

Lecture 7: Risk and Mistakes

17-313 Fall 2022

Learning Goals

- Learn to discuss risk in a project
- Strategize about ways to mitigate risk
- Learn to get early feedback to reduce risk
- Find ways to catch our technical errors

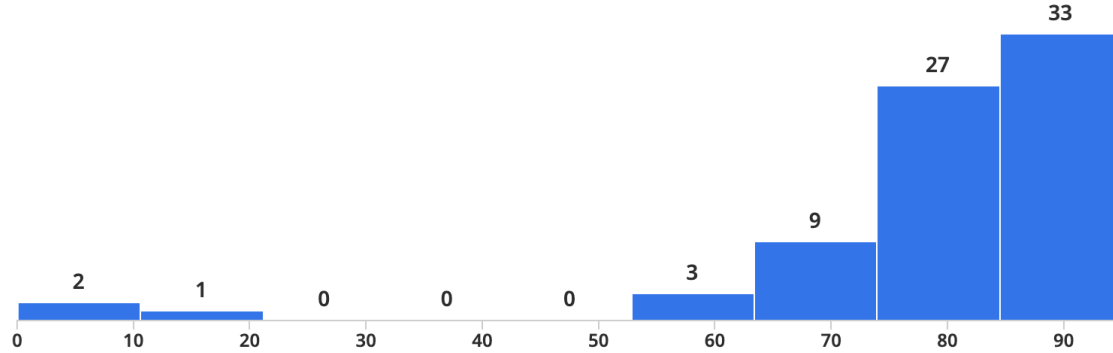
Administrivia

- Reminder: HW2 presentation in recitation
- Participation activity: Teamwork Self-Assesement
- Repos will be public for HW 3
- HW 1 Grades Posted
- Statue of limitations for HW regrades is 1 week
- Participation activity to prepare for Class Thursday. Bring your laptop on Thursday.

HW 1 Grades

Review Grades for P1 Written Assignment

● Grades Published



Minimum

0.0

Median

83.0

Maximum

95.0

Mean

80.08

Std Dev [?](#)

17.8

Risk

Risk

 **Tony Webster** 
@webster Follow 

I appreciate the honesty.

Pick a password

Don't reuse your bank password, we didn't spend a lot on security for this app.
At least 6 characters

Continue

8:20 PM - 15 Sep 2018

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 58  5.9K  16K 

Definition: Risk

Risk is a measure of the potential inability to achieve overall program objectives within defined cost, schedule, and technical constraints.



Risk is defined by two key components



The probability (or likelihood) of failing to achieve a particular outcome



The consequences (or impact) of failing to achieve that outcomes

Internal vs. External Risk



Risks that we **can** control



Risks that we **cannot** control

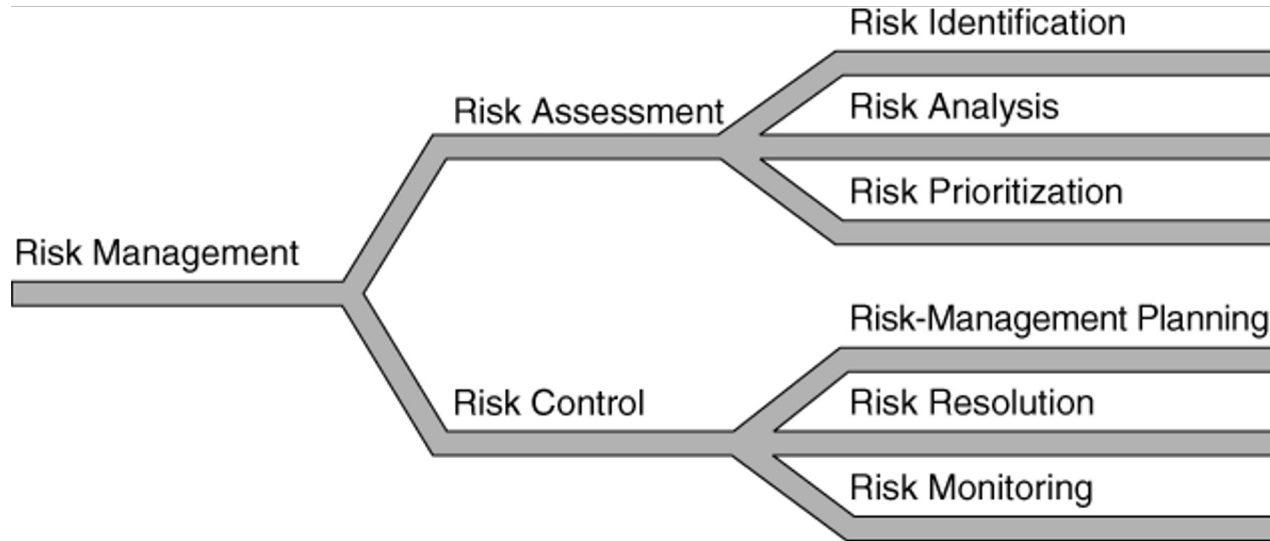
Levels of Risk Management

1. **Crisis management:** Fire fighting; address risks only after they have become problems.
2. **Fix on failure:** Detect and react to risks quickly, but only after they have occurred.
3. **Risk mitigation:** Plan ahead of time to provide resources to cover risks if they occur, but do nothing to eliminate them in the first place.
4. **Prevention:** Implement and execute a plan as part of the software project to identify risks and prevent them from becoming problems.
5. **Elimination of root causes:** Identify and eliminate factors that make it possible for risks to exist at all.

Levels of Risk Management

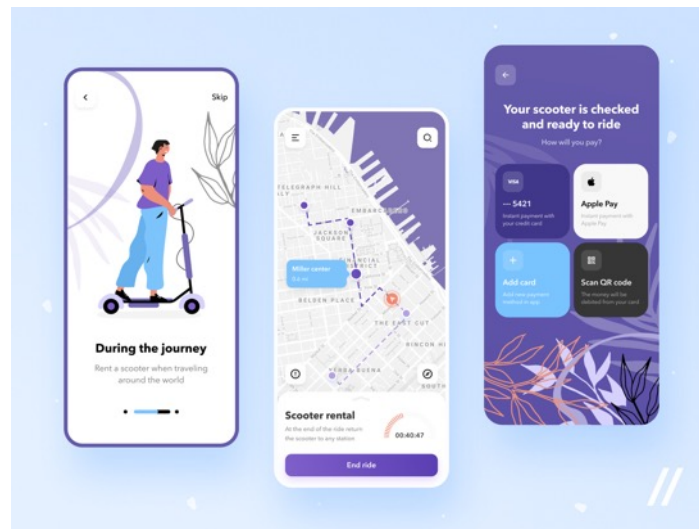
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Risk Management



Team Exercise: Risk Identification

- What risks exist for your scooter app?



Risk assessment matrix



TABLE III. Risk assessment matrix

RISK ASSESSMENT MATRIX				
SEVERITY PROBABILITY	Catastrophic (1)	Critical (2)	Marginal (3)	Negligible (4)
Frequent (A)	High	High	Serious	Medium
Probable (B)	High	High	Serious	Medium
Occasional (C)	High	Serious	Medium	Low
Remote (D)	Serious	Medium	Medium	Low
Improbable (E)	Medium	Medium	Medium	Low
Eliminated (F)	Eliminated			

Aviation failure impact categories

- **No effect** – failure has no impact on safety, aircraft operation, or crew workload
- **Minor** – failure is noticeable, causing passenger inconvenience or flight plan change
- **Major** – failure is significant, causing passenger discomfort and slight workload increase
- **Hazardous** – high workload, serious or fatal injuries
- **Catastrophic** – loss of critical function to safely fly and land

Risk Analysis

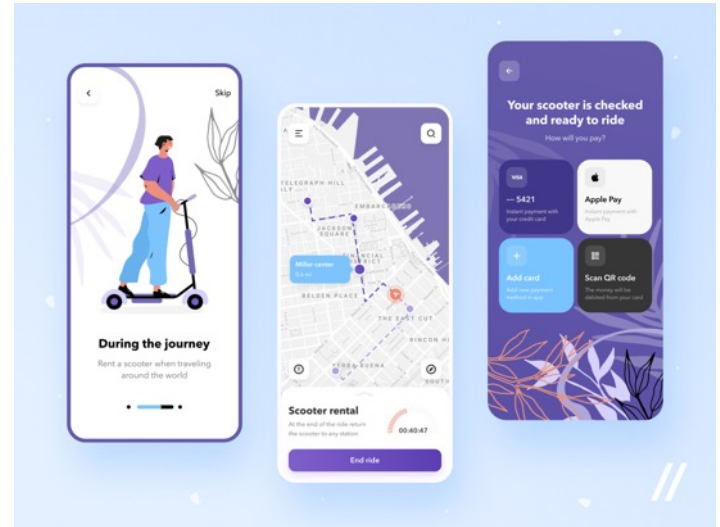
Risk	Probability (%)	Size of Loss (weeks)	Risk Exposure (weeks)
Overly optimistic schedule	50%	5	2.5
Additional features added by marketing (specific features unknown)	35%	8	2.8
Project approval takes longer than expected	25%	4	1.0
Management-level progress reporting takes more developer time than expected	10%	1	0.1
New programming tools do not produce the promised savings	30%	5	1.5
...
Total			12

Risk Analysis Estimations

- Size of Loss
 - Use consensus-based approaches that we discussed in previous lecture
- Probability
 - **This is much harder to estimate!**
 - Use a group-consensus approach (e.g., Planning Poker)
 - Use adjective calibration: Label each risk as “Very likely”, “Likely”, “Somewhat likely”, “Unlikely”, then convert labels into approximate quantitative values.

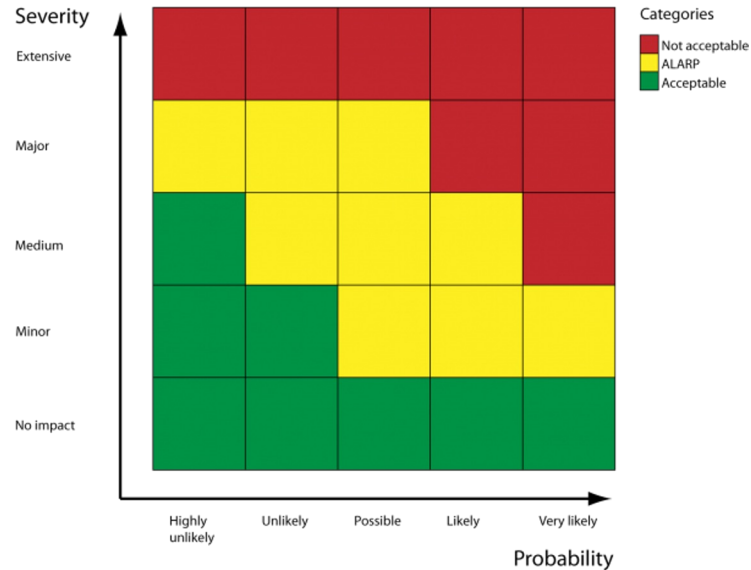
Exercise: Risk Analysis

- What is the risk severity for your scooter app?



Risk Prioritization

Focus on risks with the highest exposure



Risk Control

- What steps can be taken to avoid or mitigate the risk?
- Can you better understand and forecast the risk?
- Who will be responsible for monitoring and addressing the risk?
- Have risks evolved over time?
- Bake risks into your schedule
 - Don't assume that nothing will go wrong between now and the end of the semester!

DECIDE Model



Detect that the action necessary

Estimate the significance of the action

Choose a desirable outcome

Identify actions needed in order to achieve the chosen option

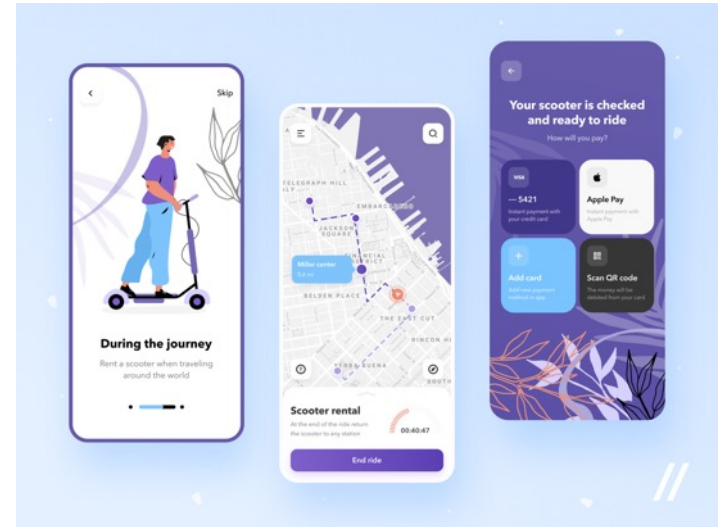
Do the necessary action to achieve change

Evaluate the effects of the action

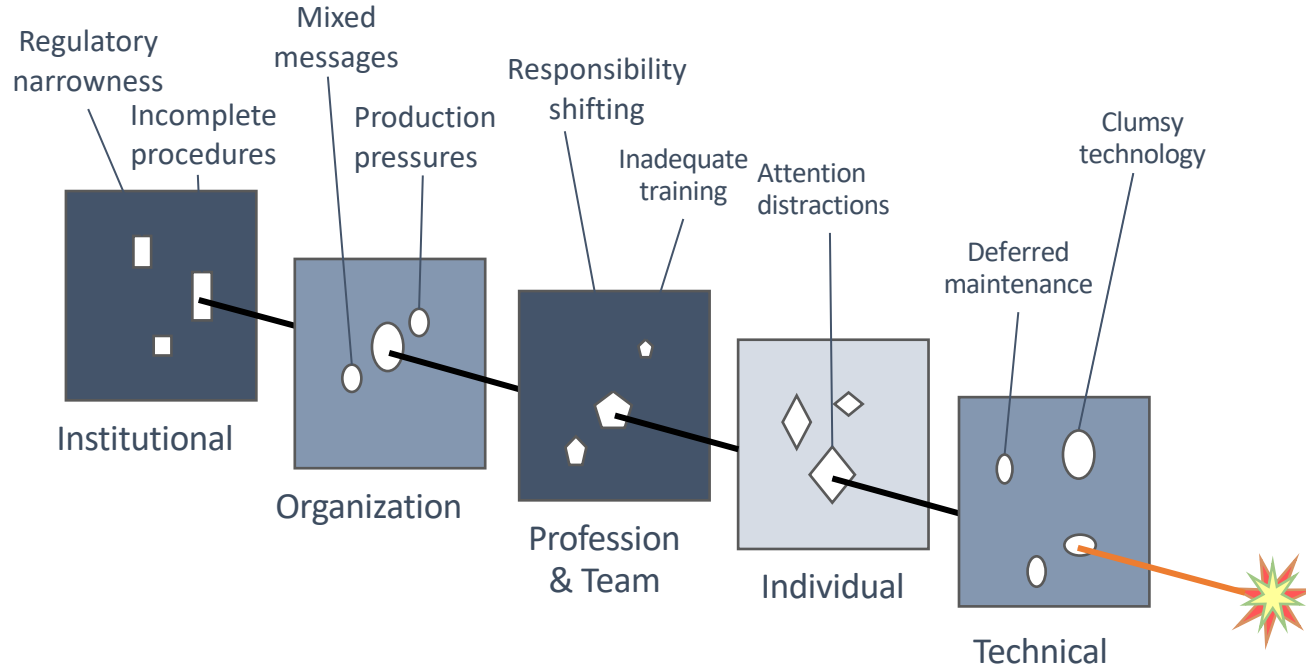
https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/media/FAA-H-8083-2.pdf

Discussion: Risk Elimination and Mitigation

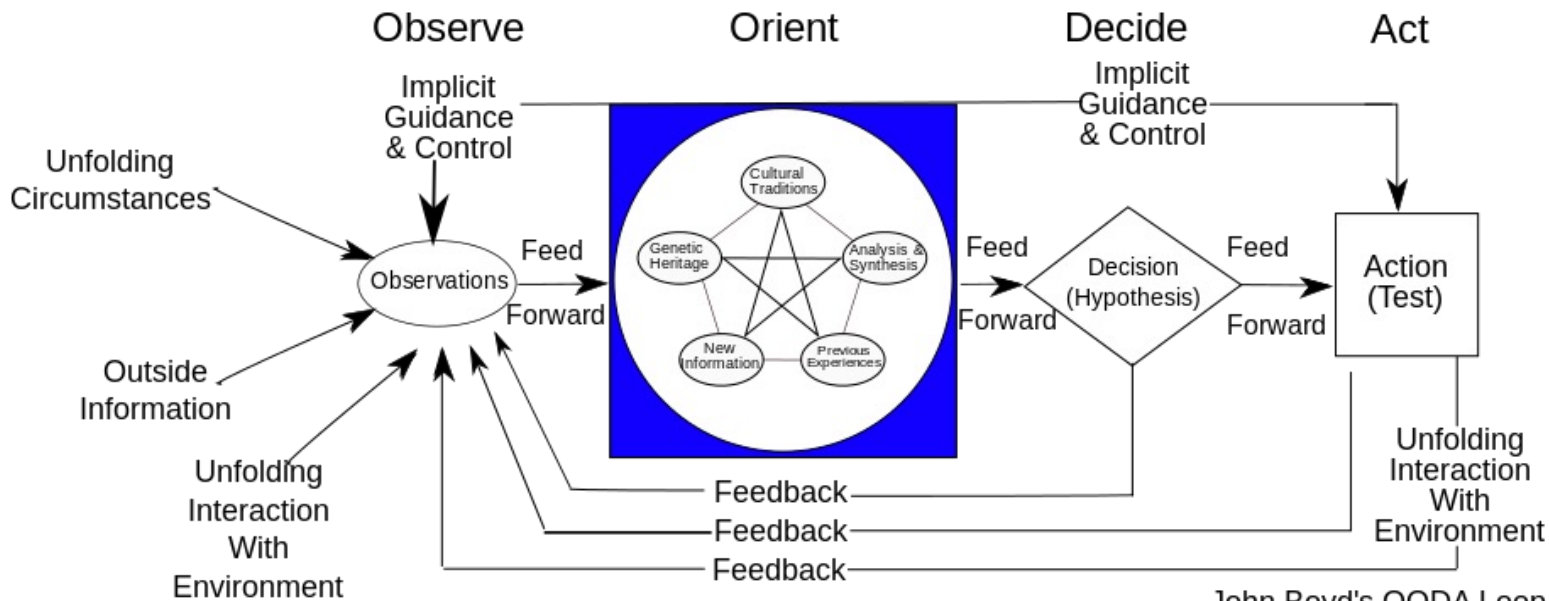
- How can you eliminate/mitigate risk for your scooter app?



The Swiss cheese model



OODA Loop



John Boyd's OODA Loop

By Patrick Edwin Moran - Own work, CC BY 3.0,
<https://commons.wikimedia.org/w/index.php?curid=3904554>

No matter what you do

- Some idiots won't follow your rules 😊



Pre-mortems

- "unlike a typical critiquing session, in which project team members are asked what *might* go wrong, the premortem operates on the assumption that the 'patient' has died, and so asks what *did* go wrong."

Project Management

Performing a Project Premortem

by Gary Klein

From the Magazine (September 2007)



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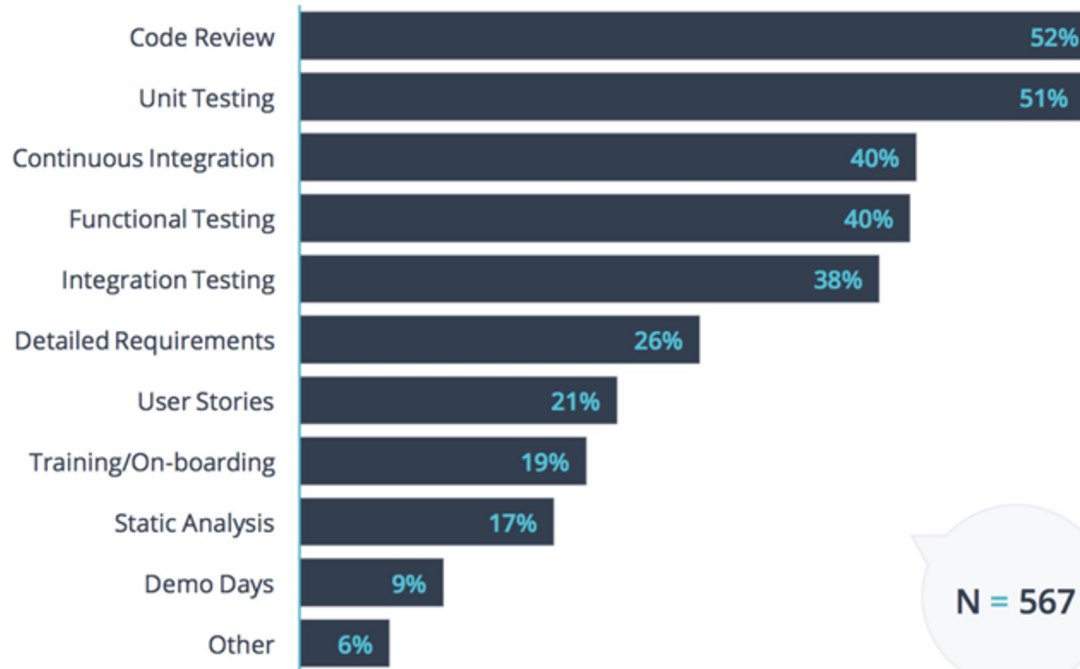


Print

Summary. Reprint: F0709A In a premortem, team members assume that the project they are planning has just failed—as so many do—and then generate plausible reasons for its demise. Those with reservations may speak freely at the outset, so that the project can be... **more**

What are things that can go wrong?

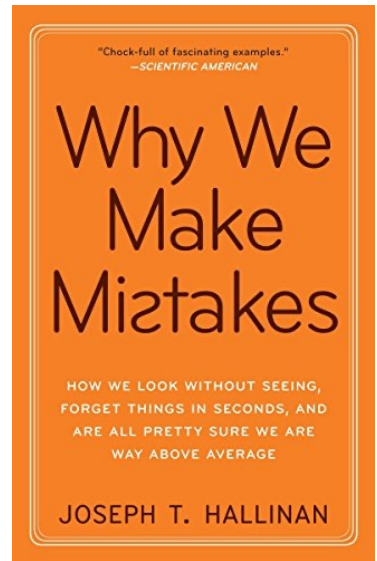
What do you believe is the number one thing a company can do to improve code quality?



N = 567

[State of Code Review 2017]

Why do we make mistakes?



Generalization

- ...in the words of psychologist Tom Stafford, we can't find our typos because we're engaging in a high-level task in writing. **Our brains generalize simple, component parts to focus on complex tasks**, so essentially we can't catch the small details because we're focused on a large task.

<https://medium.com/swlh/why-we-miss-our-own-typos-96ab2f06afb7>

Boredom can give rise to errors, adverse patient events, and decreased productivity—costly and unnecessary outcomes for consumers, employees, and organizations alike. As a function of boredom, individuals may feel over-worked or under-employed, and become distracted, stressed, or disillusioned. Staff who are bored also are less likely to engage with or focus on their work.

The screenshot shows a research article page. At the top, it says 'Original Articles'. The title is 'Boredom in the Workplace: Reasons, Impact, and Solutions'. The authors are Michelle Cleary, PhD, RN, Jan Sayers, PhD, RN, Violeta Lopez, PhD, RN & Catherine Hungerford, PhD, RN. The page number is 83-89. It was received on 24 Jun 2015, accepted on 13 Aug 2015, and published online on 10 Feb 2016. There are links for 'Download citation' and 'Check for updates'. Below the title, there are navigation buttons: 'Full Article', 'Figures & data', 'References', 'Citations', 'Metrics', 'Reprints & Permissions', and 'Get access'. The 'Abstract' section begins with the text: 'Boredom in the workplace is not uncommon, and has been discussed widely in the academic literature in relation to the associated costs to individuals and organizations. Boredom can give rise to errors, adverse patient events, and decreased productivity—costly and unnecessary outcomes for consumers, employees, and organizations alike. As a function of boredom, individuals may'. On the right side, there is a 'Related rese' section with a 'People also read' button and a link to 'Boredom at work spillover model c work motivation boredom >'. The 'Get access' button is orange, while the others are blue.

Cognitive Load

- ...” students who switch back and forth between attending to a classroom lecture and checking e-mail, Facebook, and IMing with friends”



Laptop multitasking hinders classroom learning for both users and nearby peers

Faria Sana^a, Tina Weston^{b,c}, Nicholas J. Cepeda^{b,c,*}

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^bYork University, Department of Psychology, 4700 Keele Street, Toronto, ON M3J 1P3, Canada

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ARTICLE INFO

ABSTRACT

Article history:

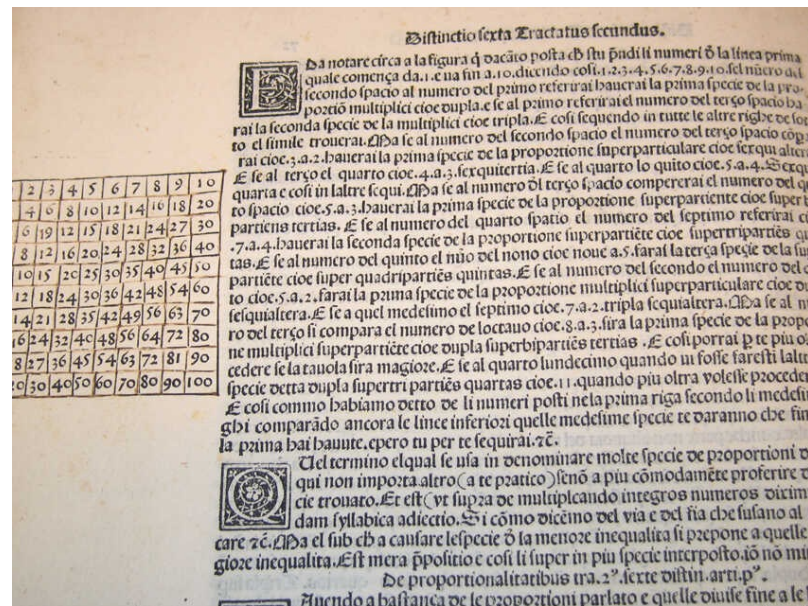
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Can we remove human error?

catch Can we ~~remove~~ human error?

Can we catch human error before we ship our code?

Can we automate tasks to prevent problems?



CI/CD Pipeline overview

