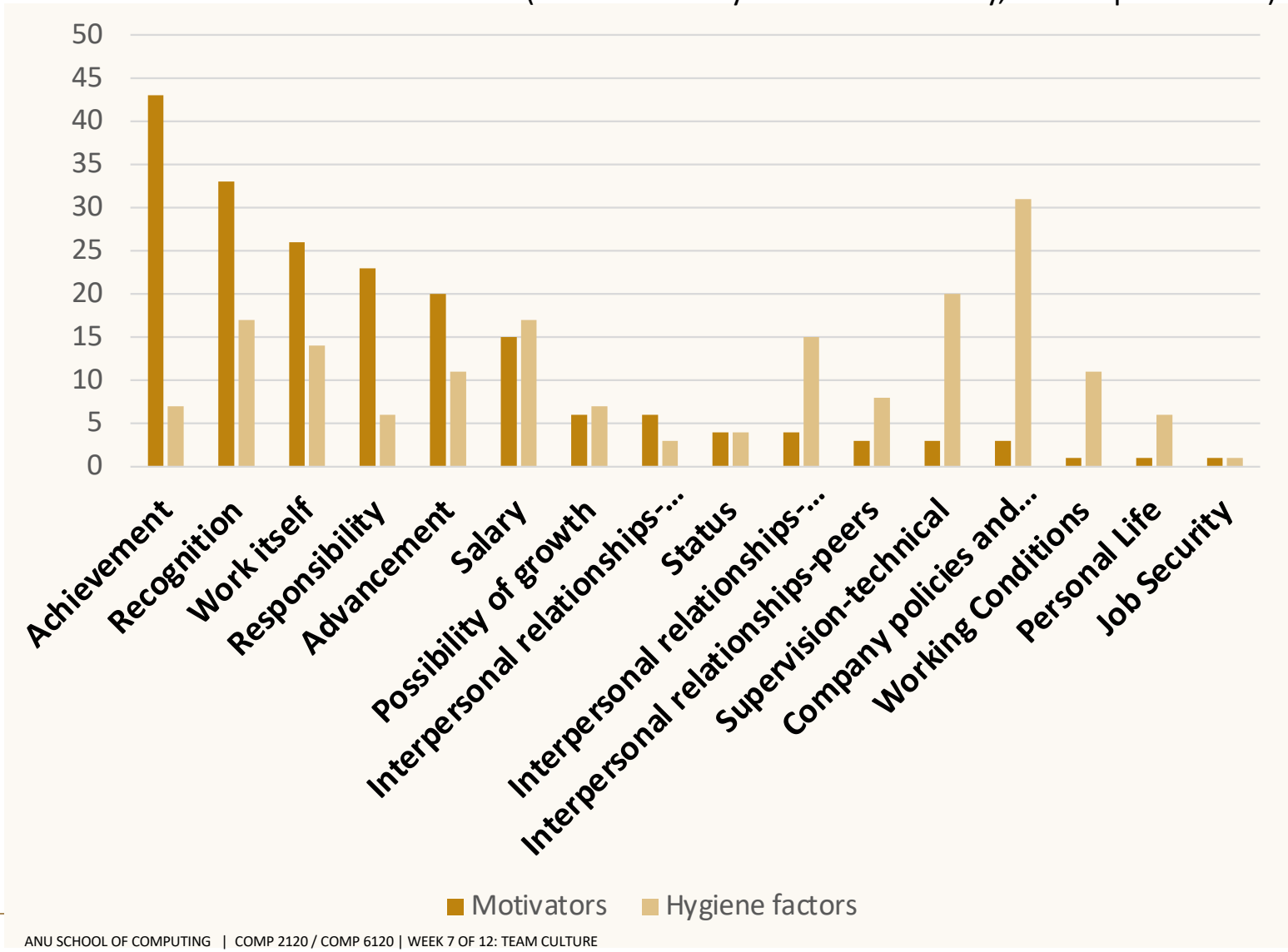


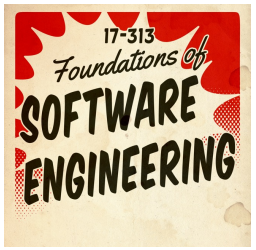


Herzberg's Motivation and Hygiene Factors (1960s)

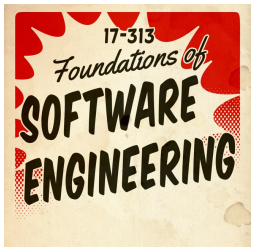
- (aka two-factor theory)
- Different factors for satisfaction and dissatisfaction
  - Addressing dissatisfaction does not lead to satisfaction
- Step 1: Eliminate dissatisfaction
- Step 2: Create condition for satisfaction

(Observation by Mantle and Lichty, not empirical data)



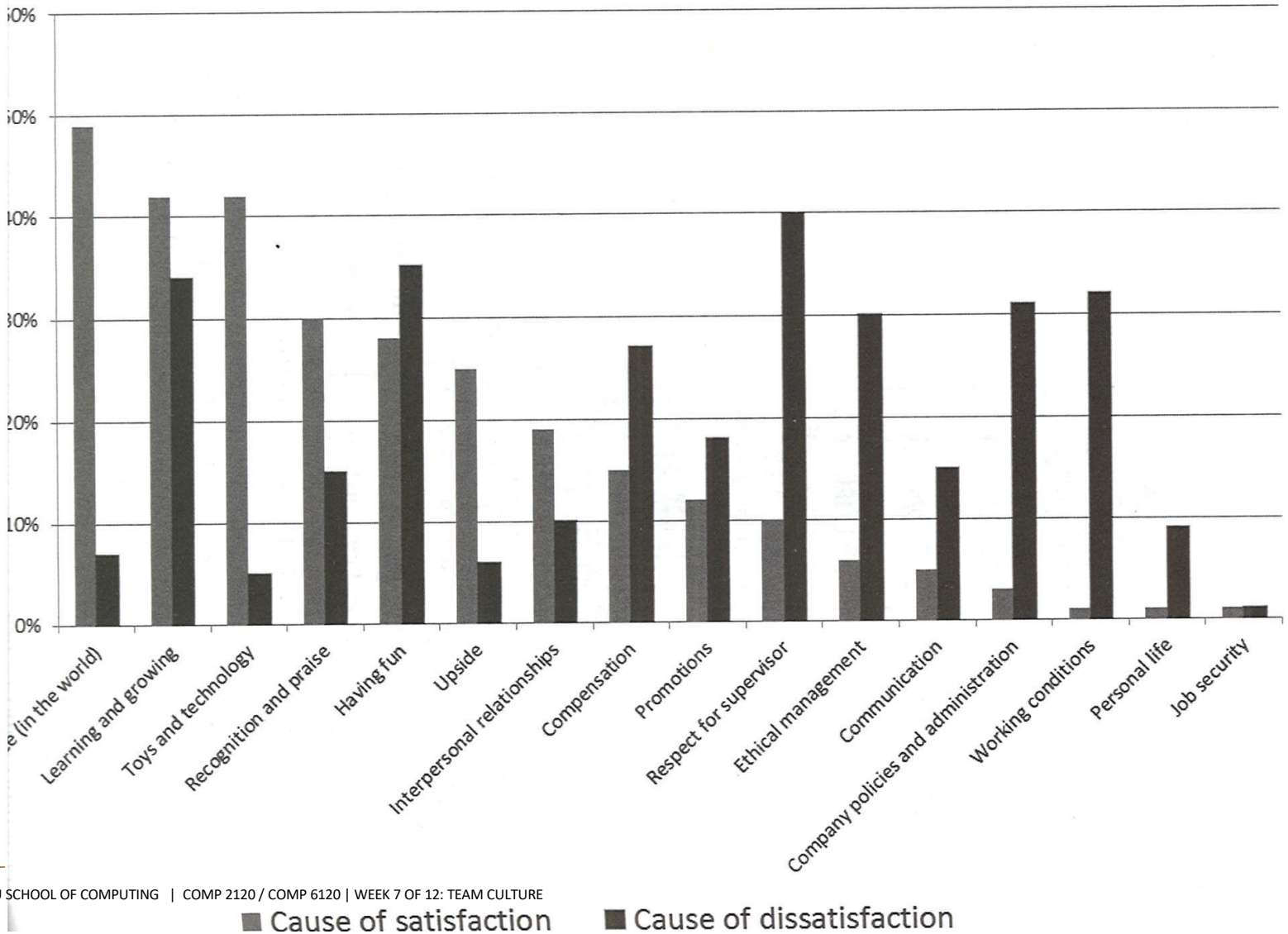


Identify Motivation and Hygiene Factors for Programmers

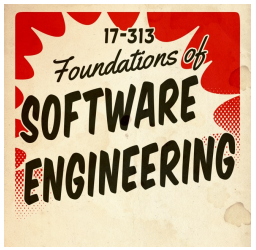


- Communication
- Company policies and administration
- Compensation
- Ethical management
- Having fun
- Interpersonal relationships
- Job security
- Learning and growing
- Making a difference
- Promotions
- Recognition and praise
- Respect for supervisor
- Toys and technology
- Upside

(Observation by Mantle and Lichty, not empirical data)



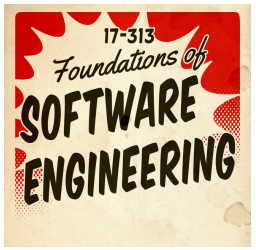
Addressing Causes of Dissatisfaction



- Respect for supervisor
- Having fun
- Learning and growing
- Good working conditions
- Sane company policies and administration
- Ethical management
- Fair compensation

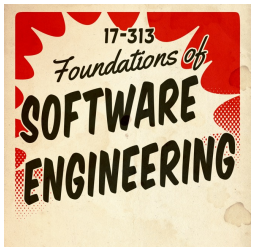
- (often within control)

Addressing Causes of Dissatisfaction (selective)



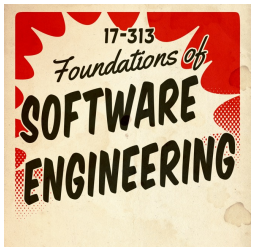
- Respect as supervisor
  - gain technical credit
  - respect others
  - lead by example
  - help solve technical problems
  - manage and coach
- Having fun
  - out of office play
  - celebrations of accomplishments and occasions

Addressing Causes of Dissatisfaction (selective)



- Learning and growing
  - protect time for learning
  - explore new technologies; prototype
  - budget for attending conferences, seminars, in-house training
  - invite guest speakers
- Good working conditions
  - plenty of whiteboards
  - room for discussions
  - Quiet space, Limit interruptions, avoid meeting culture
  - cubicles vs separate offices
  - fire “jerks”
  - free food
  - flexible hours, flexible dress, flexible space

Addressing Causes of Dissatisfaction (selective)

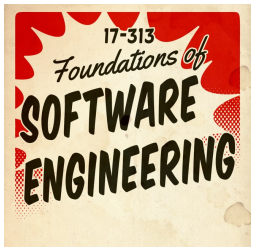


- Sane company policies and administration
  - communicate frequently (vision, intentions, requirements, schedules, …)
  - protect staff from organizational distractions
  - protect staff from bad communication practices (establish culture)

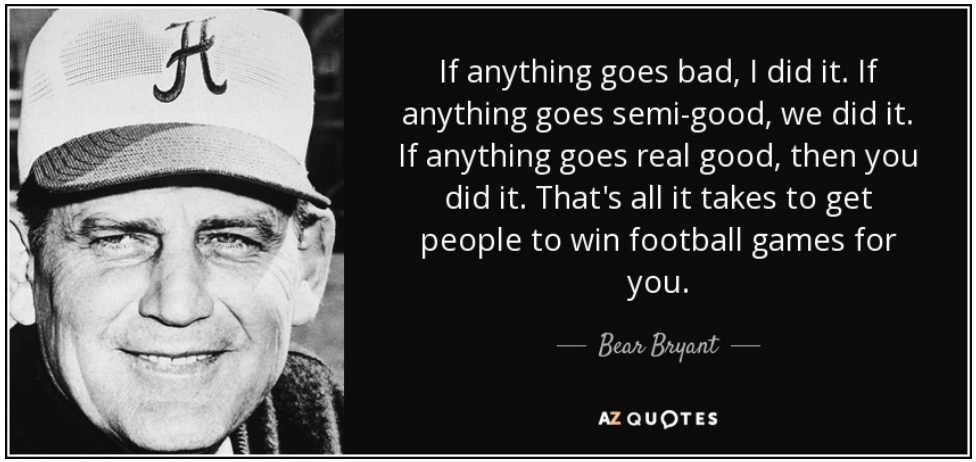
Addressing Motivating Factors (selective)

- Making a difference
  - worthy goals, long term vision
  - Steve Jobs when recruiting John Scully from Pepsi: “Do you want to sell sugar water or change to world”
- Toys and technology
  - modern hardware, large screens, phones, …

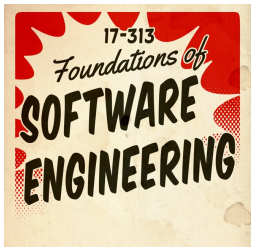
Addressing Motivating Factors (selective)



- Recognition and praise
  - praise loudly and specifically, blame softly/privately
  - celebrate success

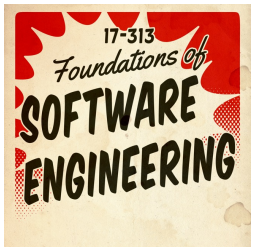


Why do engineers choose TO JOIN particular teams?

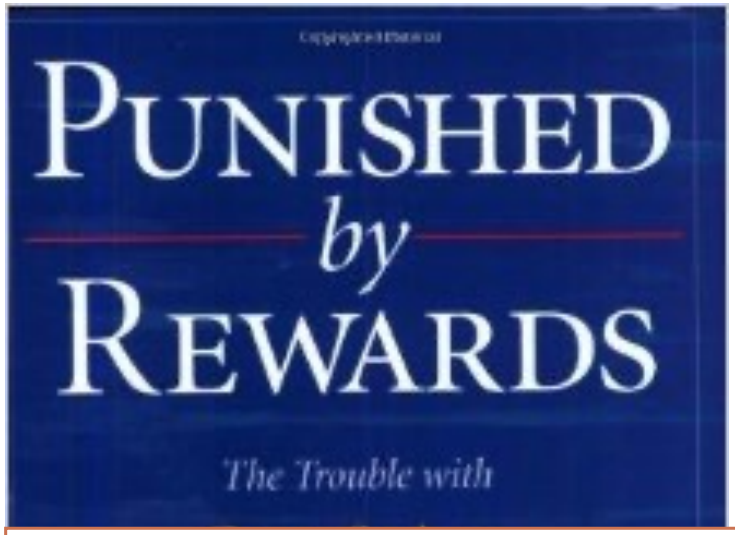


Reasons grouped by clustering analysis	Percent
Liked new team and/or technology (exciting, manager)	**85.8%**
Coworker asked me to join (new team, old team)	**37.8%**
Joined for better opportunities (location, domain, lack of other options)	**24.5%**
Followed my manager (former or current)	**14.6%**

Why do engineers want to leave their teams?

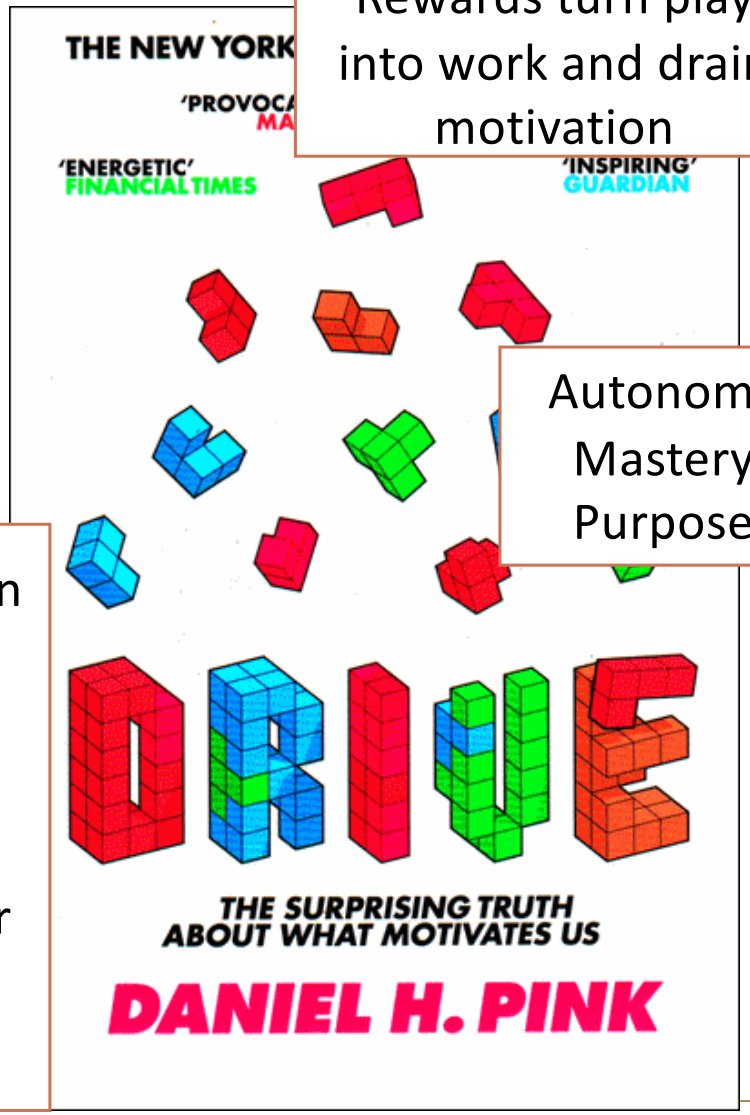


Reasons grouped by clustering analysis	Percent
Change is coming (technology, charter, re-org, turnover)	**52.6%**
Seeking new challenges or location (role, location, challenges)	**39.0%**
Dissatisfaction with manager (priorities, goals, person, actions)	**31.6%**
The grass is always greener on the other side (novelty, escape)	**12.3%**
Not a good fit (bored, no need for my skills)	**5.3%**
Poor team dynamics (dysfunctional, no career growth)	**4.4%**

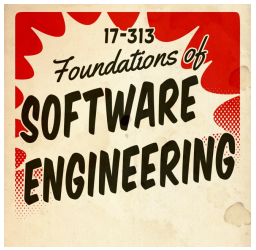


Can extinguish intrinsic motivation
Can diminish performance
Can crush creativity
Can crowd out good behavior
Can encourage cheating, shortcuts, and unethical behavior
Can become addictive
Can foster short-term thinking

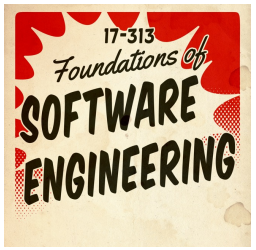
Rewards turn play into work and drain motivation



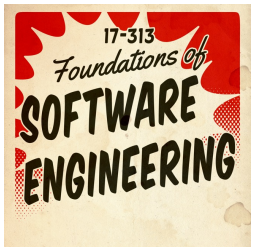
Autonomy
Mastery
Purpose



Rewards (aka grinding)

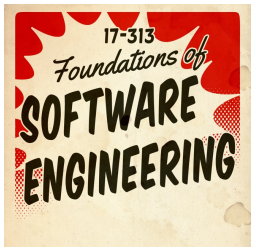


Rewards



- Fair and adequate pay as foundation
  - Takes money issue off the table, focus on work
- Non contingent awards
  - Reinforce extra effort and excellence if not expected

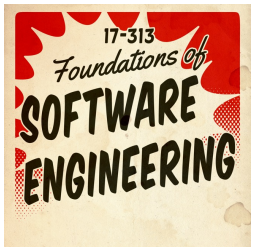
Daytime distractions



- “You never get anything done around here between 9 and 5”
- “I get my best work done in the early morning, before anybody else arrives”
- “In one late evening, I can do two or three days’ worth of work”

DeMarco and Lister. Peopleware. Chapter 8

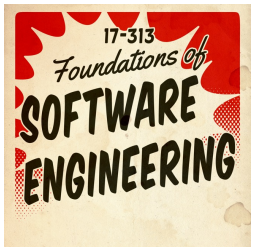
Quality



- Quality important for satisfaction and self-image
- Even if market may not pay for that level or quality
- "Under time pressure developers sacrifice quality and hate themselves for that"
- "Quality, far beyond that required by the end user, is a means to higher productivity"

DeMarco and Lister. Peopleware. Chapter 4

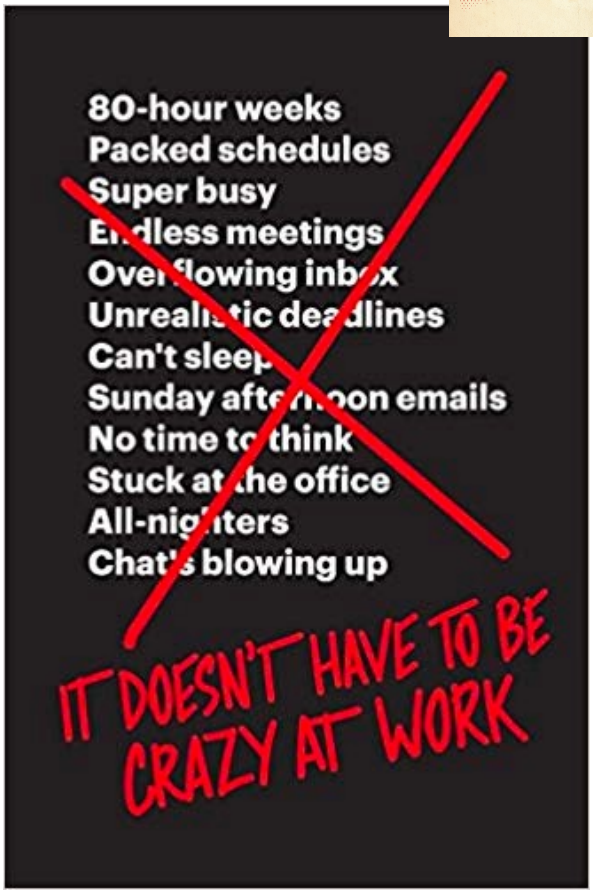
Overtime?



- Often caused by deadlines (real or artificial)
- Avoid over long periods
- Peak productivity at 40h/week
- Incentivize overtime
  - free food/overtime refrigerators
  - bonus pay
  - social pressure

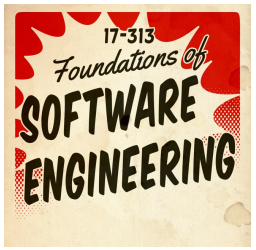
Avoid “Gotcha Benefits”

- Fully paid vacations every year, including airfare
- Three-day weekends all summer.
- 30-day-paid sabbaticals every three years.
- $1,000 per year continuing-education stipend. (learn anything)
- $2,000 per year charity match.
- A local monthly CSA (community-supported agriculture) share
- One monthly massage at an actual spa, not the office.
- $100 monthly fitness allowance



MANAGING PROGRAMMERS

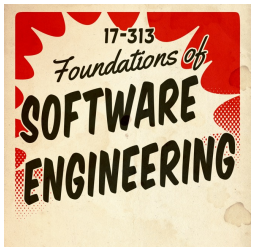
Programmer Characteristics



- Programmers have fun
  - Work is the primary motivator, not compensation
- Free spirited
  - Medium only “slightly removed from pure though stuff”
- Code right away, design as they go along
- Resistance to change
- Overconfident in own ability (writing bug free code, time estimation)

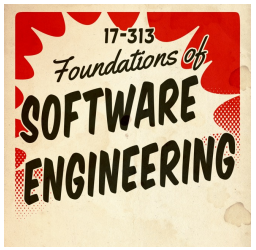
COWBOYS VS FARMERS

Managing Developers



- Earn technical respect
- Protect staff from bureaucracy
- Set goals, avoid rewards

Tuckman, 1965: Forming, Storming, Norming, Performing



- Forming: team meets and learns about challenges, agrees on goals, begins to work.
  - Team members: (1) Behave independently. (2) May be motivated, but relatively uninformed about goals, (3) usually on their best behavior (albeit self-involved)
- Storming: participants form opinions about one another, possibly leading to conflict.
  - May voice opinions or question leader, especially if someone shirking responsibility or attempting to dominate.
  - Disagreements and conflicts must be resolved before team can progress; may regress if new challenges arise.
  - Stage can be destructive, but can lead to a better team in the long run if effective resolution tactics established.
- Norming: Resolved conflicts leads to a spirit of co-operation.
  - Team shares a common goal for which everyone takes responsibility.
  - Tolerate one another, move on from individual challenges.
  - Danger: too much avoidance of conflict can lead to avoidance of controversial ideas.
- Performing: group members focus on achieving common goals.
  - Everyone is now competent and can make decisions without supervision. Dissent is allowed if it's through acceptable channels.
  - Supervisors are almost always participating.
- Upshot: Preserve existing teams, resist project mobility.
  - Tradeoffs? Compared to practices you've seen in companies?

Further Reading

- Mantle and Lichty. Managing the Unmanageable. Addison-Wesley, 2013
  - Very accessible and practical tips at recruiting and managment
- DeMarco and Lister. Peopleware. 3rd Edition. Addison Wesley, 2013
  - Anecdotes, stories, and tips on facilitating teams, projects, and environments
- Pink. Drive: The Surprising Truth About What Motivates Us. Riverhead 2011
  - Detailed discussion of motivating factors for creative people
- Sommerville. Software Engineering. 8th Edition. Chapter 25

DOCUMENTATION

Documentation (Chapter 10 of SE @ Google)

- What Qualifies as Documentation?
  - Any supplemental text that an engineer needs to write to do their job (including comments).
- Why is Documentation Needed?
  - Helps formulate an API (writing docs helps figure out if it makes sense)
  - Provides roadmap for maintenance and history
  - Makes code look more professional and attractive
  - Prompts fewer questions from other users

"optimise for the reader"

Documentation is Like Code

- Your documentation *should*:
  - Have internal policies or rules to be followed
  - Be placed under source control
  - Have clear ownership responsible for maintaining the docs
  - Undergo reviews for changes (and change *with* the code it documents)
  - Have issues tracked, as bugs are tracked in code
  - Be periodically evaluated (tested, in some respect)
  - If possible, be measured for aspects such as accuracy, freshness, etc. (need more tools here!)

Case Study: The Google Wiki

When Google was much smaller and leaner, it had few technical writers. The easiest way to share information was through our own internal wiki (GooWiki). At first, this seemed like a reasonable approach; all engineers shared a single documentation set and could update it as needed.

But as Google scaled, problems with a wiki-style approach became apparent. Because there were no true owners for documents, many became obsolete.[3] Because no process was put in place for adding new documents, duplicate documents and document sets began appearing. GooWiki had a flat namespace, and people were not good at applying any hierarchy to the documentation sets. At one point, there were 7 to 10 documents (depending on how you counted them) on setting up Borg, our production compute environment, only a few of which seemed to be maintained, and most were specific to certain teams with certain permissions and assumptions.

Another problem with GooWiki became apparent over time: the people who could fix the documents were not the people who used them. New users discovering bad documents either couldn't confirm that the documents were wrong or didn't have an easy way to report errors. They knew something was wrong (because the document didn't work), but they couldn't "fix" it. Conversely, the people best able to fix the documents often didn't need to consult them after they were written. The documentation became so poor as Google grew that the quality of documentation became Google's number one developer complaint on our annual developer surveys.

The way to improve the situation was to move important documentation under the same sort of source control that was being used to track code changes. Documents began to have their own owners, canonical locations within the source tree, and processes for identifying bugs and fixing them; the documentation began to dramatically improve. Additionally, the way documentation was written and maintained began to look the same as how code was written and maintained. Errors in the documents could be reported within our bug tracking software. Changes to the documents could be handled using the existing code review process. Eventually, engineers began to fix the documents themselves or send changes to technical writers (who were often the owners).

Moving documentation to source control was initially met with a lot of controversy. Many engineers were convinced that doing away with the GooWiki, that bastion of freedom of information, would lead to poor quality because the bar for documentation (requiring a review, requiring owners for documents, etc.) would be higher. But that wasn't the case. The documents became better.

The introduction of Markdown as a common documentation formatting language also helped because it made it easier for engineers to understand how to edit documents without needing specialized expertise in HTML or CSS. Google eventually introduced its own framework for embedding documentation within code: g3doc. With that framework, documentation improved further, as documents existed side by side with the source code within the engineer's development environment. Now, engineers could update the code and its associated documentation in the same change (a practice for which we're still trying to improve adoption).

The key difference was that maintaining documentation became a similar experience to maintaining code: engineers filed bugs, made changes to documents in changelists, sent changes to reviews by experts, and so on. Leveraging of existing developer workflows, rather than creating new ones, was a key benefit.

Know Your Audience

Types of Audiences

- Experience level
- Domain knowledge
- Purpose
- *Seekers* versus *Stumblers*
- *Customer* versus *Provider*

Documentation Types

- Reference documentation (including comments)
- Design documents
- Tutorials
- Conceptual documentation
- Landing pages

Reference Documentation

- File Comments

```
// ------------------------------------------------------------------------
// str_cat.h
// ------------------------------------------------------------------------
//
// This header file contains functions for efficiently concatenating and appending
// strings: StrCat() and StrAppend(). Most of the work within these routines is
// actually handled through use of a special AlphaNum type, which was designed
// to be used as a parameter type that efficiently manages conversion to
// strings and avoids copies in the above operations.
…
```

- Class Comments

```
// ------------------------------------------------------------------------
// AlphaNum
// ------------------------------------------------------------------------
//
// The AlphaNum class acts as the main parameter type for StrCat() and
// StrAppend(), providing efficient conversion of numeric, boolean, and
// hexadecimal values (through the Hex type) into strings.
```

- Function Comments

```
// Creates a new record for a customer with the given name and address,
// and returns the record ID, or throws `DuplicateEntryError` if a
// record with that name already exists.
int AddCustomer(string name, string address);
```

Tutorials

Example: A bad tutorial

1. Download the package from our server at http://example.com
2. Copy the shell script to your home directory
3. Execute the shell script
4. The foobar system will communicate with the authentication system
5. Once authenticated, foobar will bootstrap a new database named "baz"
6. Test "baz" by executing a SQL command on the command line
7. Type: CREATE DATABASE my_foobar_db;

Example: A bad tutorial made better

1. Download the package from our server at *http://example.com*:

   ```
   $ curl -I http://example.com
   ```

2. Copy the shell script to your home directory:

   ```
   $ cp foobar.sh ~
   ```

3. Execute the shell script in your home directory:

   ```
   $ cd ~; foobar.sh
   ```

   The foobar system will first communicate with the authentication system. Once authenticated, foobar will bootstrap a new database named "baz" and open an input shell.

4. Test "baz" by executing a SQL command on the command line:

   ```
   baz:$ CREATE DATABASE my_foobar_db;
   ```

Note how each step requires specific user intervention. If, instead, the tutorial had a focus on some other aspect (e.g., a document about the "life of a server"), number those steps from the perspective of that focus (what the server does).

Documentation Reviews

- Technical Review (accuracy)
- Audience Review (clarity)
- Writing Review (consistency)
- Documentation Philosophy:
  - ~~HOW~~
  - WHO (audience)
  - WHAT (purpose of the doc)
  - WHEN (created/reviewed/updated)
  - WHERE (*ideally with source code it documents*)
  - WHY (what to take away after reading)

Key Points

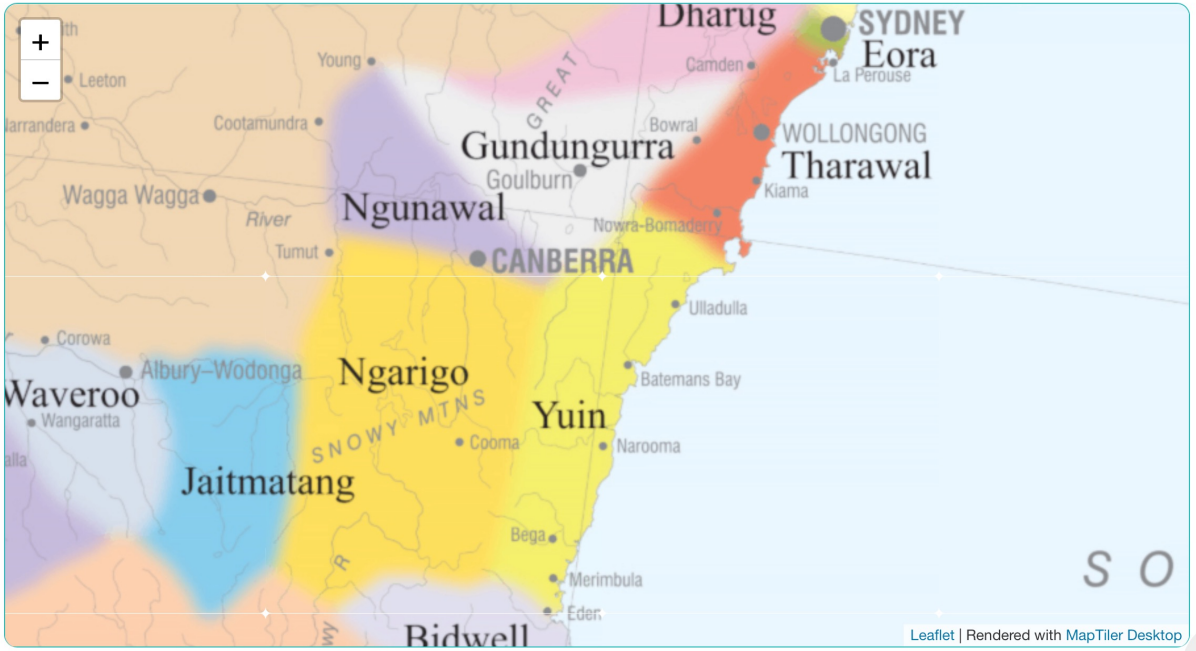
- Understand the differences among developers and implications for hiring and teamwork.
- Describe various models of motivation and their relationship to productive work environments.
- Design conditions that motivate developers.
- Understand team development and progression.

End of Monday Lecture/Start of Tuesday Lecture

ANU Acknowledgment of Country

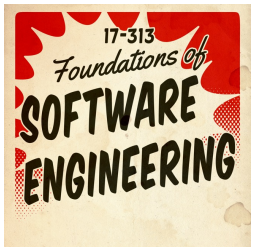
AIATSIS Explore Family history Collection Research Education What's new About Shop Search

"We acknowledge and celebrate the First Australians on whose traditional lands we meet, and pay our respect to the elders past and present."

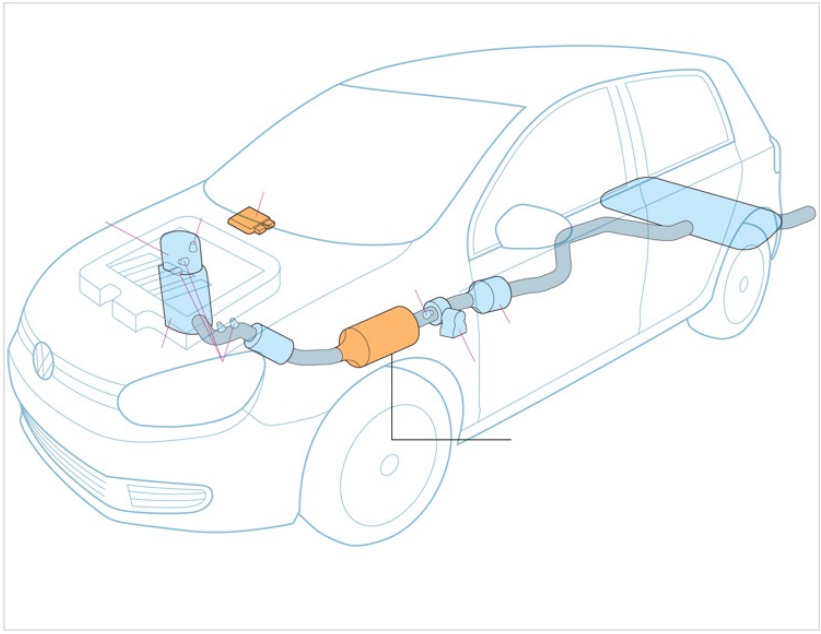


https://aiatsis.gov.au/explore/map-indigenous-australia

Volkswagen Scandal

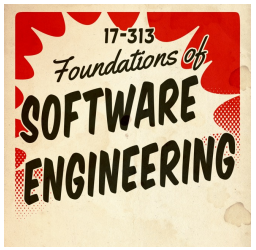


VW was caught cheating on emissions for Diesel engines



https://www.nytimes.com/interactive/2015/business/international/vw-diesel-emissions-scandal-explained.html?mtrref=www.google.com&assetType=REGIWALL

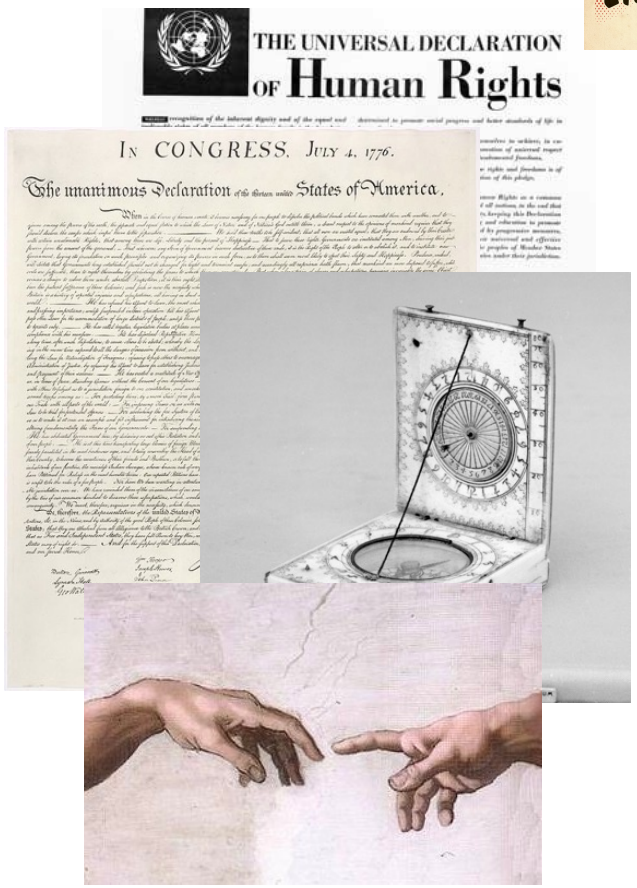
What is Human Flourishing?

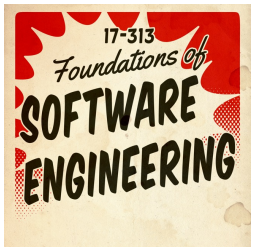


According to Harvard's Human flourishing program: Human flourishing is composed of five central domains: **happiness and life satisfaction, mental and physical health, meaning and purpose, character and virtue**, and **close social relationships**.

Why Human Flourishing?

- Universal Declaration of Human Rights: “All human beings are born free and equal in dignity and rights.”
- Declaration of Independence: “We hold these truths to be self-evident…”
- Internal Compass
- Faith





EA calls its loot boxes ‘surprise mechanics,’ says they’re used ethically

80

‘People like surprises,’ executive tells UK Parliament

By Ana Diaz | @AnaLikesPikachu | Jun 21, 2019, 9:10am EDT

SHARE

Domino's Would Rather Go to the Supreme Court Than Make Its Website Accessible to the Blind

Rather than developing technology to support users with disabilities, the pizza chain is taking its fight to the top

by Brenna Houck | @EaterDetroit | Jul 25, 2019, 6:00pm EDT

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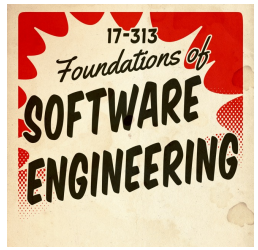


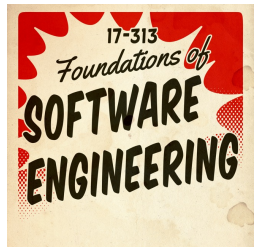
Some airlines may be using algorithms to split up families during flights

Your random airplane seat assignment might not be random at all.

By Aditi Shrikant | aditi@vox.com | Nov 27, 2018, 6:10pm EST

SHARE

Passengers boarding a Boeing aircraft of the low cost airline carrier Ryanair in Thessaloniki Macedonia Airport, Greece. | Nicolas Economou/NurPhoto/Getty Images



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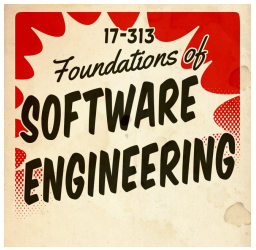
Lime halts scooter service in Switzerland after possible software glitch throws users off mid-ride

Ingrid Lunden @ingridlunden / 9:51 am EST • January 12, 2019

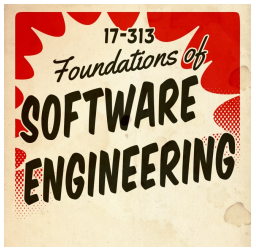
Comment



Currently, the AI portrait generator has been trained mostly on portraits of people of European ethnicity. We're planning to expand our dataset and fix this in the future. At the time of conceptualizing this AI, authors were not certain it would turn out to work at all. This is close to state of the art in AI at the moment.

Sorry for the bias in the meanwhile. Have fun!

324 Retweets **65** Quote Tweets **1,243** Likes



Uber self-driving car involved in fatal crash couldn't detect jaywalkers

The system had several serious software flaws, the NTSB said.

Steve Dent, @stevetdent
11.06.19 in Transportation

25
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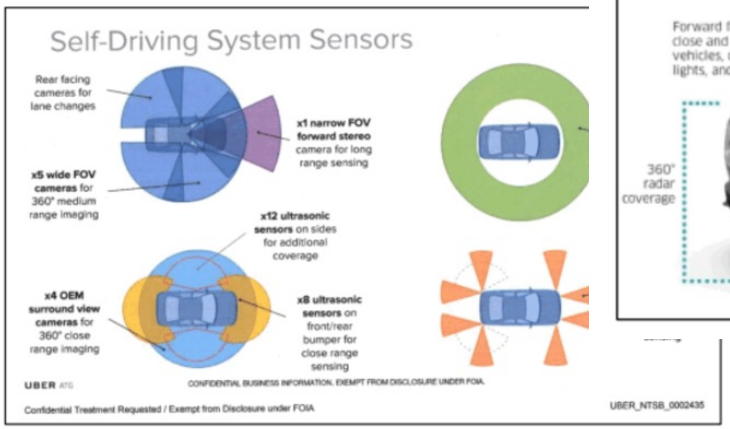
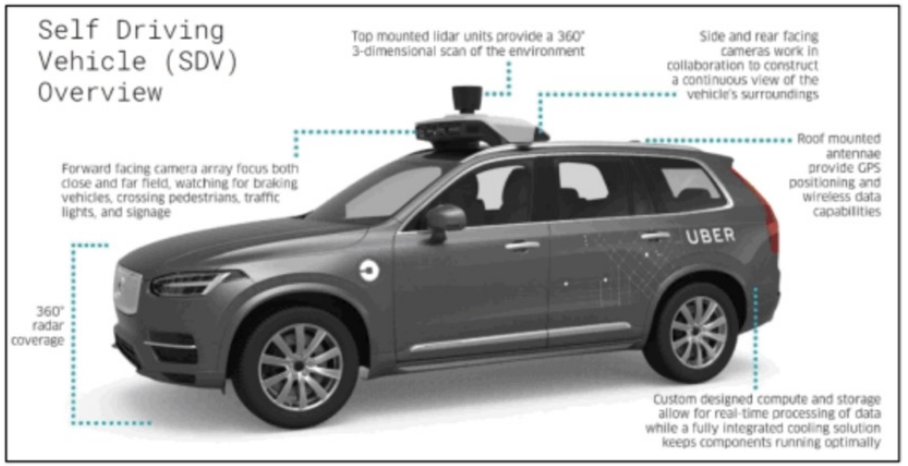
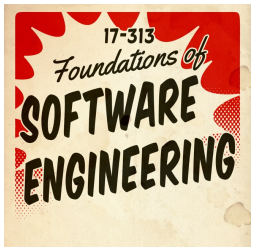




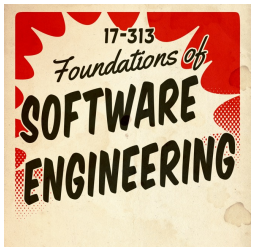
xing.com search for “Brand Strategist”



Search query	Work experience	Education experience	Profile views	Candidate	Xing ranking
Brand Strategist	146	57	12992	male	1
Brand Strategist	327	0	4715	female	2
Brand Strategist	502	74	6978	male	3
Brand Strategist	444	56	1504	female	4
Brand Strategist	139	25	63	male	5
Brand Strategist	110	65	3479	female	6
Brand Strategist	12	73	846	male	7
Brand Strategist	99	41	3019	male	8
Brand Strategist	42	51	1359	female	9
Brand Strategist	220	102	17186	female	10

Lahoti, Preethi, Krishna P. Gummadi, and Gerhard Weikum. “iFair: Learning Individually Fair Data Representations for Algorithmic Decision Making.” 2019 IEEE 35th International Conference on Data Engineering (ICDE) (2019

Twitter cropping photos



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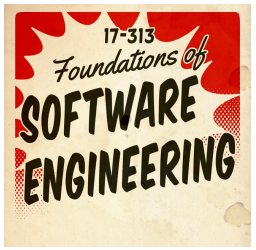
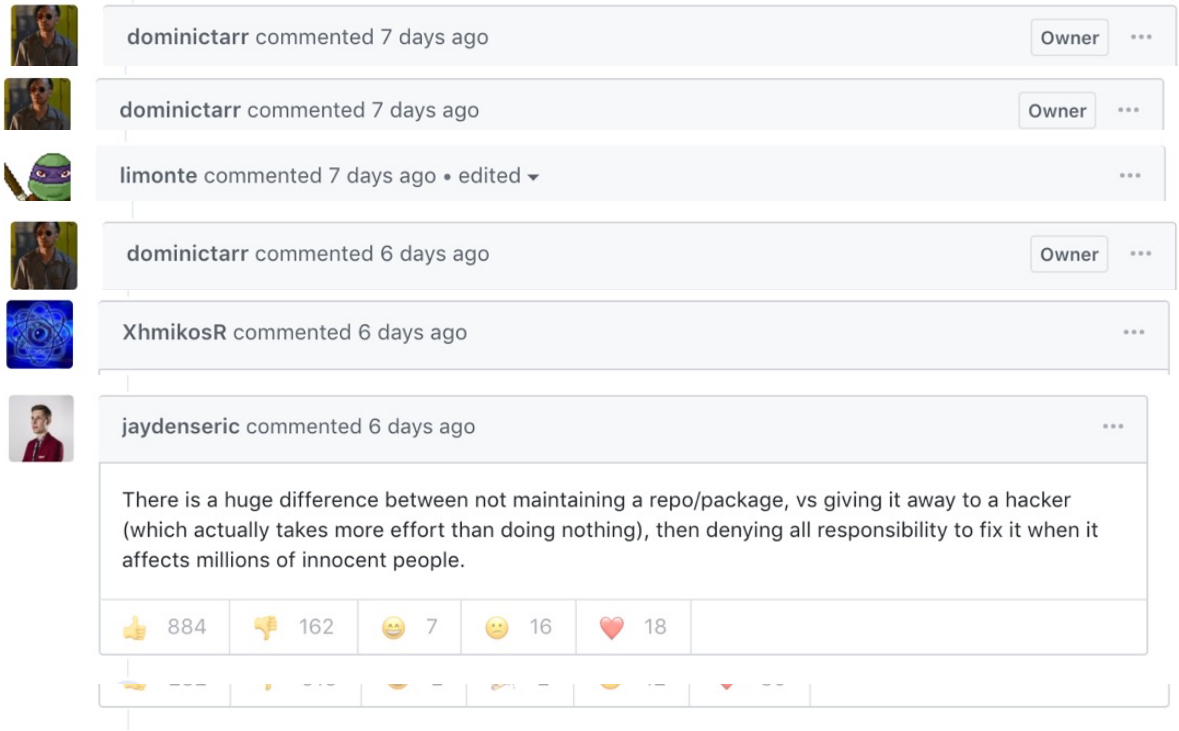
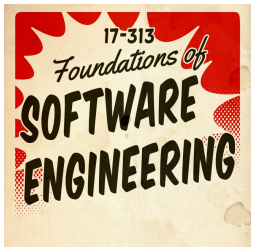
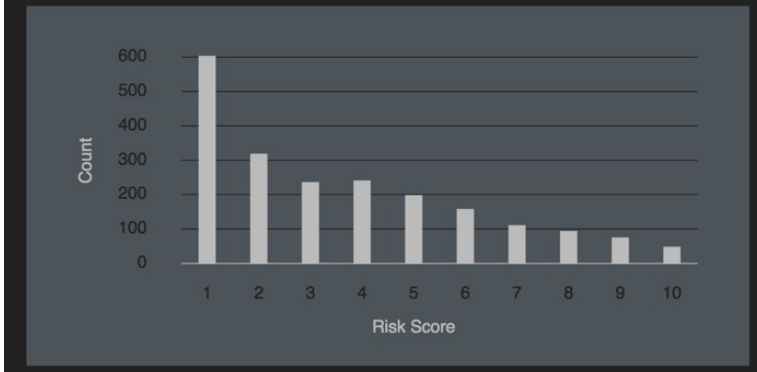


Open Source Maintainers

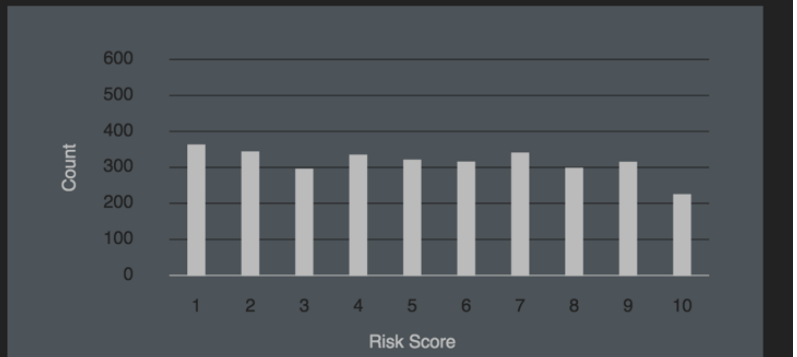




White Defendants' Risk Scores



Black Defendants' Risk Scores

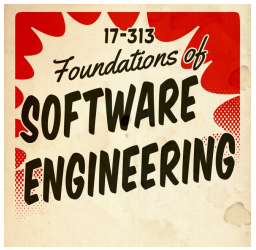


These charts show that scores for white defendants were skewed toward lower-risk categories. Scores for black defendants were not. *(Source: ProPublica analysis of data from Broward County, Fla.)*

Prediction Fails Differently for Black Defendants

	WHITE	AFRICAN AMERICAN
Labeled Higher Risk, But Didn't Re-Offend	23.5%	44.9%
Labeled Lower Risk, Yet Did Re-Offend	47.7%	28.0%

Algorithmic Bias



Algorithms affect:

Where we go to school

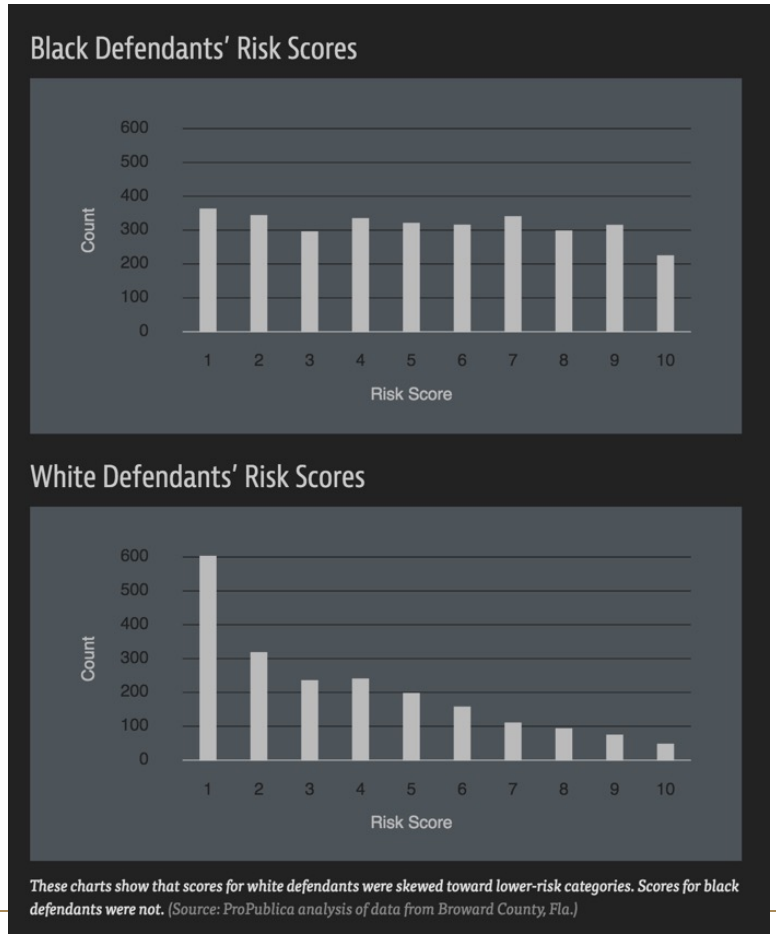
Access to money

Access to health care

Receiving parole

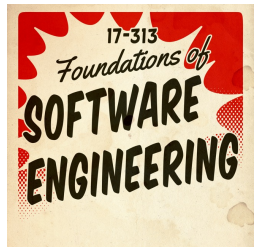
Possibility of Bail

Risk Scores



These charts show that scores for white defendants were skewed toward lower-risk categories. Scores for black defendants were not. (Source: ProPublica analysis of data from Broward County, Fla.)

Therac-25



Bug (race-condition) in software lead to at least 6 deaths

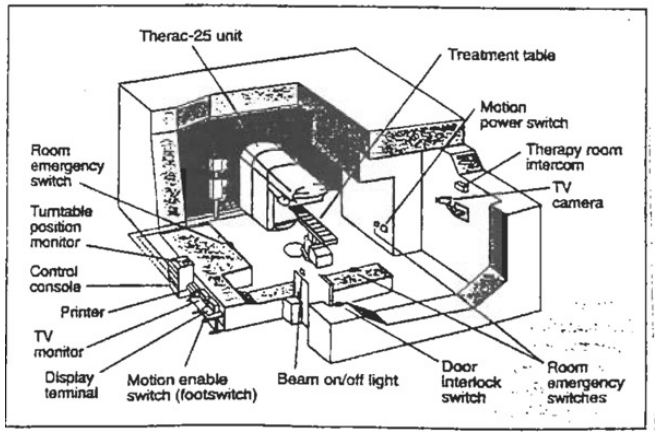
Traced to:

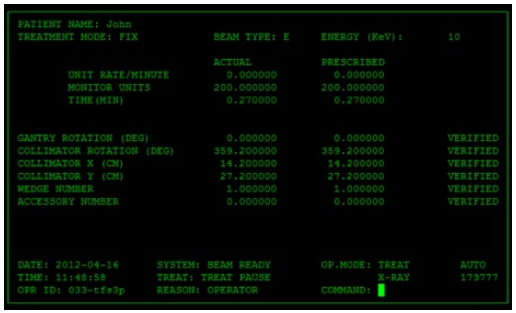
Lack of reporting bugs

Lack of proper due diligence

Engineers were overconfident, removed hardware locks

Race condition of 8 seconds could lead to problems





The New York Times

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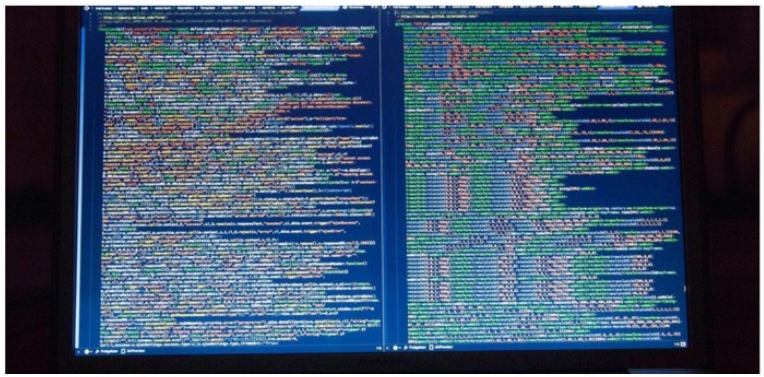
4,331 views | Oct 17, 2018, 06:13pm

We Need To Work Harder To Make Software Engineering More Ethical

Jessica Baron Contributor

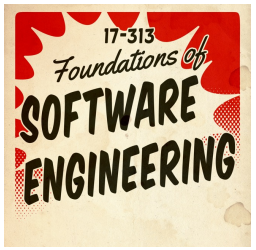
Consumer Tech

I write about the ethics of science and technology.



patch the software, but you can't patch a person if you, you know, damage someone's reputation." Sam Hodgson for The New York Times

ACM Code of Ethics



As an ACM member I will ....

Association for Computing Machinery

Contribute to society and human well-being.

Avoid harm to others.

Be honest and trustworthy.

Be fair and take action not to discriminate.

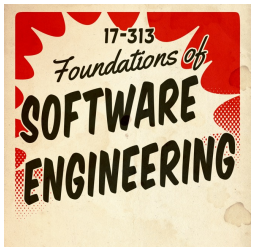
Honor property rights including copyrights and patent.

Give proper credit for intellectual property.

Respect the privacy of others.

Honor confidentiality.

Code of Ethics



Research shows that the code of ethics does not appear to affect the decisions made by software developers.

Does ACM's Code of Ethics Change Ethical Decision Making in Software Development?

Andrew McNamara
North Carolina State University
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ajmcnama@ncsu.edu

Justin Smith
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Emerson Murphy-Hill
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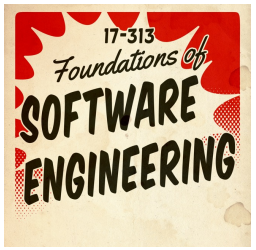
ABSTRACT

Ethical decisions in software development can substantially impact end-users, organizations, and our environment, as is evidenced by recent ethics scandals in the news. Organizations, like the ACM, publish codes of ethics to guide software-related ethical decisions. In fact, the ACM has recently demonstrated renewed interest in its code of ethics and made updates for the first time since 1992. To better understand how the ACM code of ethics changes software-

The first example is the Uber versus Waymo dispute [26], in which a software engineer at Waymo took self-driving car code to his home. Shortly thereafter, the engineer left Waymo to work for a competing company with a self-driving car business, Uber. When Waymo realized that their own code had been taken by their former employee, Waymo sued Uber. Even though the code was not apparently used for Uber's competitive advantage, the two companies settled the lawsuit for $245 million dollars.

Challenge:



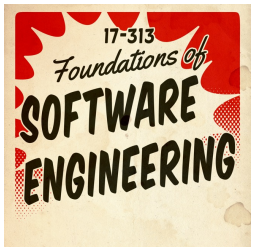
How do we apply ethics to a field (Software Engineering) that is changes so often?

Remember the Dominos case? The ADA law was written before the first website (1990)

To handle this uncertainty about the future, let's focus on three questions we can ask to remind ourselves to focus on promoting human flourishing.

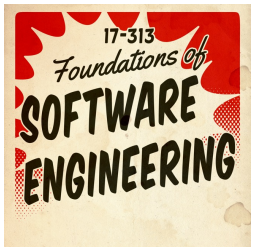
Three questions to promote human flourishing

1. Does my software respect the **humanity** of the **users**?
2. Does my software **amplify positive** behavior, or **negative** behavior for users and society at large?
3. Will my software's **quality** impact the **humanity** of others?



1.Does my software respect the **humanity** of the **users**?

Humane Design Guide
http://humanetech.com



Humane Design Guide (Alpha Version)

Use this worksheet to identify opportunities for Humane Technology.

Product or feature:
Value proposition:
Measure of success:

What are Human Sensitivities?

Human Sensitivites are instincts that are often vulnerable to new technologies.

Human Sensitivity	We are inhibited when	What inhibits	We are supported when	Opportunity to improve
Emotional What we feel in our body and in our physical health.	We are stressed, low on sleep, afraid or emotionally exhausted.	• Artificial scarcity • Urgency signalling • Constant monitoring • Optimizing for screentime	Design engenders calm, balance, safety, pauses and supports circadian rhythms.	High / Low
Attention How and where we focus our attention.	Attention is physiologically drawn, overwhelmed or fragmented.	• Constant context switching • Many undifferentiated choices • Fearful information • No stopping cues (e.g. infinite scroll) • Unnecessary movement	Enabled to bring more focus and mindfulness.	
Sensemaking How we integrate what we sense with what we know.	Information is fear-based, out of context, confusing, or manipulative.	• Facts out of context • Over-personalized filters • Equating virality with credibility • Deceptive authority (ads vs. content)	Enabled to consider, learn, express and feel grounded.	
Decisionmaking How we align our actions with our intentions.	Intentions and agency are not solicited nor supported.	• Avatars to convey authority • Stalking ads and messages • Push content models • Serving preference over intent	Enabled to gain agency, purpose, and mobilization of intent.	
Social Reasoning How we understand and navigate our personal relationships.	Status, relationships or self-image are manipulated.	• Quantified social status • Viral sharing • Implied obligation • Enabling impersonation	Enabled to connect more safely and authentically with others.	
Group Dynamics How we navigate larger groups, status, and shared understanding.	Excluded, divided or mobilized through fear.	• Suppressing views and nuance • Enabling ad hominem or hate speech • Enabling viral outrage • Lack of agreed-upon norms	Enabled to develop a sense of belonging and cooperation.	

[Center for Humane Technology] www.humanetech.com

Now rank the sensitivities 1-6 based on what you now see as the largest opportunities for Humane Design. Then use the second sheet to develop an action statement.

Humane Design Guide
http://humanetech.com

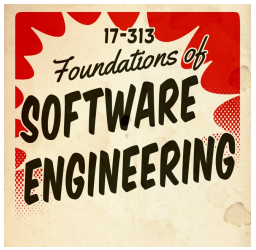
Provides a template for considering a piece of software, and asking questions to help us arrive at a “humane design”

Consider 6 human sensitivities: Emotional, Attention, Sense making, Decision making, Social Reasoning, and Group Dynamics

Human Sensitivity	We are inhibited when	What inhibits	We are supported when	Opportunity to improve
Attention How and where we focus our attention.	Attention is physiologically drawn, overwhelmed or fragmented.	• Constant context switching • Many undifferentiated choices • Fearful information • No stopping cues (e.g. infinite scroll) • Unnecessary movement	Enabled to bring more focus and mindfulness.	

Identify Opportunities to improve

Humane Design Guide
http://humanetech.com



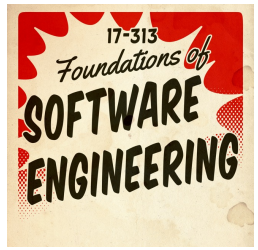
After analysis step, develop plan of action:

1. In what ways does your product/feature currently engage Human Sensitivities?

2. How might your product/feature support or elevate human sensitivities?

3. Action Statement

GenderMag
https://gendermag.org



Abby Jones[1]

You can edit anything in blue print

- 28 years old
- Employed as an Accountant
- Lives in Cardiff, Wales

Abby has always liked music. When she is on her way to work in the morning, she listens to music that spans a wide variety of styles. But when she arrives at work, she turns it off, and begins her day by scanning all her emails first to get an overall picture before answering any of them. (This extra pass takes time but seems worth it.) Some nights she exercises or stretches, and sometimes she likes to play computer puzzle games like Sudoku

Background and skills

Abby works as an accountant. She is comfortable with the technologies she uses regularly, but she just moved to this employer 1 week ago, and their software systems are new to her.

Abby says she's a "numbers person", but she has never taken any computer programming or IT systems classes. She likes Math and knows how to think with numbers She writes and edits spreadsheet formulas in her work.

In her free time, she also enjoys working with numbers and logic. She especially likes working out puzzles and puzzle games, either on paper or on the computer

Motivations and Attitudes

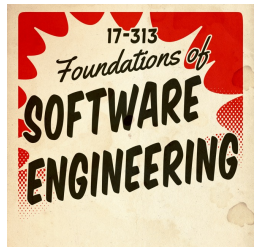
- ***Motivations***: Abby uses technologies to accomplish her tasks. She learns new technologies if and when she needs to, but prefers to use methods she is already familiar and comfortable with, to keep her focus on the tasks she cares about.
- ***Computer Self-Efficacy***: Abby has low confidence about doing unfamiliar computing tasks. If problems arise with her technology, she often blames herself for these problems. This affects whether and how she will persevere with a task if technology problems have arisen.
- ***Attitude toward Risk:*** Abby's life is a little complicated and she rarely has spare time. So she is risk averse about using unfamiliar technologies that might need her to spend extra time on them, even if the new features might be relevant. She instead performs tasks using familiar features, because they're more predictable about what she will get from them and how much time they will take.

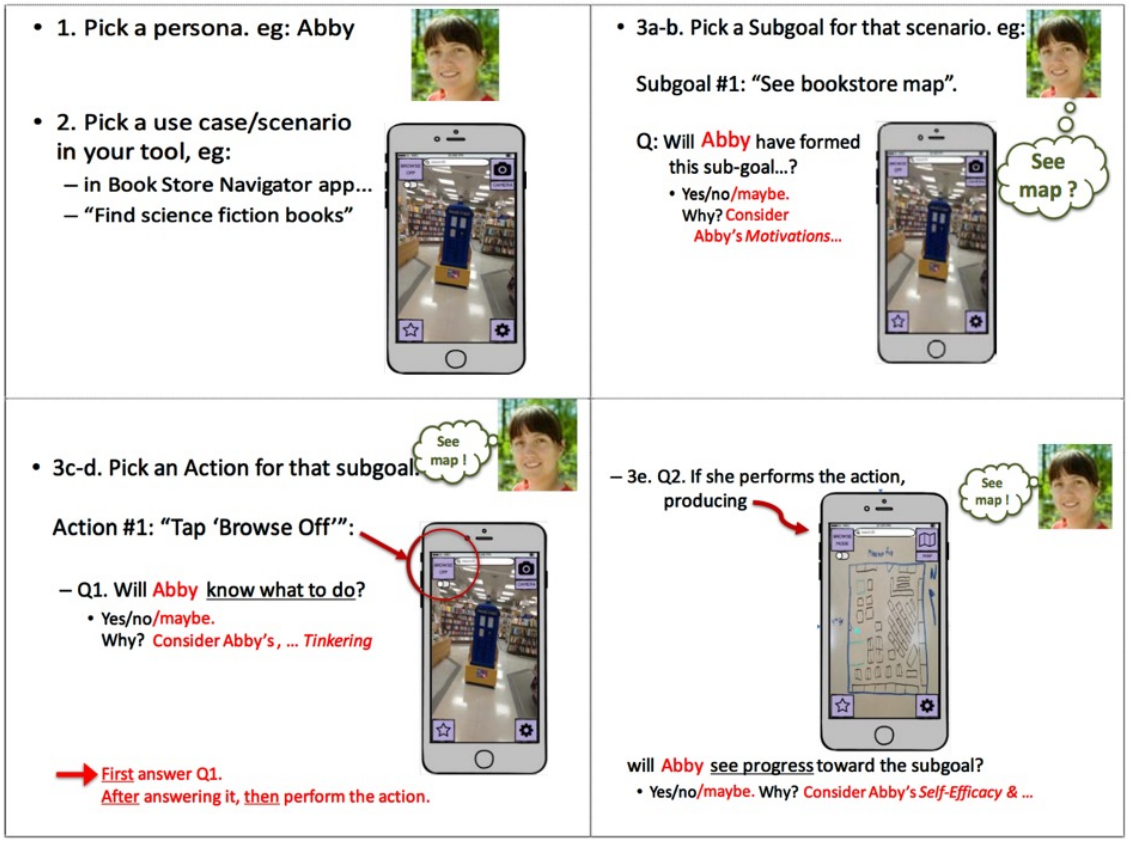
How Abby Works with Information and Learns:

- ***Information Processing Style:*** Abby tends towards a *comprehensive information processing style* when she needs to more information. So, instead of acting upon the first option that seems promising, she gathers information comprehensively to try to form a complete understanding of the problem before trying to solve it. Thus, her style is "burst-y"; first she reads a lot, then she acts on it in a batch of activity.
- ***Learning: by Process vs. by Tinkering***: When learning new technology, Abby leans toward process-oriented learning, e.g., tutorials, step-by-step processes, wizards, online how-to videos, etc. She doesn't particularly like learning by tinkering with software (i.e., just trying out new features or commands to see what they do), but when she does tinker, it has positive effects on her understanding of the software.

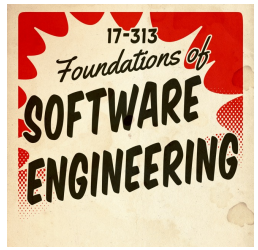
[1]Abby represents users with motivations/attitudes and information/learning styles similar to hers. For data on females and males similar to and different from Abby, see http://eusesconsortium.org/gender/gender.php

GenderMag
https://gendermag.org



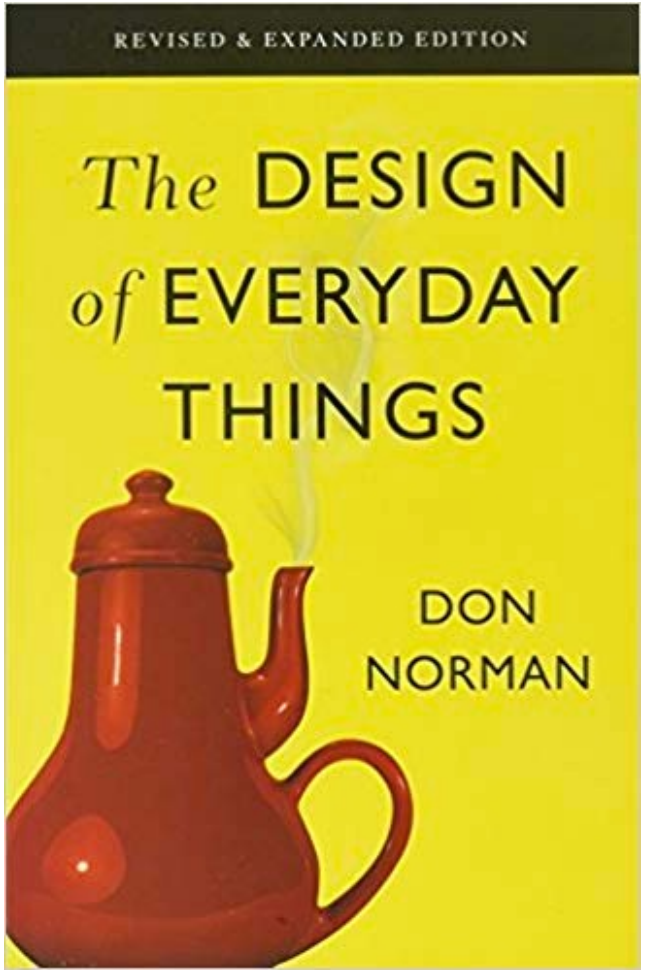


User Centered Design

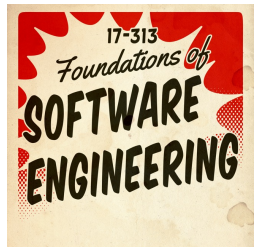


User-centered design tries to optimize the product around how **users can, want, or need to use the product**, rather than forcing the users to change their behavior to **accommodate the product.**

-Wikipedia

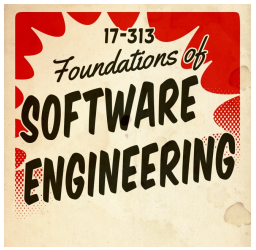


Agile



User Centered Design

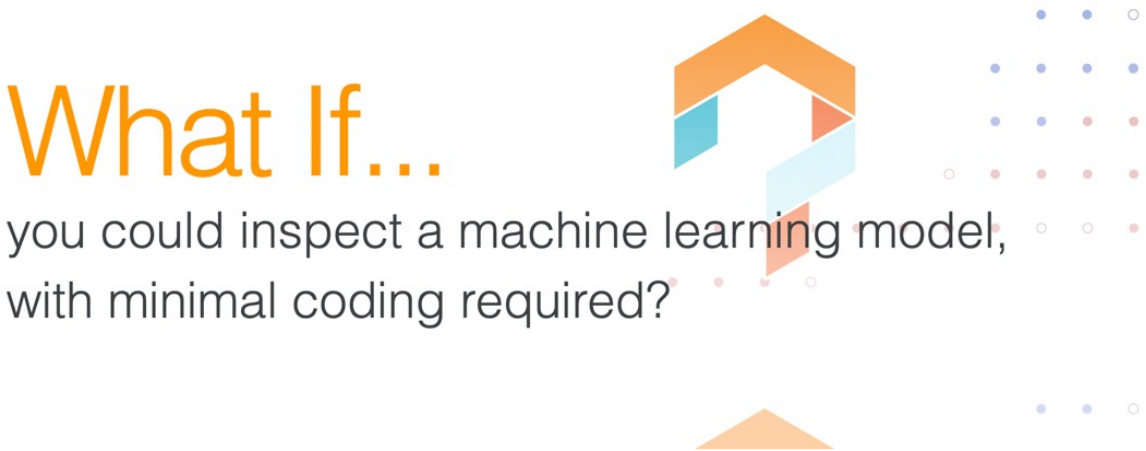
Agile customer representative



2.Does my software **amplify positive** or **negative** behavior for users and society at large?

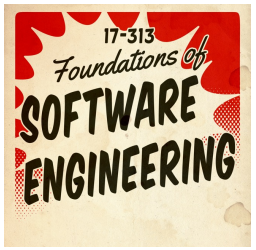
What if...

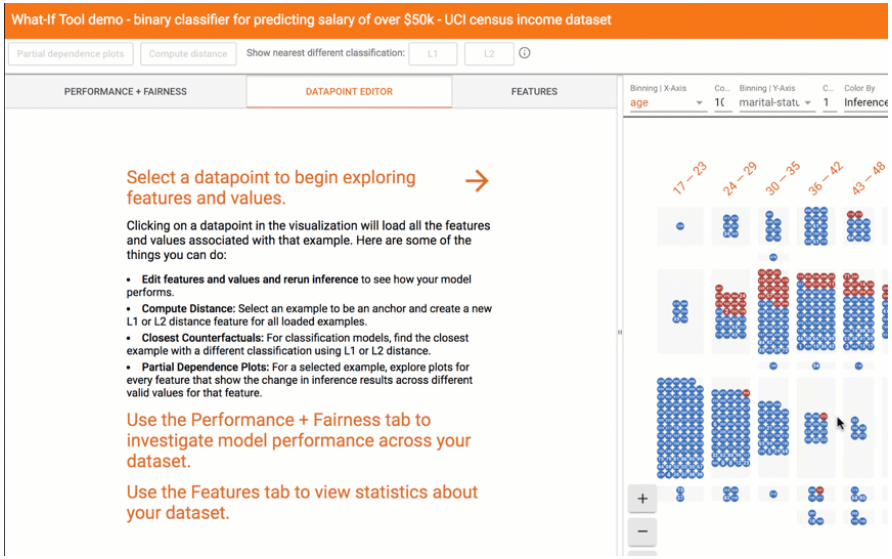
https://pair-code.github.io/what-if-tool/



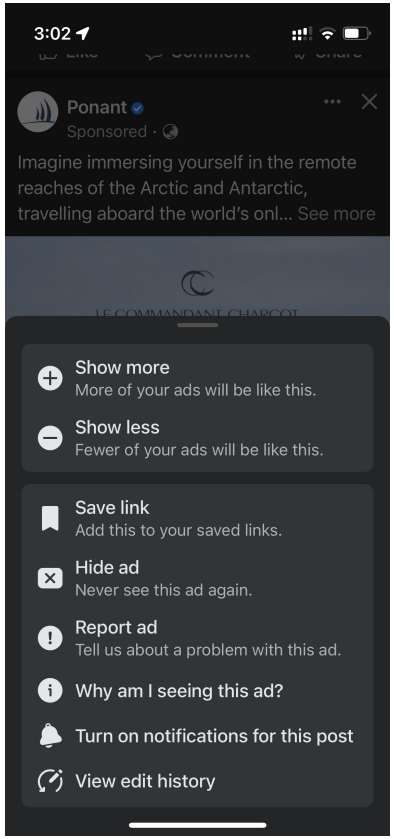
What if...

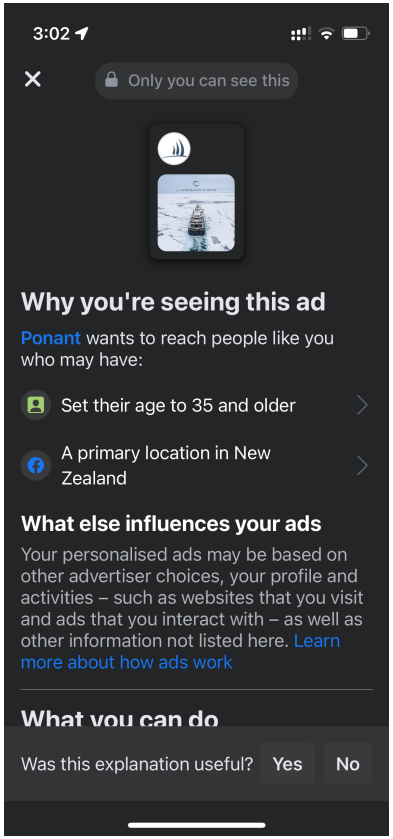
https://pair-code.github.io/what-if-tool/

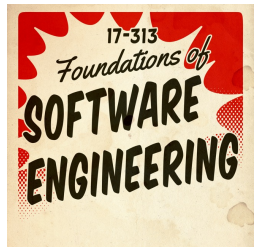


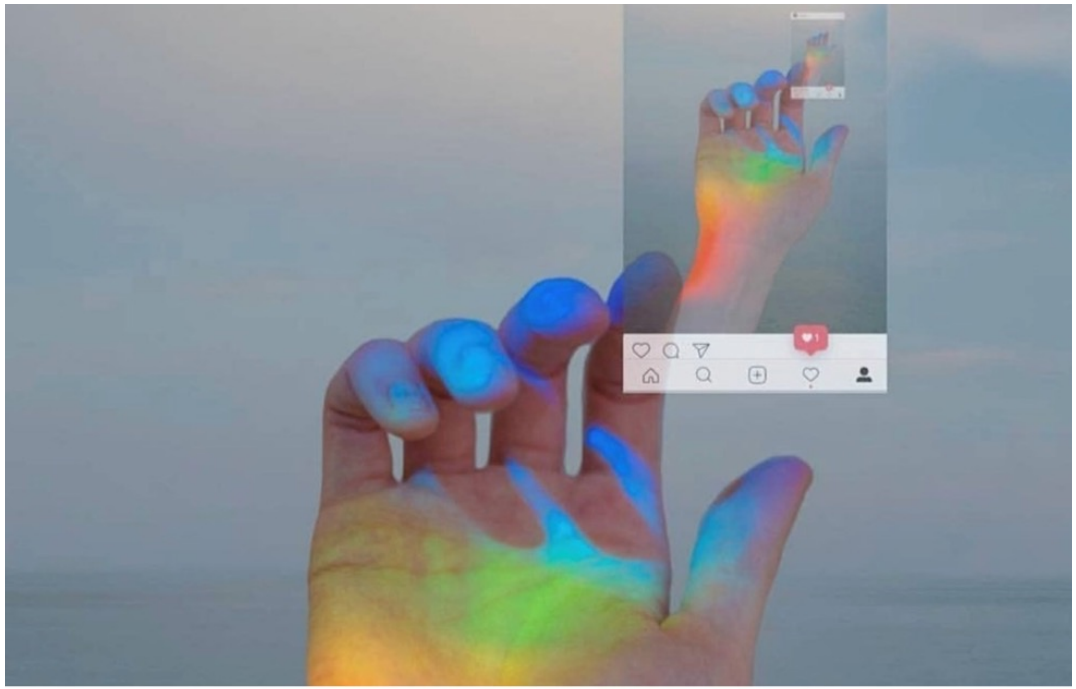


Explain “why” to customers









@dovneon

What Instagram removing likes may mean for influencers and our self-esteem

SCIENCE & TECH - FEATURE

The decision could have a positive impact on the way people use the platform, but harm those trying to use it professionally

Anil Dash on how to prevent abuse

http://anildash.com/2011/07/20/if_your_websites_full_of_assholes_its_your_fault-2/

You should have real humans dedicated to monitoring and responding to your community.

You should have community policies about what is and isn't acceptable behavior.

Your site should have accountable identities.

You should have the technology to easily identify and stop bad behaviors.

You should make a budget that supports having a good community, or you should find another line of work.

Deon
https://github.com/drivendataorg/deon

deon

tests passing | codecov 97% | pypi v0.2.2 | conda-forge v0.2.2

> Read more about `deon` on the project homepage

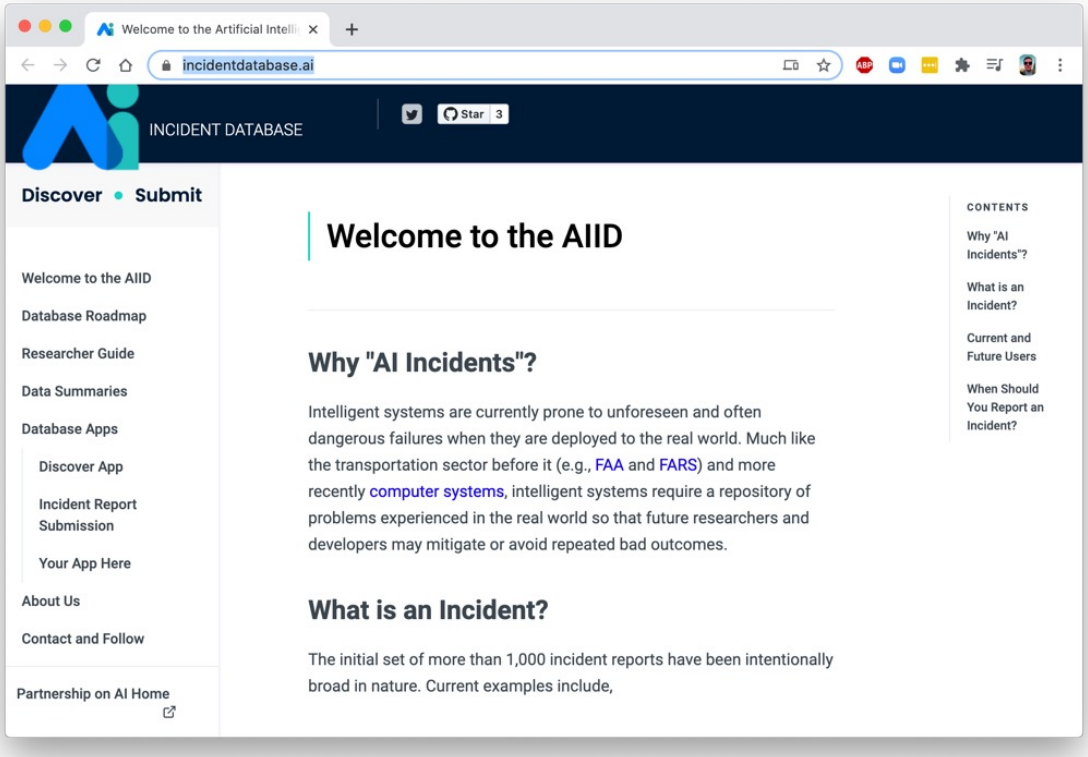
An ethics checklist for data scientists

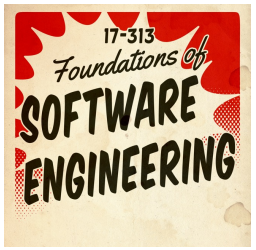
`deon` is a command line tool that allows you to easily add an ethics checklist to your data science projects. We support creating a new, standalone checklist file or appending a checklist to an existing analysis in many common formats.

δέον • (déon) [n.] (*Ancient Greek*) wikitionary

> Duty; that which is binding, needful, right, proper.

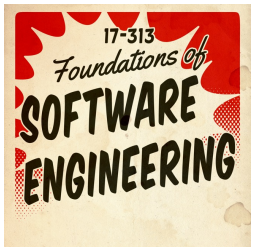
AI Incident Database





3. Will my software's **quality** impact the **humanity** of others?

Quality has long been considered



Quality attributes [edit]

Notable quality attributes include:

- accessibility
- accountability
- accuracy
- adaptability
- administrability
- affordability
- agility [Tol] (see Common Subsets below)
- auditability
- autonomy [Erl]
- availability
- compatibility
- composability [Erl]
- configurability
- correctness
- credibility
- customizability
- debugability
- degradability
- determinability
- demonstrability
- dependability
- deployability
- discoverability [Erl]
- distributability
- durability
- effectiveness
- efficiency
- evolvability
- extensibility
- failure transparency
- fault-tolerance
- fidelity
- flexibility
- inspectability
- installability
- integrity
- interchangeability
- interoperability [Erl]
- learnability
- localizability
- maintainability
- manageability
- mobility
- modifiability
- modularity
- observability
- operability
- orthogonality
- portability
- precision
- predictability
- process capabilities
- producibility
- provability
- recoverability
- relevance
- reliability
- repeatability
- reproducibility
- resilience
- responsiveness
- reusability [Erl]
- robustness
- safety
- scalability
- seamlessness
- self-sustainability
- serviceability (a.k.a. supportability)
- securability
- simplicity
- stability
- standards compliance
- survivability
- sustainability
- tailorability
- testability
- timeliness
- traceability
- transparency
- ubiquity
- understandability
- upgradability
- vulnerability
- usability

Engineering ethics.

Ethics applies and is formalized in many professional fields: medical, legal, business, and engineering.

The first codes of engineering ethics were formally adopted by American engineering societies in 1912-1914. In 1946 the National Society of Professional Engineers (NSPE) adopted their first formal Canons of Ethics.

https://www.engineersaustralia.org.au/publications/code-ethics

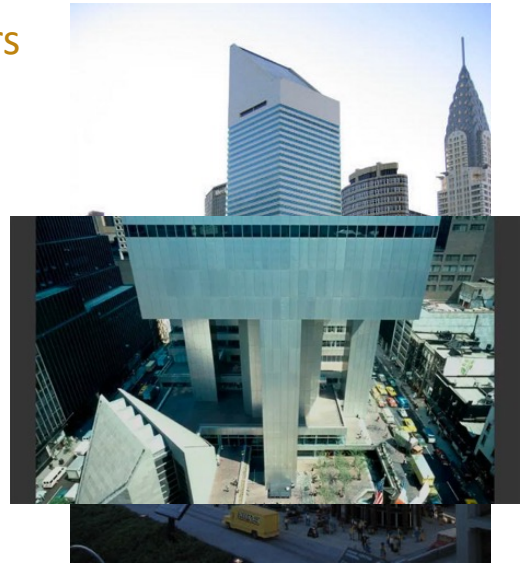
“hold paramount safety, health and welfare of the public”

Citigroup Center, Designed by Structural engineer William LeMessurier

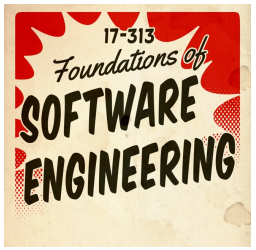
Followed calculations required by building codes

Civil Engineering student Diane Hartley realized there was a problem

Tests showed that winds needed to bring it down would happen every 55 years



Professional Ethics



Professional ethics encompass the personal, and corporate standards of behavior expected by professionals.

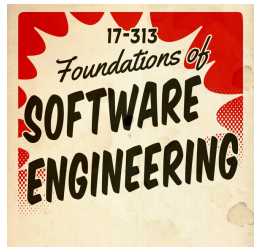
First three “professions”

-Divinity

-Law

-Medicine

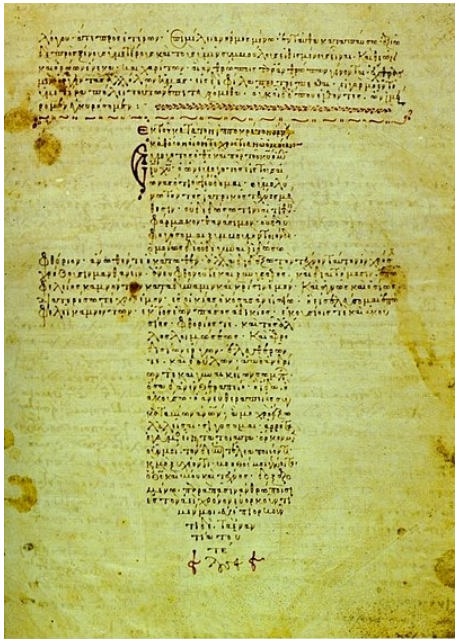
Medicine - Intrinsic



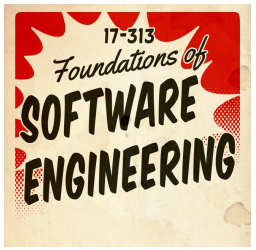
Hippocratic Oath

~450BC

“Do no Harm”



Law -Extrinsic

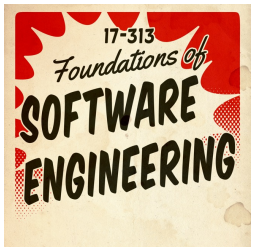


Bar regulates behavior

Oath to follow rules

Malpractice

Legal Malpractice



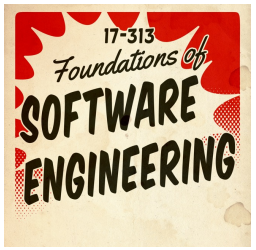
Not every mistake is legal malpractice. For malpractice to exist:

Attorney must handle a case inappropriately

due to negligence or with intent to harm

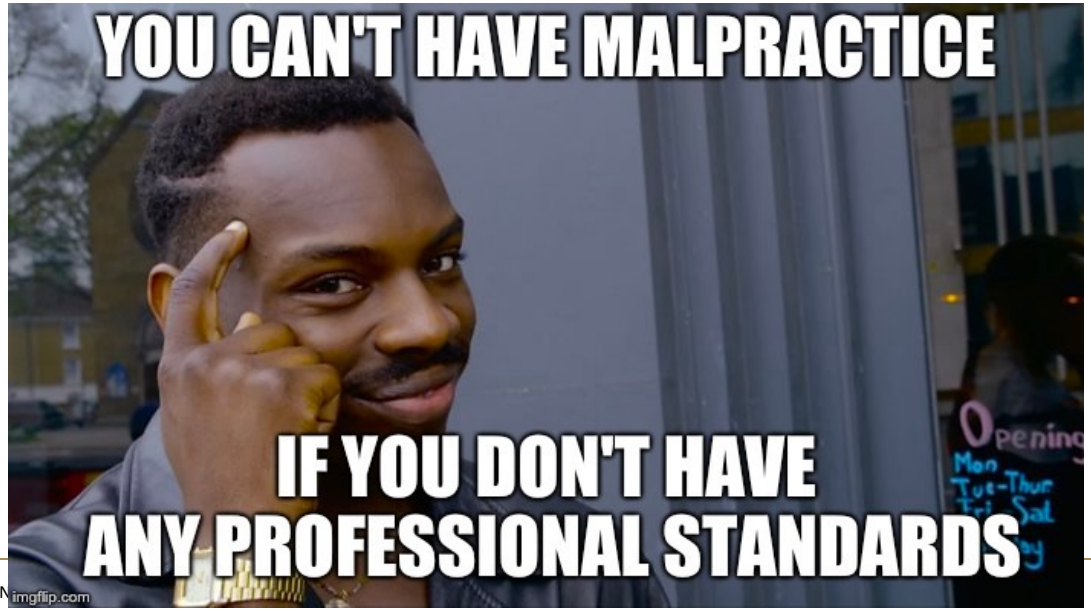
And cause damages to a client

Malpractice vs. Negligence

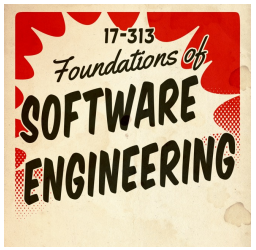


Negligence is a failure to exercise the care that a **reasonably prudent person** would exercise in like circumstances.

Malpractice is a type of negligence; it is often called "professional negligence". It occurs when a **licensed professional** (like a doctor, lawyer or accountant) fails to provide services as per the **standards set by the governing body** ("standard of care"), subsequently causing harm to the plaintiff.

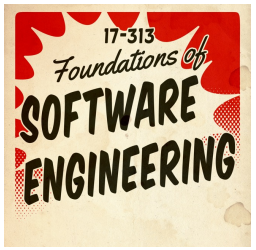


Bioengineering Ethics:



- Respect for Autonomy
- Beneficence
- Nonmaleficence
- Justice

Professional Engineers

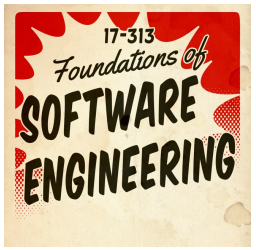


What {is / could be} the role of **professional engineers** in software?

https://en.wikipedia.org/wiki/Engineer%27s_Ring

By ----PCStuff 03:47, 31 July 2006 (UTC), CC BY-SA 2.5,
https://commons.wikimedia.org/w/index.php?curid=10340855

Will software quality impact human flourishing?



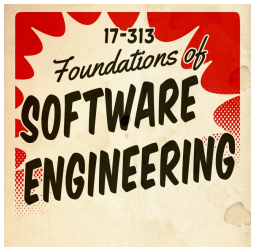
Most traditional emphasis of “engineering ethics”

What can we learn from other professions?

Should software have ”Professional Engineers”?

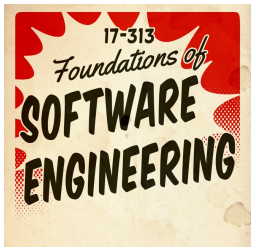
How do we define “safety critical systems”?

How much testing is enough? How can we convince others to do that much testing?



These questions are the **start** of the **conversation**, but as technology evolves, we must be **vigilant** to ensure we are promoting human flourishing

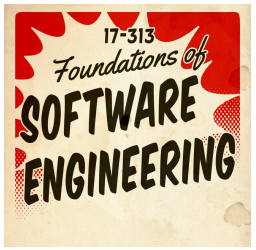
Three questions to promote human flourishing



1. Does my software respect the **humanity** of the **users**?
2. Does my software **amplify positive** behavior, or **negative** behavior for users and society at large?
3. Will my software's **quality** impact the **humanity** of others?

https://www.ted.com/talks/kevin_slavin_how_algorithms_shape_our_world?language=en

Key Points



- Awareness of ethical issues in software engineering
- Reflection on decision making
- Questions to ask when evaluating the ethics of software
- Starting points to dig deeper