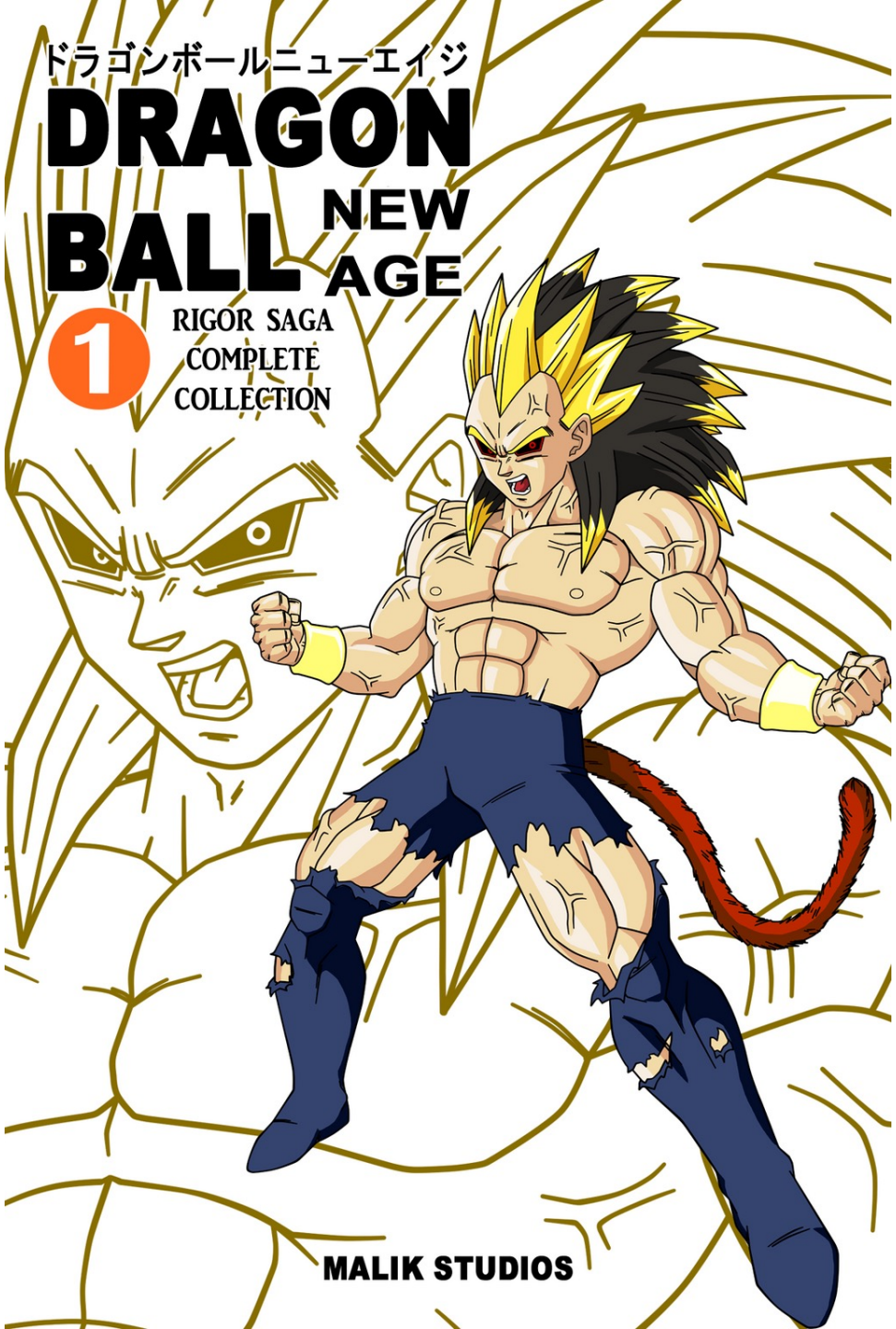

Rigor, You Say

When you should care, when you should run away, and why it keeps you up up at night

Rebecca Wirfs-Brock

rigor in your modeling process is different from a rigorous model

What is rigor?

from The American Heritage® Dictionary of the English Language, 5th Edition.

rigor noun rig·or ˈri-gər

1. Strictness or severity, as in action or judgment.
2. A harsh or trying circumstance; a hardship or difficulty: synonym: difficulty.
3. *Archaic* A harsh or severe act.
4. Strictness in adhering to standards or a method; exactitude.
5. A standard or exacting requirement, as of a field of study.
6. *Medicine* Shivering or trembling, as caused by a chill.
7. Physiology A state of rigidity in living tissues or organs that prevents response to stimuli.
8. *Obsolete* Stiffness or rigidity.

How I will use rigor in this talk

from The American Heritage® Dictionary of the English Language, 5th Edition.

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8. *Obsolete* Stiffness or rigidity.

Two ways to think about rigor in your code/software system

adherence to standards:

precisely following a process or method

or

Supporting people as they precisely follow a process or method

exactitude:

determining a precise, accurate answer to a well-formed question before proceeding

adherence to standards

Supporting people as they precisely follow a process or method

Alaska Airlines Flight 1282

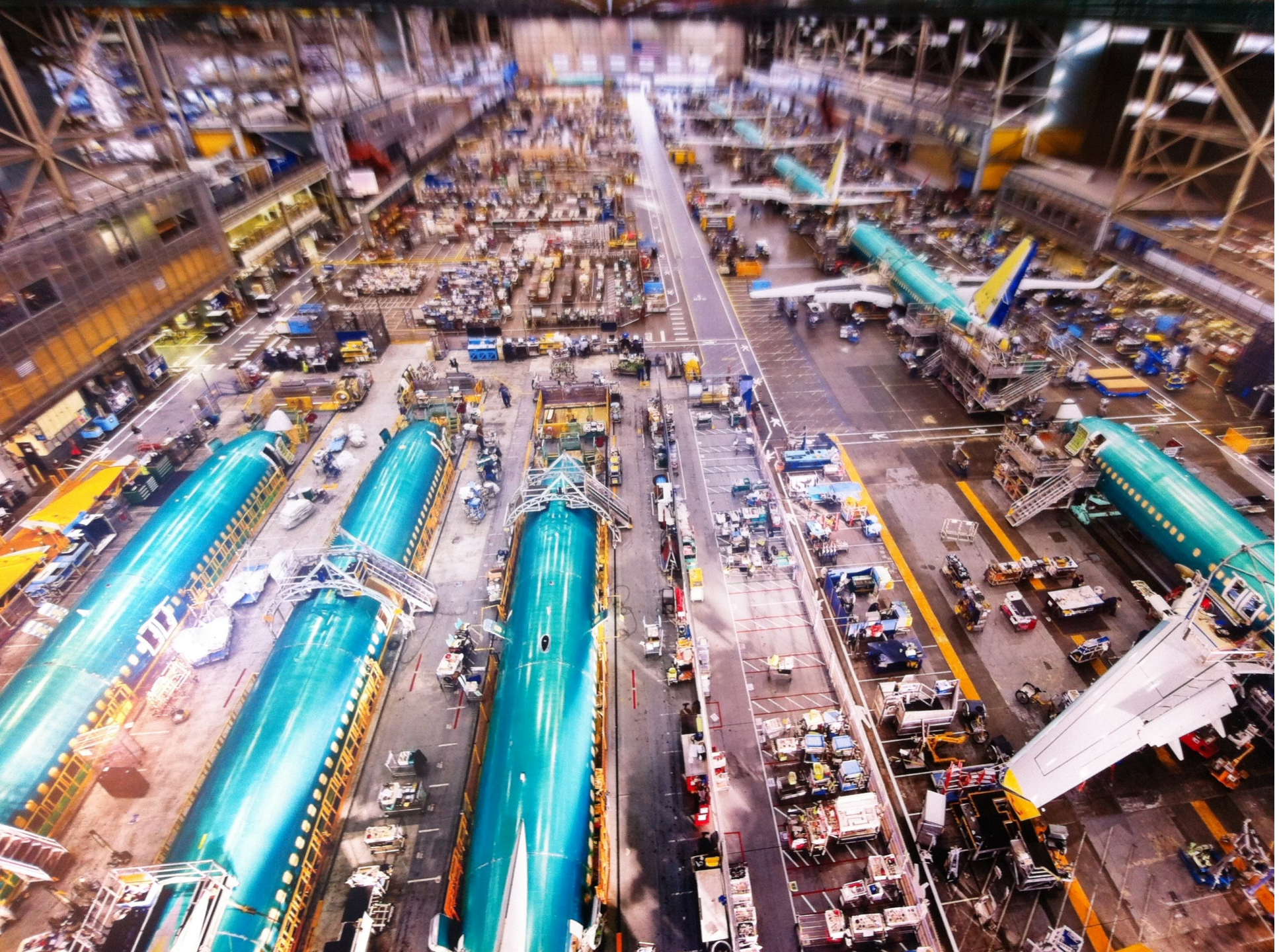
Alaska Air 737 MAX-9 Loses Plugged Door In Flight
How could this have happened?

Door

By Jeff Hitchcock, CC BY 2.0, https://commons.wikimedia.org/w/index.php?curid=143597665D

Plugged Door

By KirkXWB - https://www.jetphotos.com/photo/10884712, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=143597620



The Boeing Factory in Renton, Wa. where the 737 Max is assembled

Pressures to go fast…

…led to:

- mechanics allowed *in some instances* to sign off on their own work
- workers installed parts that had not been logged or inspected
- employees “inspector shopping” to find someone who would automatically approve their work

* Shortcuts everywhere’: How Boeing Favored Speed Over Quality— by Niraj Chokshi, Sydney Ember and Santul Nerkar https://www.nytimes.com/2024/03/28/business/boeing-quality-problems-speed.html?unlocked_article_code=1.gE0.i4lu.epn_2OH_k6BE&smid=url-share

People find ways to circumvent required process rigor when under pressure

When a high degree of process rigor is required in a sociotechnical system, human agency and environmental conditions must be primary concerns

Heuristic

Recent Improvements

Process:

- Additional inspections at Renton factory
- No longer accept Max 737 bodies that still need work

People:

- Workers asked for and got additional factory floor training
- Management overhaul

Dish Soap and Card Keys Help Build Planes: Boeing Signs Off on Spirit's Improved Assembly Method

SPIRIT AEROSYSTEMS

Beware of false dichotomies (e.g., quality vs speed).

Remove unnecessary constraints.

Reduce confusion around any process step that demands rigor.

Foster agency. People doing the work know what's going on. Listen to them.

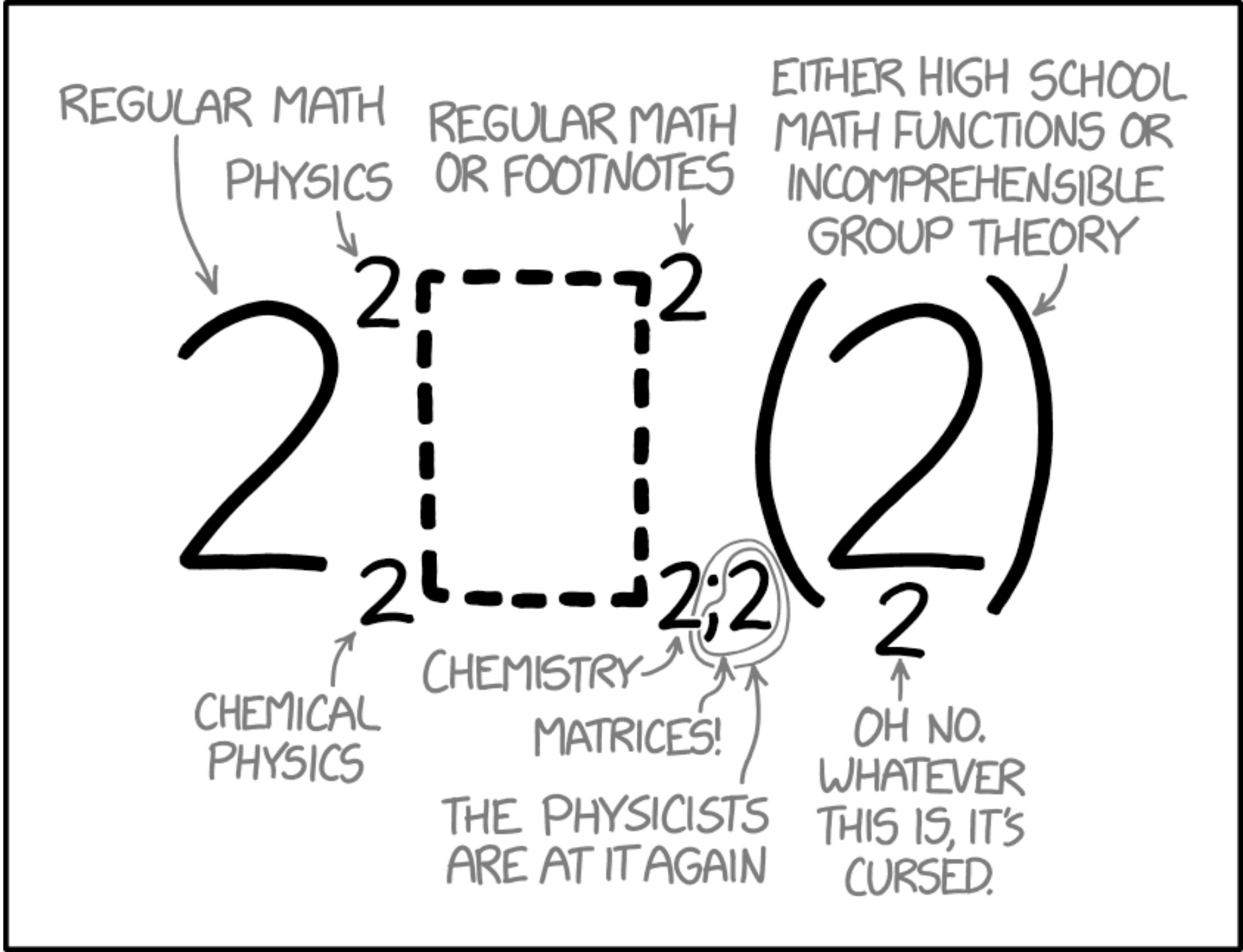
Observe what actually happens, how people really work, and adapt & and adjust.

exactitude

determining a precise, accurate answer to a well-formed question before proceeding

Exactitude is not arbitrary with physical laws/physics/ mathematical formulas

But in other situations…?



What question is your software answering?

Authentication—establishing genuineness

- **Confirm**—remove doubts by an authoritative statement or indisputable fact
- **Corroborate**—strengthen what is already partly established
- **Substantiate**—offer evidence
- **Verify**—establish correspondence of facts or details with those proposed or guessed at
- **Validate**—establish validity by factual proof or authoritative affirmation

What question are you *really* answering?

- **Confirming** a known user by **verifying** entered username & password
- **Corroborating** a person's identity by having them supply the correct answer to a secret question
- **Substantiating** someone is not a bot by having them correctly identify a captcha

…

What *about* identity?

Intel RealSense ID for Facial Authentication

Securely Unlock your World

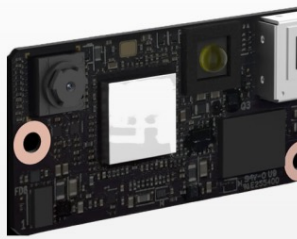
Intel® RealSense™ ID is a trusted and accurate on-device facial authentication solution built on Intel's leadership in vision technology and AI. It combines an active stereo-depth sensor with a specialized neural network to deliver an intuitive and secure solution that adapts over time.

Intel RealSense ID simplifies secure entry for everyone, everywhere. It supports people of varied heights and is designed for Kiosks, Access Control, ATMs, Time-Card Checks, Point-of-Sale, and more.

Fast
Authenticates in less than a second

Accurate
One-in-a-million false acceptance rate

Secure
On-device encrypted transactions with the use of embedded secure element

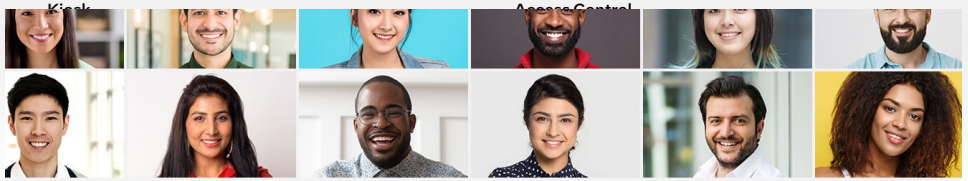


Secure Entry Everywhere You Need It

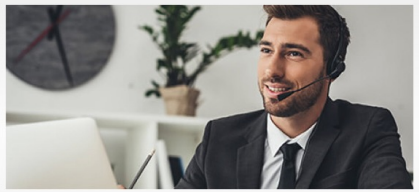
Kiosk

Access Control

ATM



Authenticates every skin tone and shade reliably.
Designed to work for everyone, you can trust Intel RealSense ID.



Custom Use Cases

Trusted and Secure

Intel RealSense ID enables you to build a facial authentication solution with built-in anti-spoofing technology, which protects against attacks using photographs, videos or high-quality 3D masks.

Get Datasheet

1 in a Million
False-Acceptance Rate

99.76%
True-Acceptance Rate

<0.1%
Spoof-Acceptance Rate

AES-256
Encryption used on all levels

Rapid Authentication. Privacy is Key.

Every component of our facial authentication solution is engineered to work together, for security, privacy, reliability and speed. With fast and easy enrollment, only registered users are authenticated.

Easy Enrollment → **Fast Authentication**

No Photos Stored

Secure Anti-Spoofing

Authenticates in Less than a Second

Your Facial Authentication SDK

Intel RealSense ID SDK is open-source, created with the developer in mind. It is designed to plug into your user authentication systems.

Download SDK
Get the latest intel RealSense ID SDK to kick-off your project.

Quick Start Guide
Get started with our Quick Start Guide.

Documentation
Find answers to your questions with our how-to guides and articles.

Code Samples
Check out how easy it is to get started with Intel RealSense ID.

Receive updates about the latest news on facial authentication solutions.

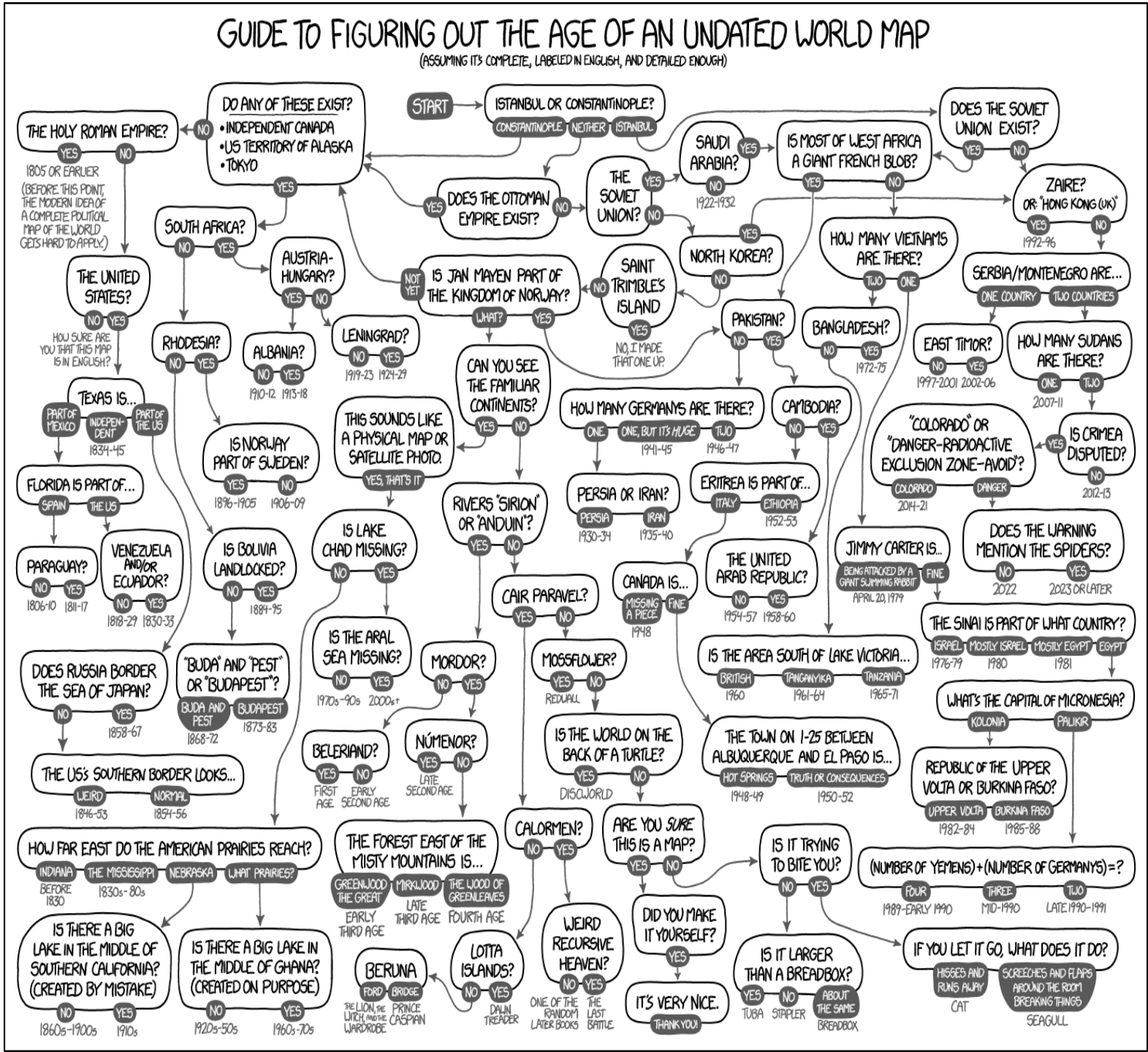
Another Example: Determining Identity

Canada Deposit Insurance Corporation

People find ways to circumvent “enforced” rigor that gets in their way

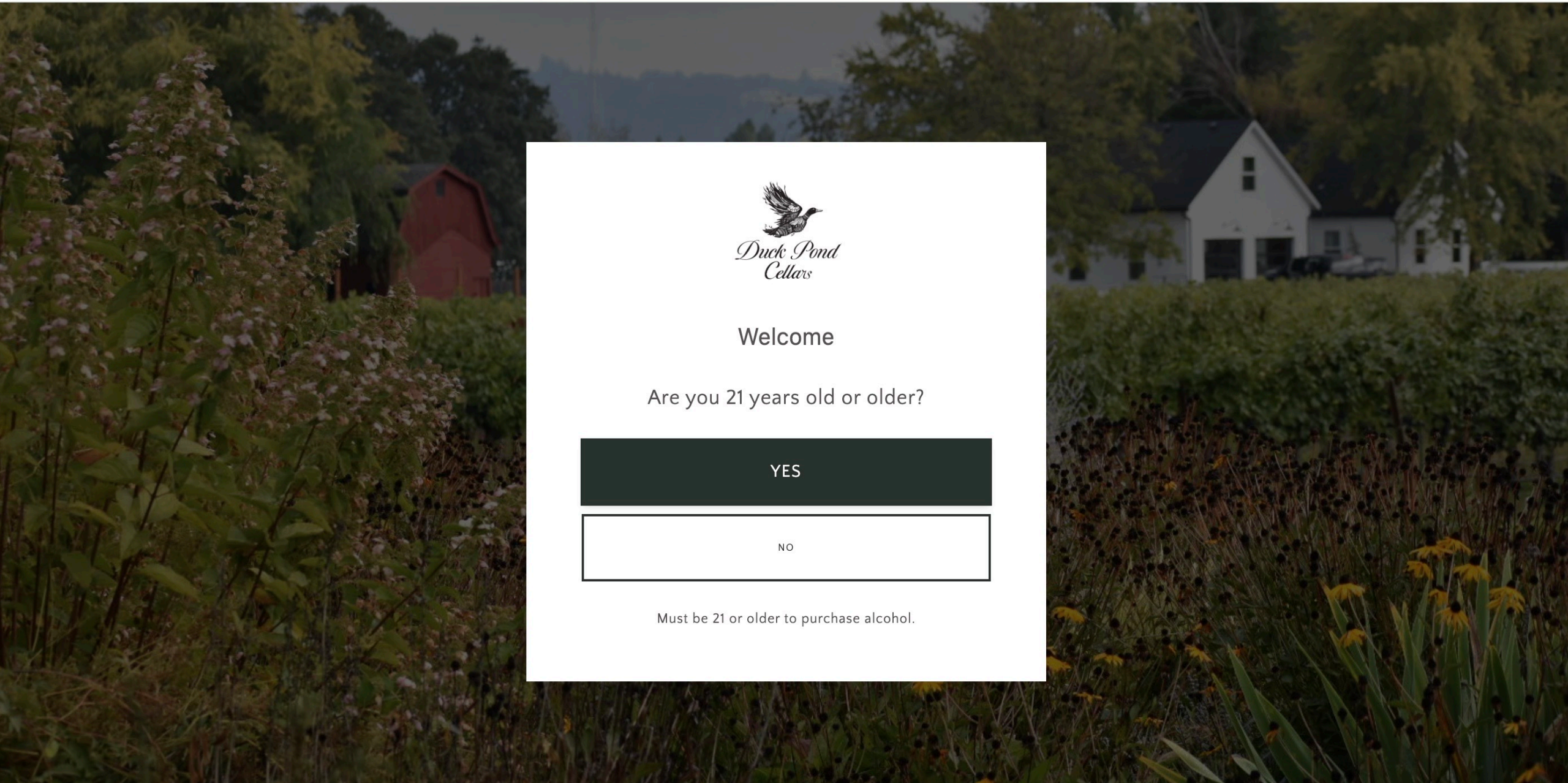
Relax model rigor when increased complexity outweighs any benefits.

Heuristic



What about authority?

Do you have the appropriate permissions to do something


duckpondcellars.com
Bookmarks
AgileUC2
Agile Use Cases
Apple
Yahoo!
Google Maps
YouTube
Wikipedia
News
untitled folder
Popular
Interesting tidbits
All Bookmarks
Duck Pond Cellars
Welcome
Are you 21 years old or older?
YES
NO
Must be 21 or older to purchase alcohol.


… rigor is a sham if your software is merely performing “rigor theatre”
Ausschnitte aus "Rigor Mortis - Der Tod steht uns gut" Theater Akzent
www.performingcenter.at

More Rigorous Age Verification System Solutions???

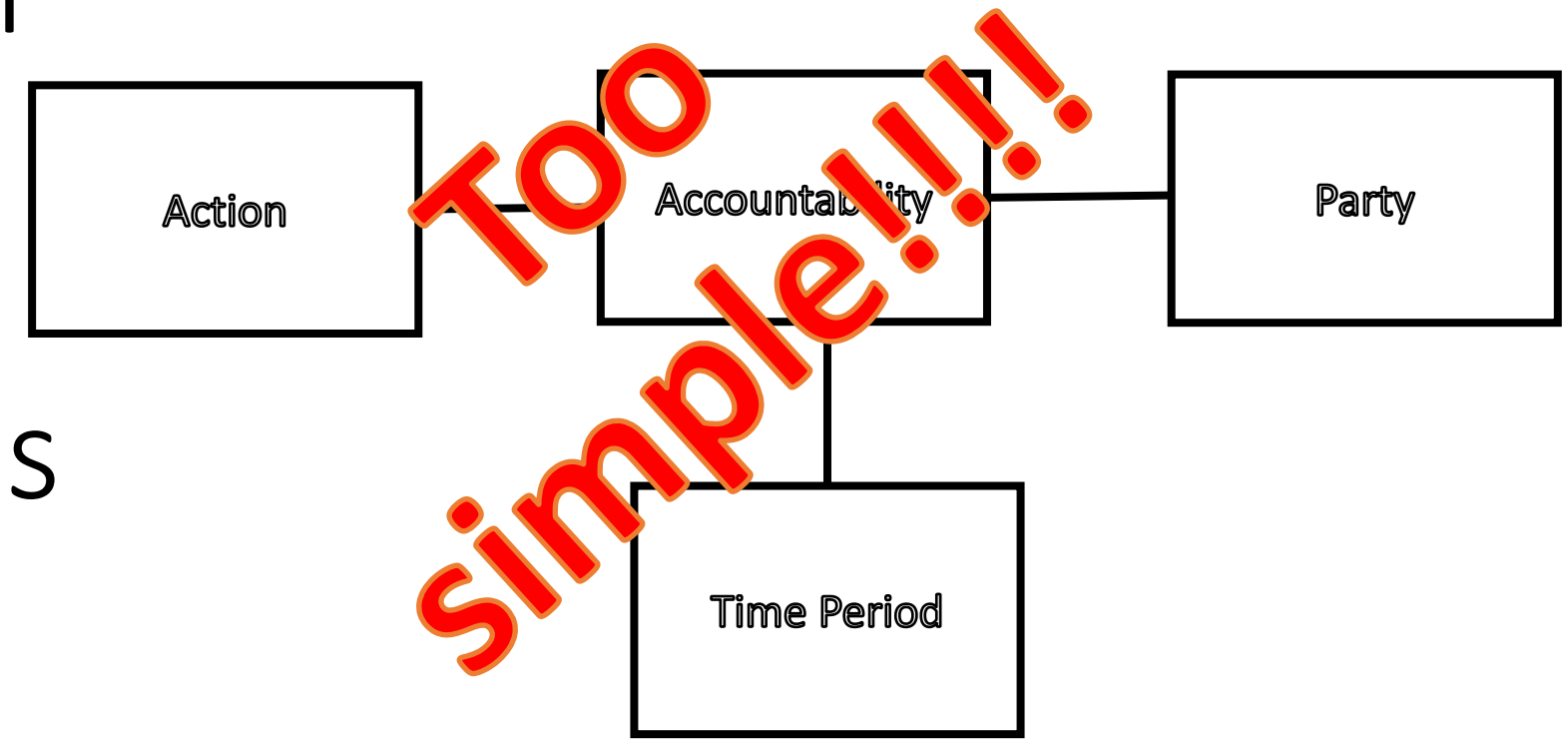
- **Rely on a third party that certifies your identity—**by directly validating a credit card or government-issued ID, or use a digital intermediary.
- **Estimate a user's age without an ID—**by using a camera and facial recognition to guess whether you're 18 (used by Facebook and Instagram).

Don’t gratuitously enforce rigor when it is impossible to determine the truth or get definitive answers

Heuristic

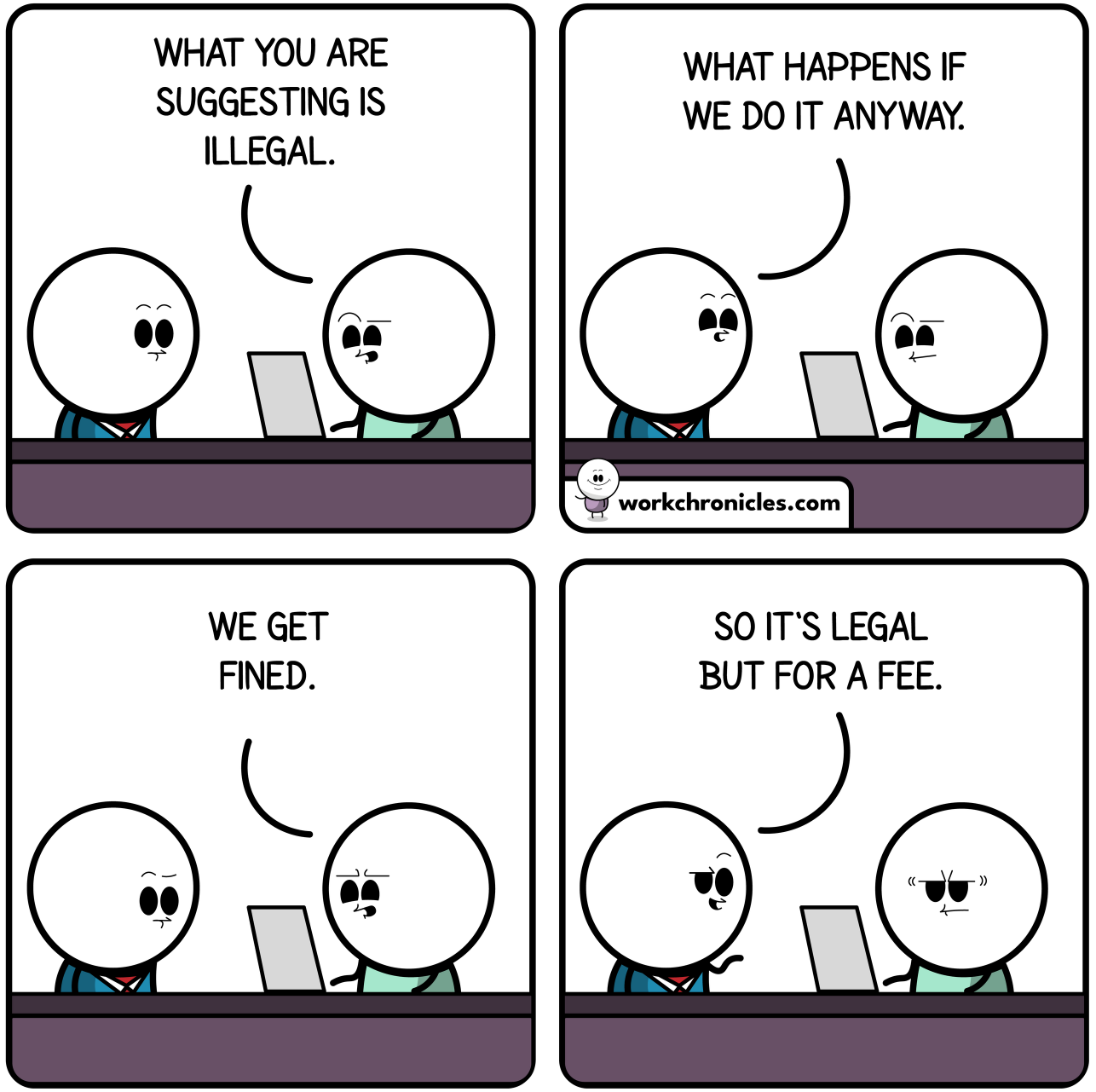
Increase model complexity, as needed, when required rigor is beneficial

Heuristic



Operational level of Accountability Pattern from *Analysis Patterns*

So how can we achieve requisite model rigor?



when you are required to enforce imposed rigor…

…take reasoned measures

…be prepared to defend your actions

…avoid difficult to enforce situations

…know the risks of non-compliance

…consider ethics/values/social responsibility

Heuristics

Define where a degree of rigor is required

Heuristic

Explore options for introducing model rigor

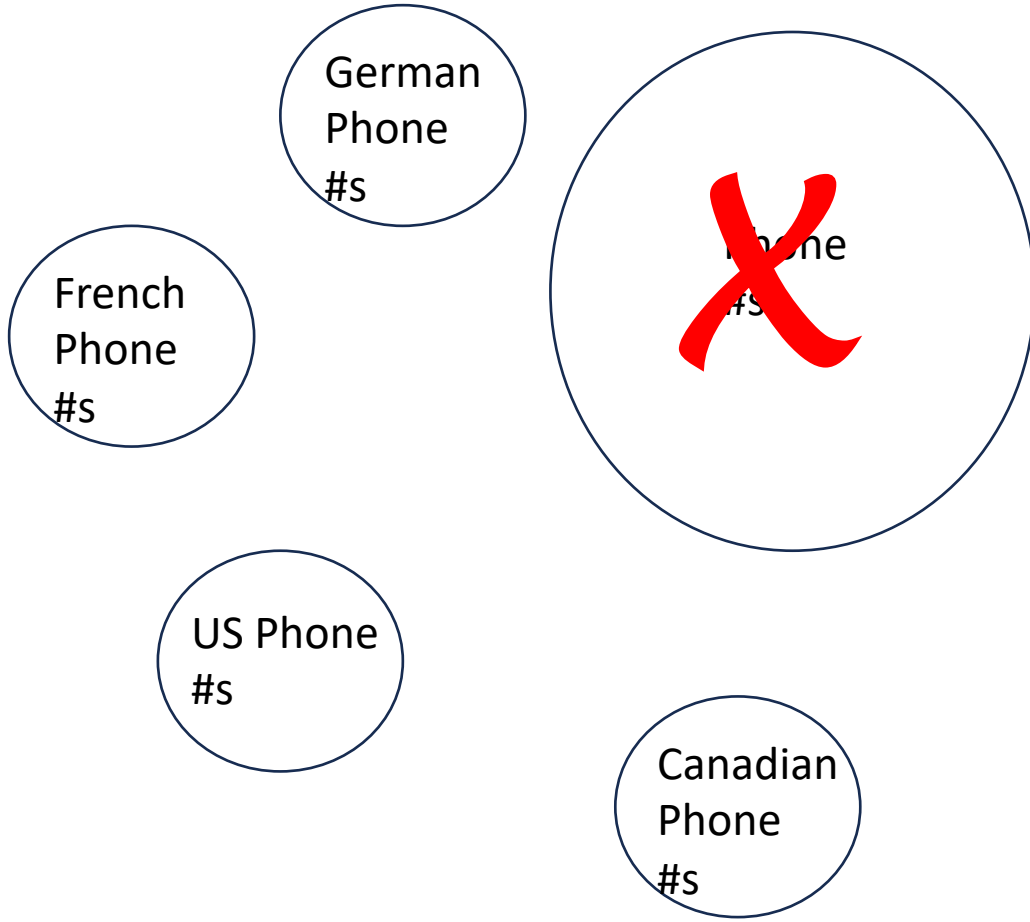
Heuristic

Constrain model rigor to where it is required and achievable

Heuristic

Carve out tiny bounded contexts where you impose rigor that you clearly separate and isolate

Eric’s Heuristic



The Keyhole Problem

"…every time software artificially restricts something you want to see or something you want to express."—Scott Meyers

The Restricted Domain Keyhole is when some elements of the natural input domain are excluded (e.g. forbidden characters)

Rebecca Wirfs-Brock

WirfsBrock

Wirfsbrock

Wirfs Brock

Brock R Wirfs

Avoid gratuitous rigor.

Heuristic

Consistently apply rigor.

Heuristic

Adding Degrees of Rigor to your model

- ✓ A model based only on happy path scenarios
- ✓ A model that also includes known “edge” cases
- ✓ A model based on requisite rigor
- ✓ …that considers people, cost, benefits, risks, and certainty

modeling gotchas…

requirements for rigor shift over time
different assumptions about rigor between related bounded contexts
different assumptions about rigor among users
different opinions about rigor among domain experts

Degrees of Rigor in a modeling process

- ✓ Create a model without input from domain experts

- ✓Talk with domain experts and then create a model

- ✓ Talk with domain experts, create a model, review it with domain experts

- ✓ Collaborate with domain and other experts on modeling, reviewing and exploring options (including areas of model rigor) based on effectiveness, costs, risks

“There is no rigorous definition of rigor.”

—Morris Kline, American mathematician

Categories of scientific rigor

Lorne J Hofseth, Getting rigorous with scientific rigor. Carcinogenesis. 2018 Jan; 39(1): 21–25

Rigor Level	Name	Description	Outcome
Rigor L6	Insidious rigor	Scientist purposely engages in falsifying data from initial grant review to publication	Misleading Misconduct Possibly criminal
Rigor L5	Creative rigor	Scientist deliberately targets or avoids targets where rigor need to be applied; shows best results to support hypothesis; cherry-picking data	Misleading Low chance of reproducibility
Rigor L4	Careless rigor	Scientist randomly applies rigor only when necessary or if asked to (e.g. verify cell lines)	Modest chance of reproducibility
Rigor L3	Selective rigor	Scientist applies rigor where their experience dictates it necessary. Logic.	Good chance of reproducibility
Rigor L2	Careful rigor	Scientist carefully applies rigor	High chance of reproducibility
Rigor L1	Enduring rigor	Results are independently repeated	Reproducible

Proposed categories for software modeling rigor

Rigor Level	Name	Description	Outcome
Rigor L0	Ad hoc rigor	Casually apply rigor to model/system only when asked to	Meh… may be rigor theatre
Rigor L1	Selective rigor	Modelers apply rigor where experience dictates it is necessary.	Good chance of effectiveness
Rigor L2	Careful rigor	Modelers carefully apply rigor, correspondingly represent the model in the code, test and monitor system behaviors, and adapt as needed	Higher chance of effectiveness
Rigor L3	Even more rigorous rigor	Rigor applied to modeling, modeling process, calculations and computations. Scenarios developed for known cases and modeled. Risks assessed. Implementation choices made based on risk/cost. Extensively tested.	Correct behavior under specified operational conditions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