CSci 4271W
Development of Secure Software Systems
Day 25: Human factors part 3: warnings and configuration; responsible disclosure

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Based in large part on slides originally by Prof. Nick Hopper
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Human factors

Ultimately, most computing systems will involve people at some point. How do we design security mechanisms that take the needs, abilities and goals of people into account?



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What are we building?

Three primary kinds of interactions occur in user interactions for security:

- Authentications prove that a person can access a computer, application, or resource
- Warnings inform a person that an action will or could have security consequences
- Configurations allow a person to make decisions about the security policy of a system

Challenges with users

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Conditioning: people learn to respond to frequent stimuli

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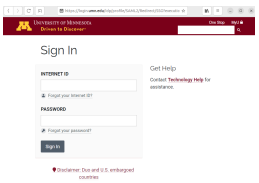
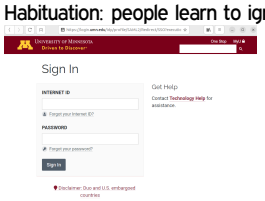


Challenges with users

Conditioning: people learn to respond to frequent stimuli
Habituation: people learn to ignore frequent warnings



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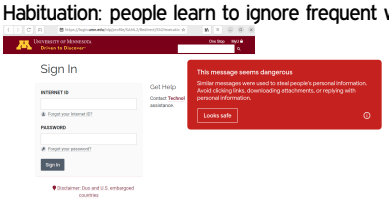

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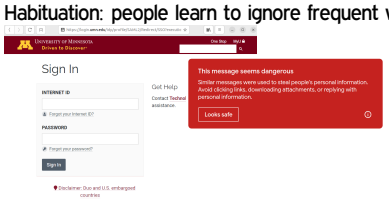
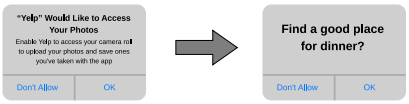


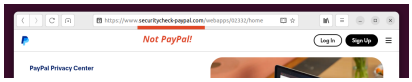
Wicked environment: no way to tell when a decision was bad

User behavior

Goal Orientation: when people are using computers, they are trying to achieve a task.



Confirmation Bias: people look for information that confirms their expectations.



Good decisions: design patterns

- Minimize what you ask of people
- Force people to complete important steps
- Avoid urgency
- Easy path to safety
- No "scamicry"

Outline

Review: what we're building

More detailed suggestions

Announcements intermission

Responsible disclosure

Warnings: NEAT

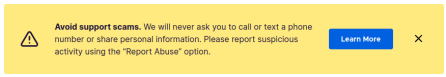
When designing a warning interaction, make sure it is NEAT (Reeder):

- N ecessary — can it be eliminated or deferred?
- E xplained — does it present all info the user needs?
- A ctionable — can the user make a correct decision?
- T ested — effective in benign and malicious settings?

Warnings/explanations: SPRUCE

We can evaluate the warning or explanation using SPRUCE:

- S ource
- P rocess
- R isk
- U nique user knowledge
- C hoices
- E vidence



Configuration design

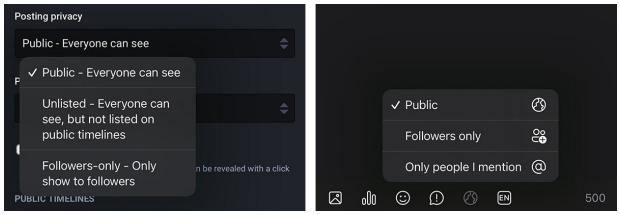
Questions to consider:

Configuration design

Questions to consider:

- Who can perform the configuration? (anyone, admin, parent?)
- What can they configure (and how granular)?
- Why would anyone want to do it? (how can we help them accomplish their goals?)
- When will the configuration happen? (Proactive/reactive? Just in time?)
- Where will users make the change? (How do they find the interface?)
- How will users implement/test their intent?

Configuration example



Who, what, when, where, why and how?

Configuration metrics

Metrics for configuration interactions:

- Discoverability (can people find the interface?)
- Accuracy (can people complete a given task?)
- Time to completion (can they do it quickly, before giving up?)
- Side effects (can they do it without messing other things up?)
- Satisfaction (easy to do, or frustrating?)

Usability testing principles

Cognitive Walkthroughs — Developers should use the security interaction, narrating (and recording) the task.
Benign and Malicious Testing — Test every feature both when there is a security risk and when there is not.
Ecological Validity — Will users respond the same way in testing as "in the wild?" (this can go both ways: "it's only a study" or "it's a security study, I will be more careful")

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Upcoming activities

- Homework 6 is due tonight by 11:59pm
- Project part 3 coming up
  - One section draft due this Thursday
  - Final report due Monday 5/5, no extensions
- Final exam Saturday 5/10 4–6pm

SRTs and completion incentive

- Student Ratings of Teaching are important feedback for me and the department
- Available now and through Monday May 5th
  - `srt.umn.edu/blue` or via Canvas
- Collective completion incentive if at least 6 (resp. 7) students complete evaluations
  - Equivalent to 1 (resp. 2) points on the final exam
- Will have reminder and time to complete on Thursday

Outline

Review: what we're building

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Responsible disclosure

Vulnerability disclosure

So you've found (and confirmed) a vulnerability. Do you…

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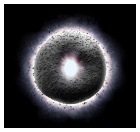
Tell everyone, everywhere all at once?



Vulnerability disclosure

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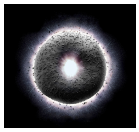


Never speak of this again.

Image sources: Everything Everywhere All at Once soundtrack "This Is A Life" single cover art; The Simpsons S06E04

Responsible disclosure

Is a process that looks for a middle ground, balancing interests among the parties:

- Finder
- Reporter
- Vendor/developer
- Downstream vendors/maintainers
- Users/customers
- The public

Disclosure process principles

- Reduce harm
  - Publish information
  - Reduce days of risk
  - Ensure high patch quality
- Presume benevolence
- Avoid surprise
- Incentivize desired behavior
- Process improvement

Ethics (CS perspective)

From the ACM Code of Ethics:

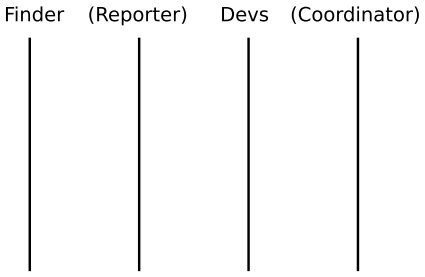
- Contribute to society and human well-being.
- Avoid harm to others.
- Be honest and trustworthy.
- Be fair and take action not to discriminate.
- Honor property rights including copyrights and patent.
- Give proper credit for intellectual property.
- Respect the privacy of others.
- Honor confidentiality.

Ethics (another perspective)

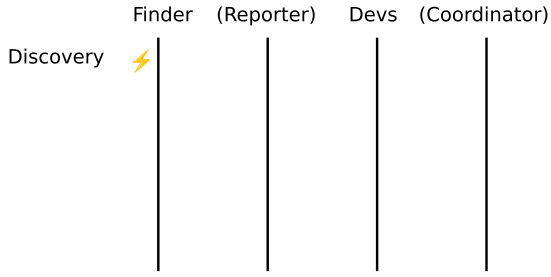
Society of Professional Journalists:

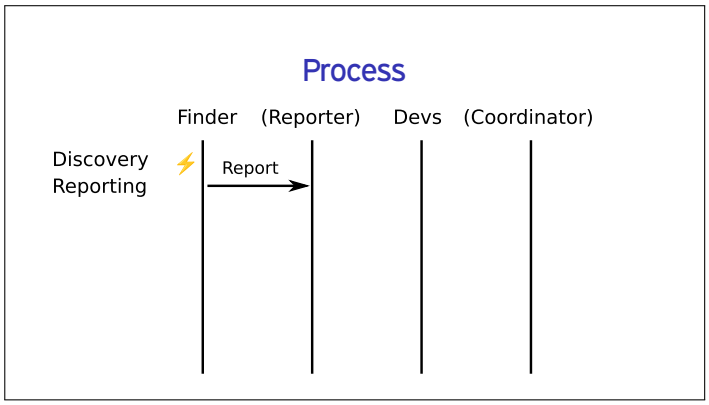
- Seek truth and report it — be accurate and fair
- Minimize harm — treat sources, subjects, colleagues and members of the public as human beings deserving of respect
- Act independently — highest and primary obligation is to serve the public
- Be accountable and transparent

Process



Process

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Finder
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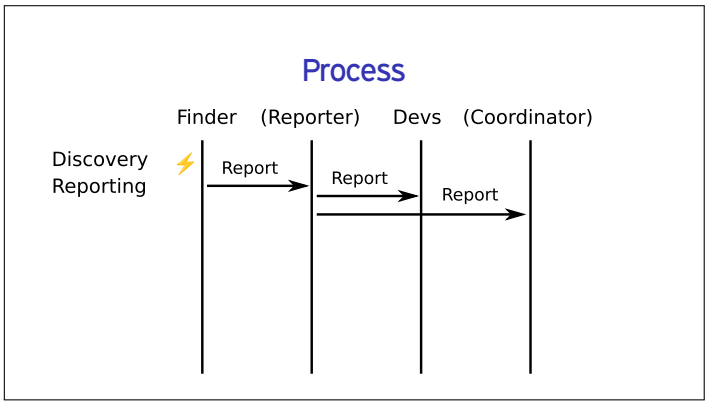
Devs
(Coordinator)
Discovery
Reporting
Report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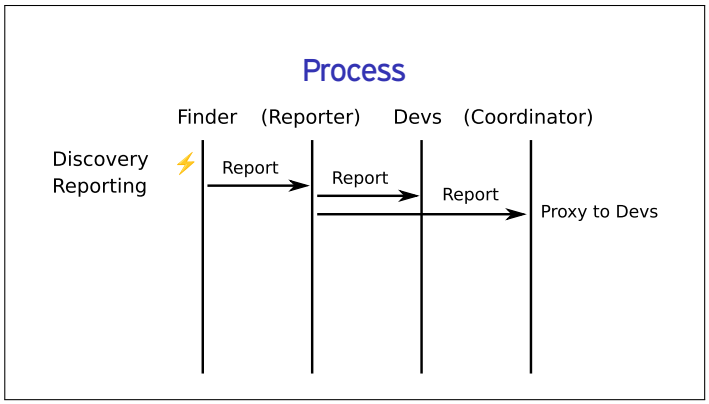
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Devs
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Discovery
Reporting
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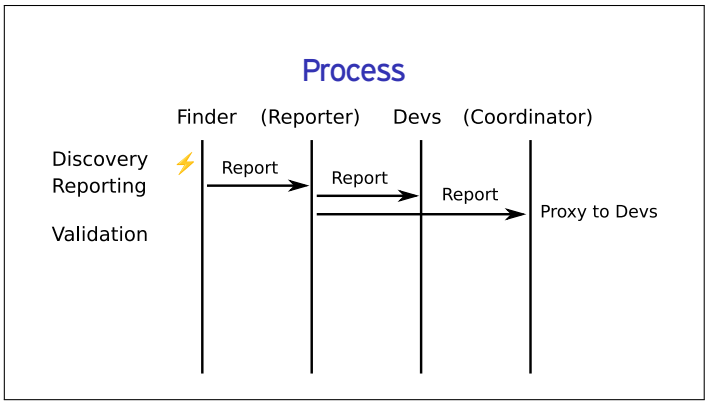
Report
Report
Proxy to Devs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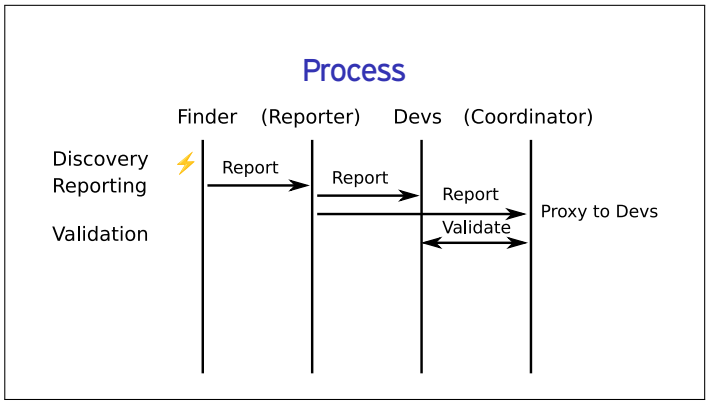
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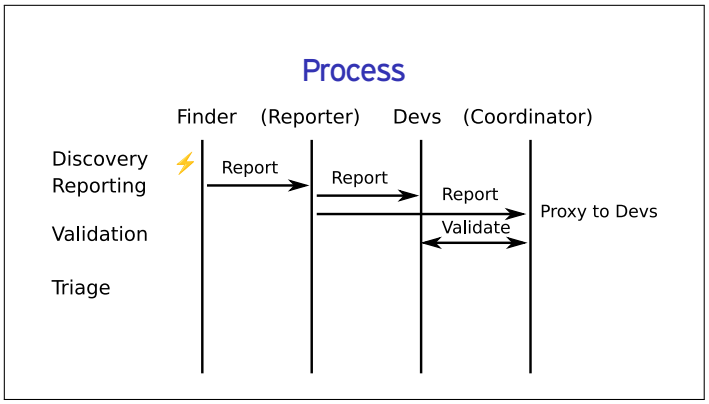
Validate
Proxy to Devs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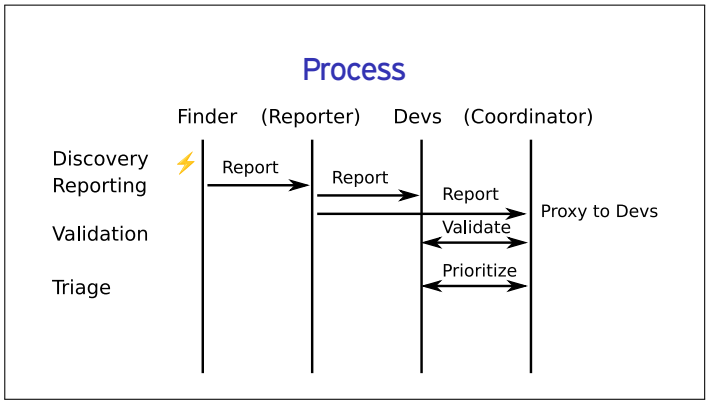
Validate
Proxy to Devs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Triage
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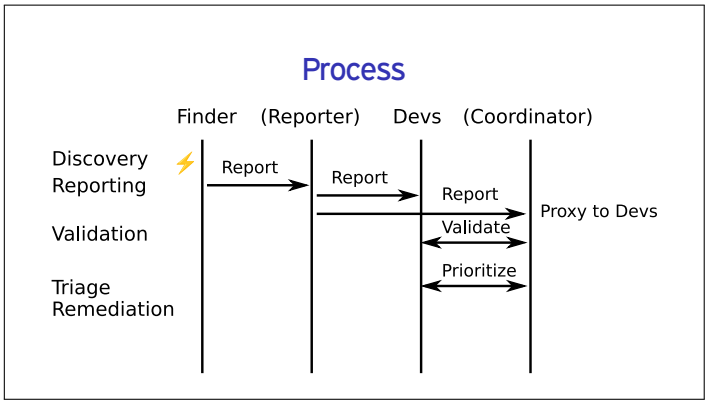
Report
Validate
Prioritize
Proxy to Devs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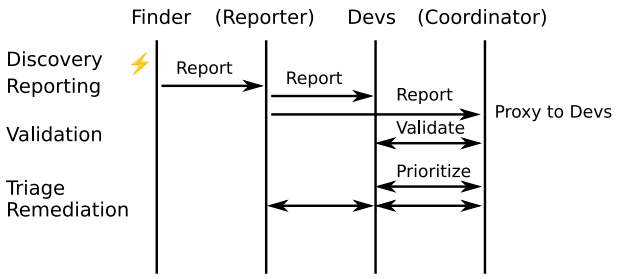

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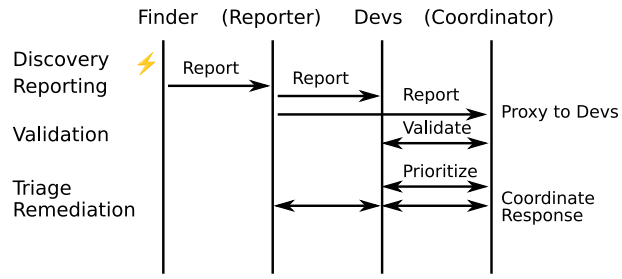

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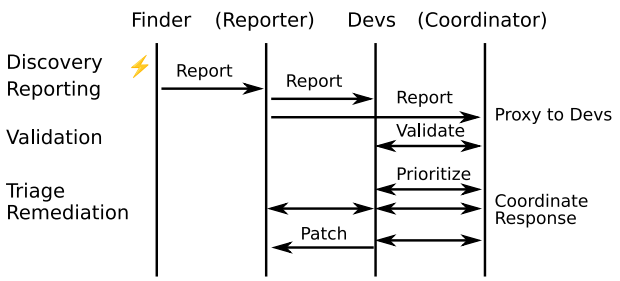

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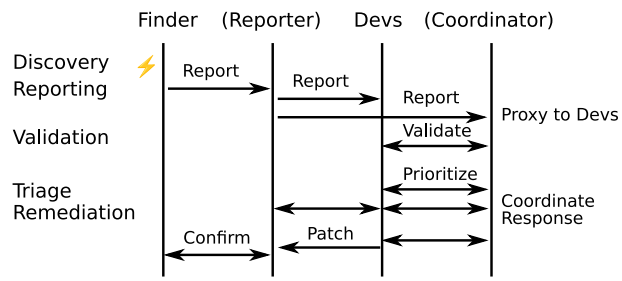

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