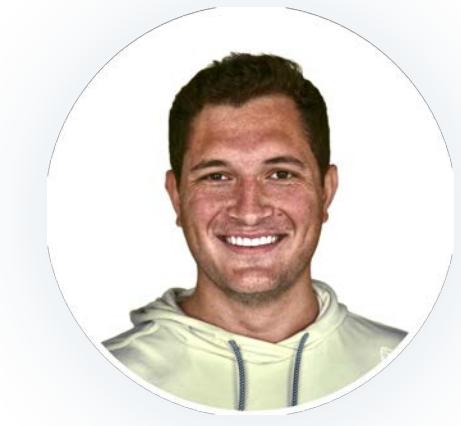


Lessons Learned From Our Adoption of AI for Software Development



Michael Edenzon
CEO, Fianu Labs

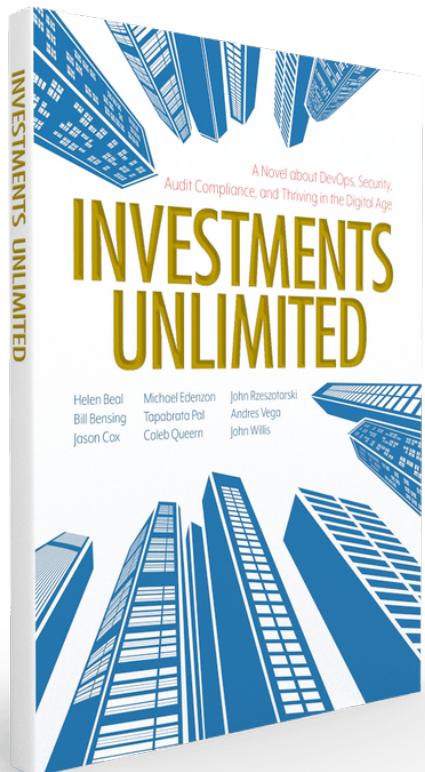
About

Engineer

Former Director of DevOps at PNC

5th Largest Bank in United States
Build & Release Automation, Toolchain
11,000 Developers
25,000 Code Repositories
9,000 Production Changes Per Year

Author



Investments Unlimited

A Novel About DevOps, Security, Audit Compliance, and Thriving in the Digital Age

Founder



Automated Software Governance platform that shortens release cycles for regulated companies by streamlining compliance and audit reporting in the DevSecOps pipeline.

Agenda

Our Stack

Tools We Use

Trends We Saw

Things I've Observed

Architecture

Commercial Real Estate

The Human Brain

Airline & Automotive Crashes

And How This Changed Our Software

The Today Show, 1994



Our Stack



User Interface



Backend



Rules for Policy
Enforcement

Our Tools



OpenAI

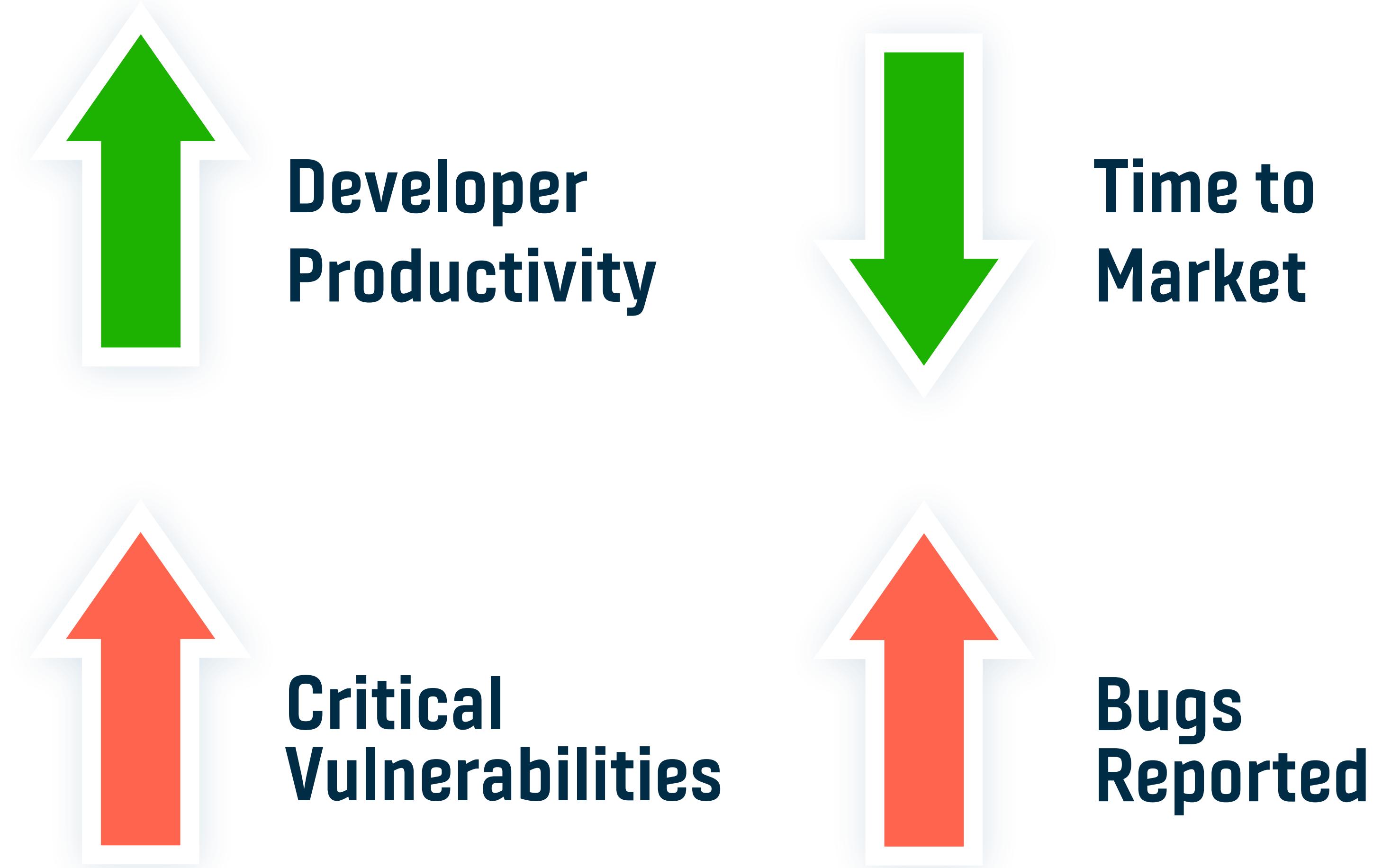
Business Logic &
Troubleshooting

Boilerplate & IaC



GitHub Copilot

What We Found



What We Found

More Features

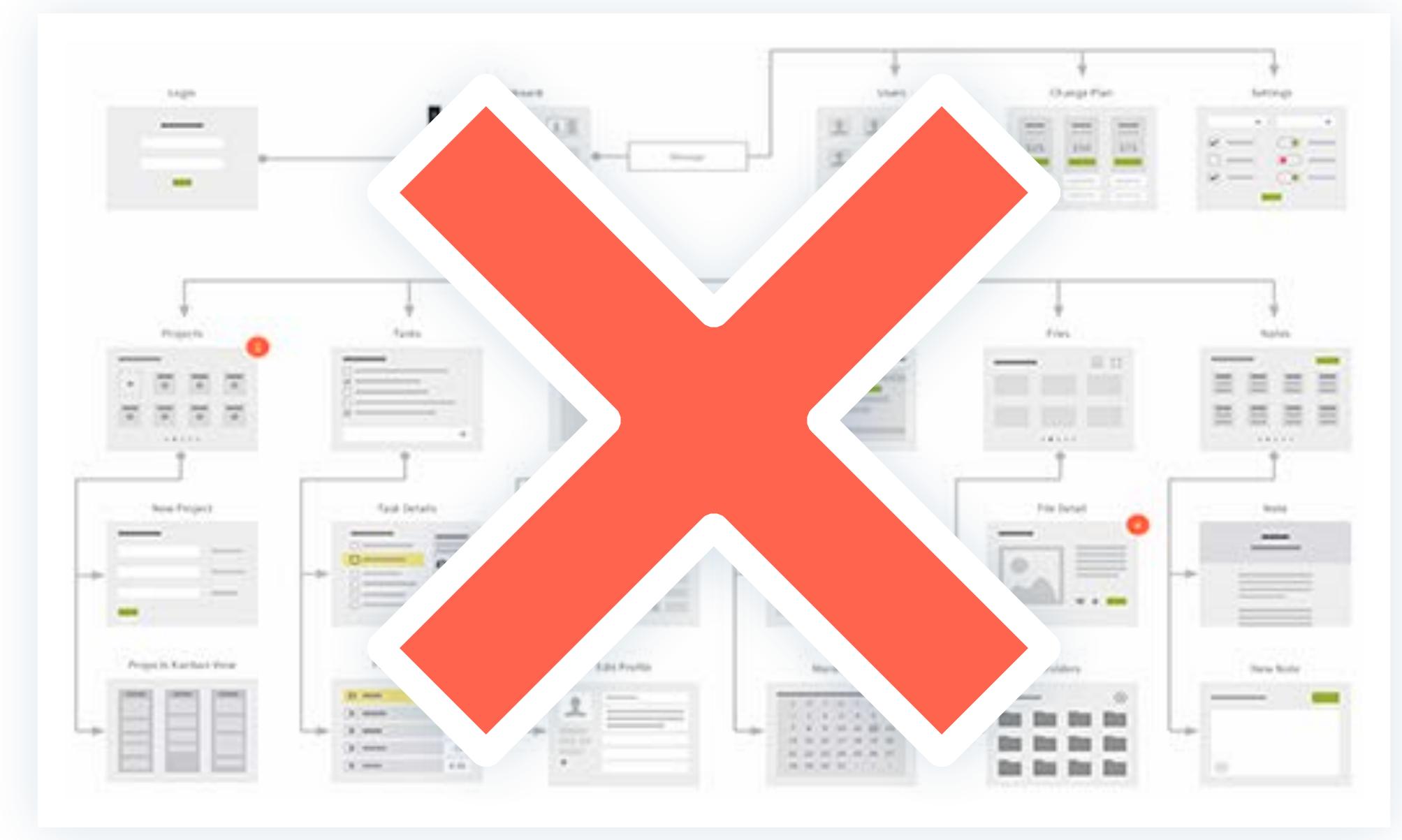
Faster Time-to-Market

Higher Security Risk

Poorer Quality

Things I've Observed

Architecture



Things I've Observed

Architecture



Things I've Observed

We *used* to build things like this.



Things I've Observed

Now we build things like this.

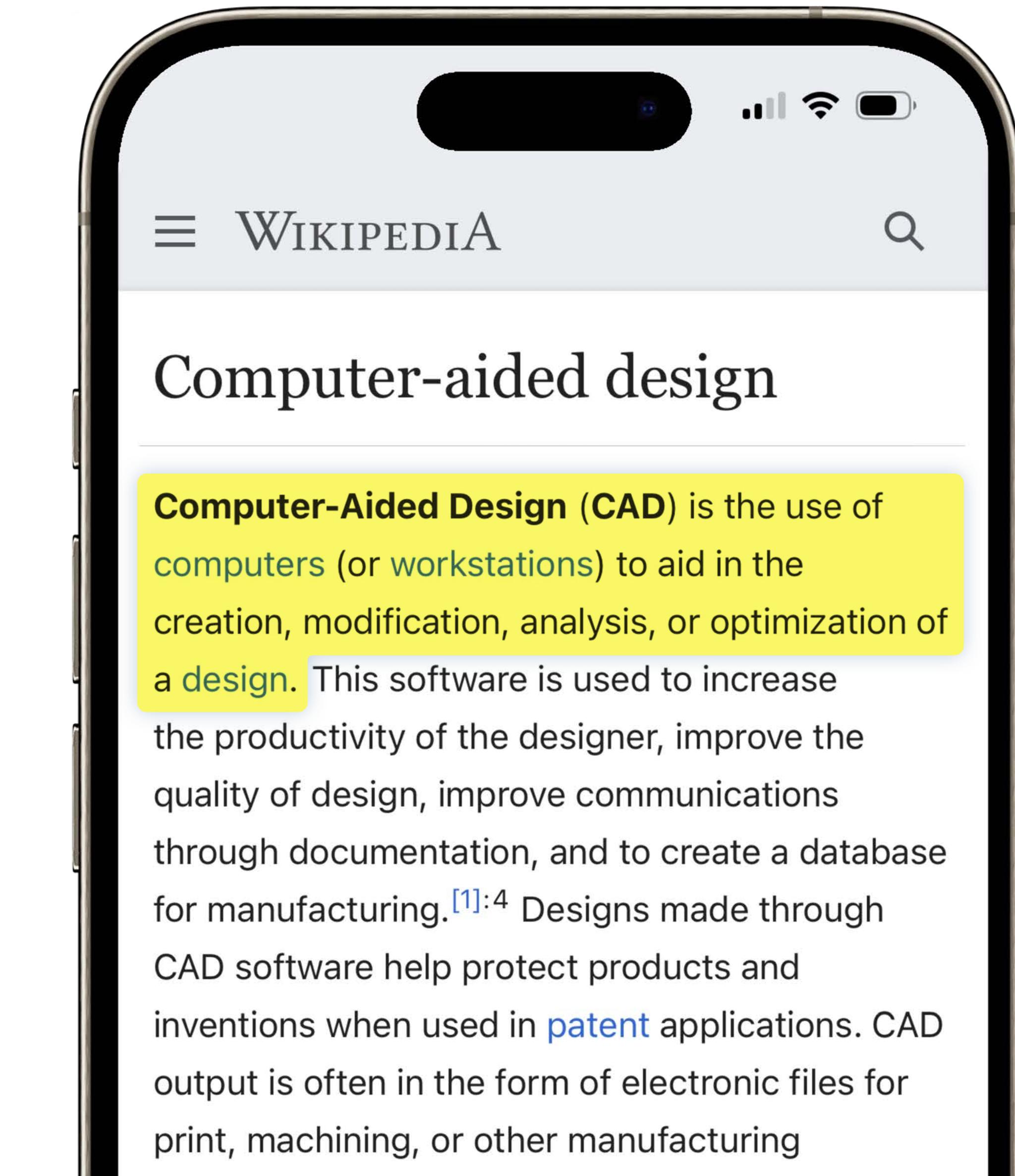


How did this happen?

How did this happen?

CAD

Computer-Aided Design



CAD-Drawn Buildings

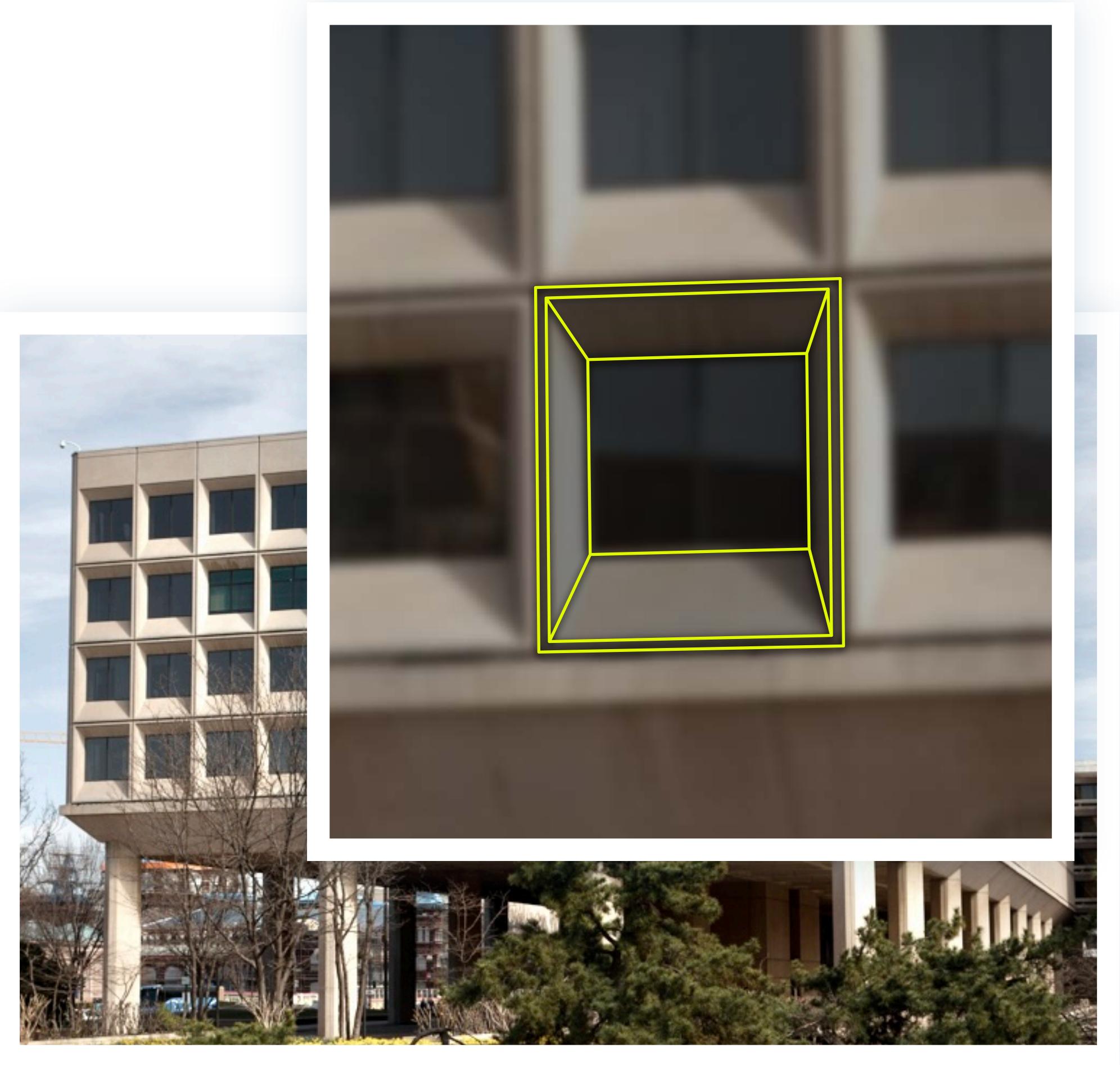
Hubert H. Humphrey Building

Washington, D.C. United States

Completed in 1977



CAD-Drawn Buildings

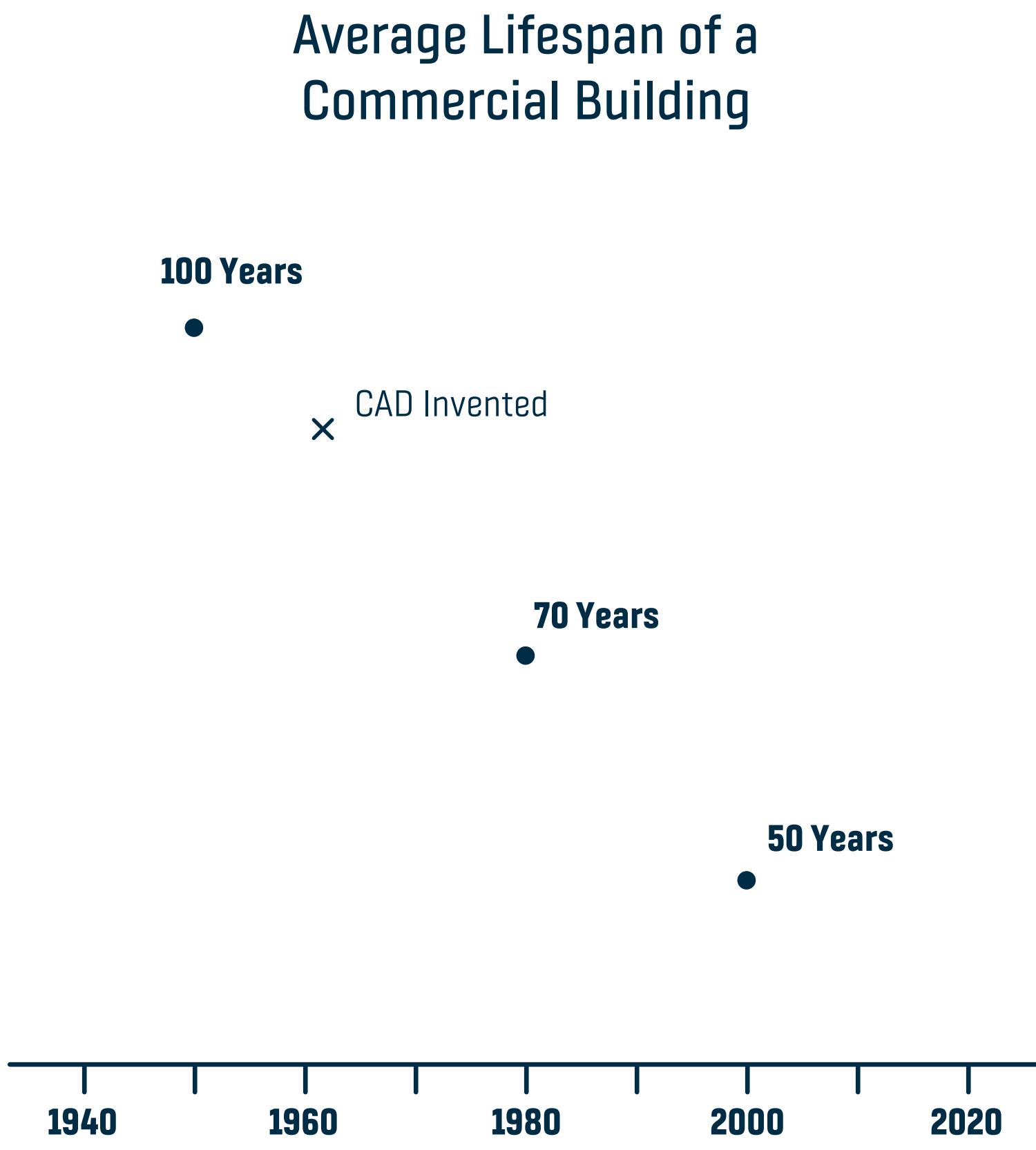


CAD-Drawn Buildings

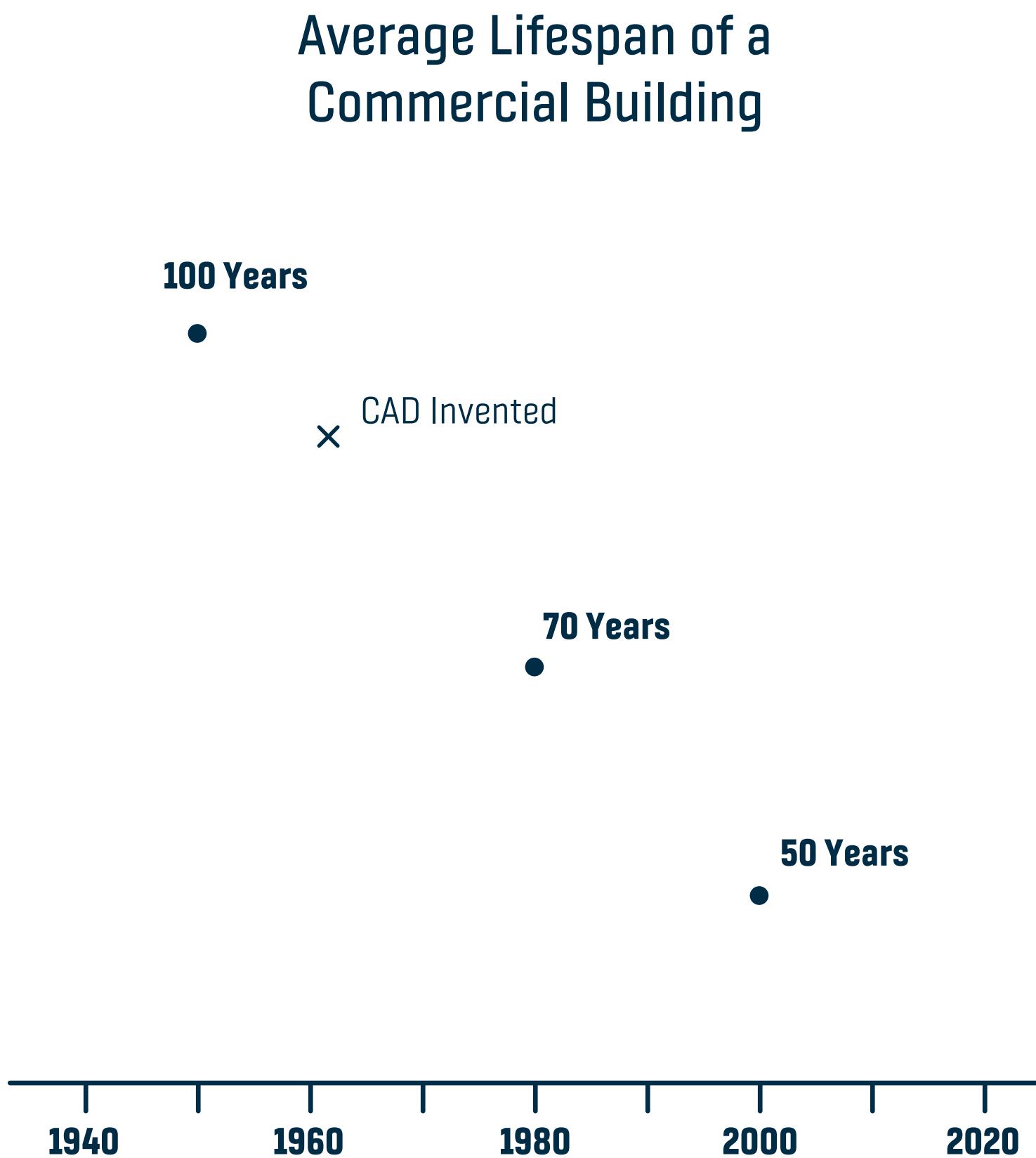


Why does it matter? Shorter lifespan.

Shorter Lifespan



Shorter Lifespan



COMMERCIAL BUILDING LIFE EXPECTANCY ISN'T WHAT IT ONCE WAS

August 22, 2019

Building life expectancy isn't what it used to be. What to do with obsolete commercial buildings and how to prevent your portfolio from falling into the trap. Buyers, owners, investors and developers of real estate are facing questions regarding how properties are valued in the current market, especially where there are problems appraising a



What is driving Decreased Commercial Building Life Expectancy?

The short answer is technology. The longer answer is human interaction with technology.

Is the same true with software?

It has never been easier to write great software,
yet software is as buggy and vulnerable as ever.

Is software becoming a product of our tools?

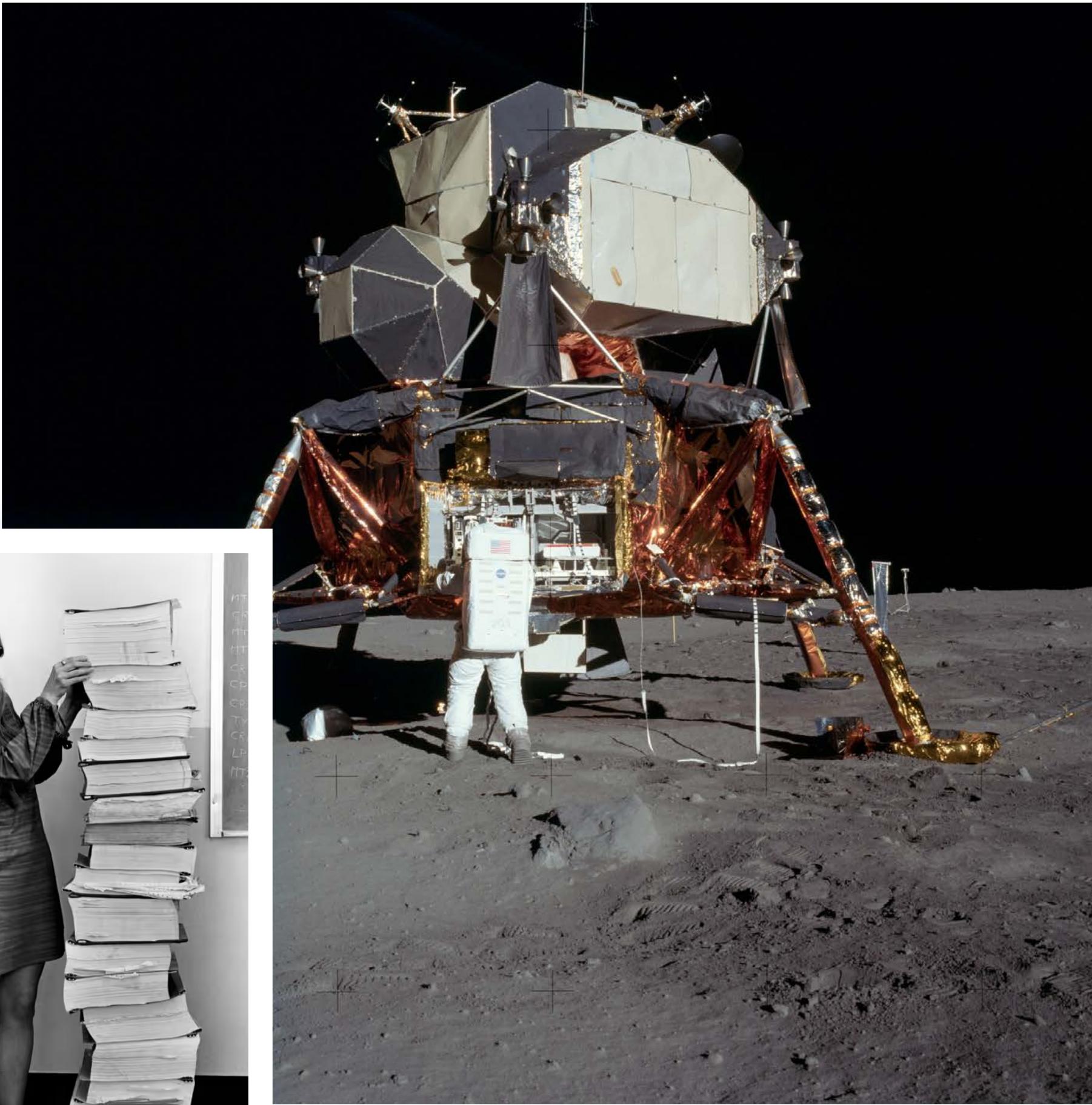
Apollo 11 Command Module

Lines of code	145,000
Bugs	0

"Her rigorous approach was so successful that no software bugs were ever known to have occurred during any crewed Apollo missions." The Guardian, 2019

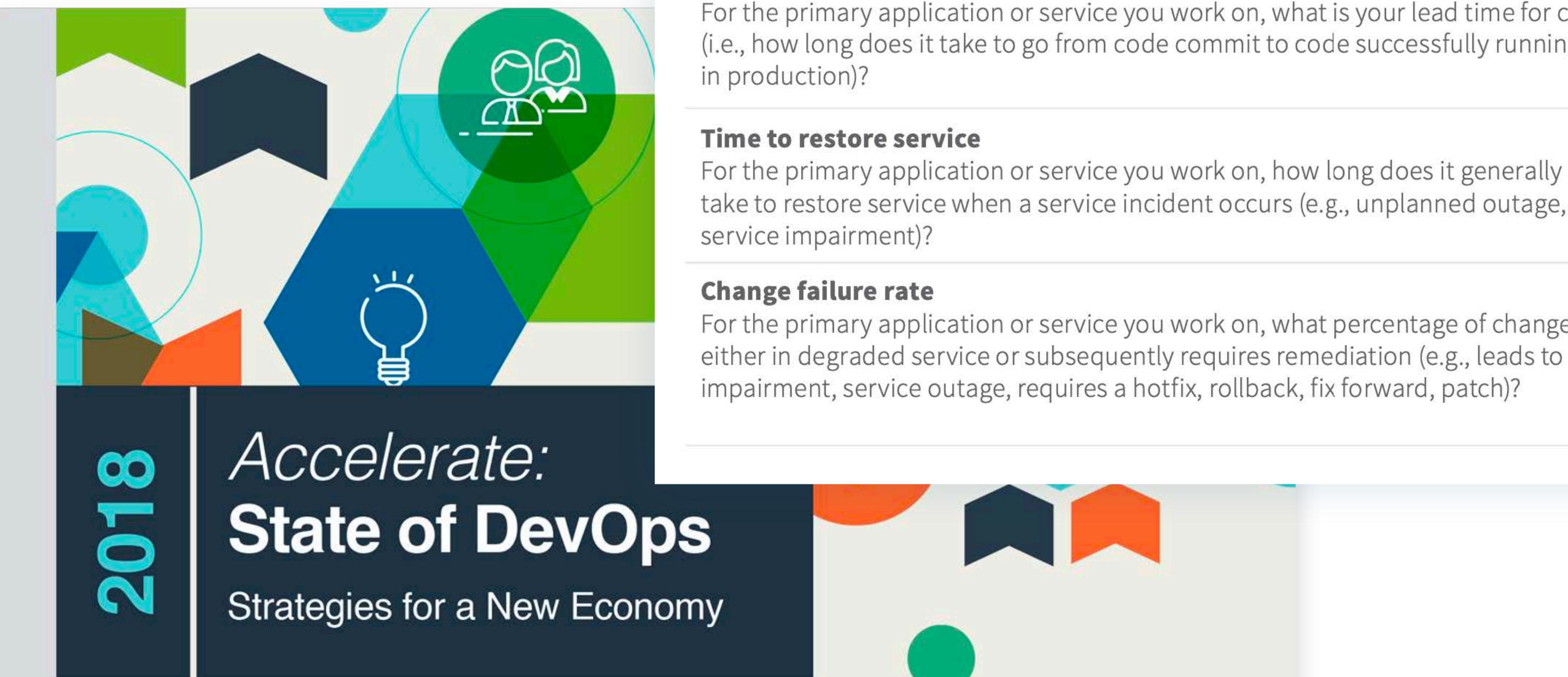


Margaret Hamilton, 1969



Forces At Play

Forces At Play



Elite ^a		
On-demand (multiple deploys per day)		
High	Medium	Low
Between once once per hour and per day	Between once per week and once per month	Between once per week and once per month
Between one and week	Between one week and one month ^b	Between one month and six months ^b
Less than day	Less than one day	Between one week and one month
0-15%	0-15%	46-60%

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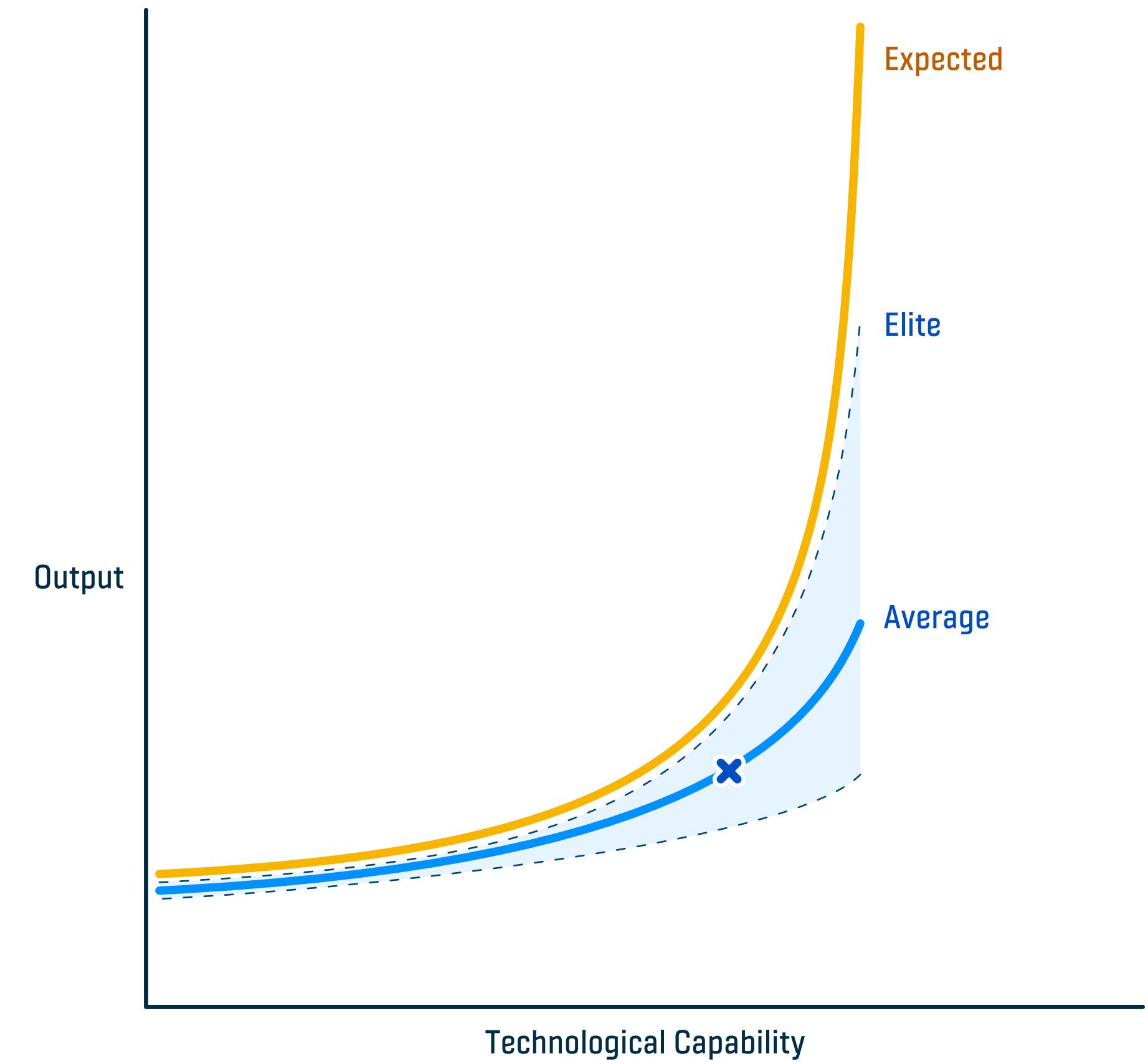
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Hypothesis

Are expectations pushing
developers too far?

Or are elite performers raising the bar...



The Hype Isn't Helping



Paul Graham  
@paulg

Talked to a programmer today who said AI coding tools made him about 10x more productive. Though 10 seems like a round number, this is an attempt at a precise estimate.

10:37 AM · Jun 12, 2023 · 1.1M Views



@jason  
@Jason

Top performers are already leveraging these tools to increase the distance between themselves & low performers... it's getting to the point where 40 & 50 year olds who have been coveted performers their whole careers who ignore these tools are going to be retired from the workforce

12:26 PM · Apr 15, 2023 · 232.2K Views

1) double your work product and quantity of code shipped and product value as you keep headcount steady.

OR

2) reduce your R&D/OpEx by 50% and have half the team + AI tools do the work that the entire team used to do before.

FWIW, I don't see how companies can empower their employees with tools and claim they have doubled their productivity unless revenue also doubles.

So the latter (#2) seems like the most obvious path that shareholders will push for. In no small part because of the SBC- based dilution they would also save if this happened.

4:58 PM · Aug 4, 2023 · 950K Views



Chamath Palihapitiya  
@chamath

I was sent this chart and found the implication, if true, important.

Many people derided the reduction in force that happened at Twitter/X and the firing of 80% of the company. But it turned out that the company wasn't only no worse for wear, but are seeing record usage since streamlining their workforce and OpEx.

Well if the chart below is true, it is a path that many other companies will have to take.

Then and Now



2010

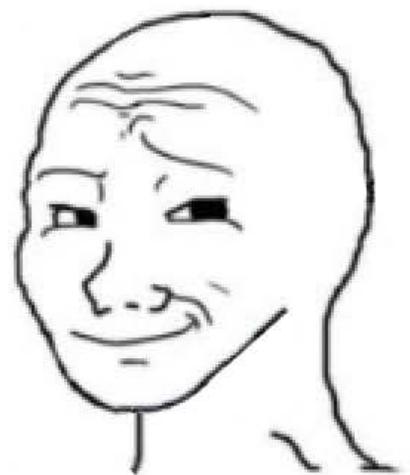
"This program cannot fail in production so I will write unit tests and regression tests, and collaborate with the business and QA teams to design a suite of functional and performance tests that will guarantee stability."

2023

"Tested locally, looks good.

Just to be safe, I'll use feature flags to ease in traffic.

If there's an issue, DataDog will detect it in the logs and open an incident in PagerDuty so that SRE can determine if the release manager should do a rollback."



The Modern Stack

Languages & Frameworks



Source Code & Pipelines



Workflow Platforms & Toolchain



We Searched For Why



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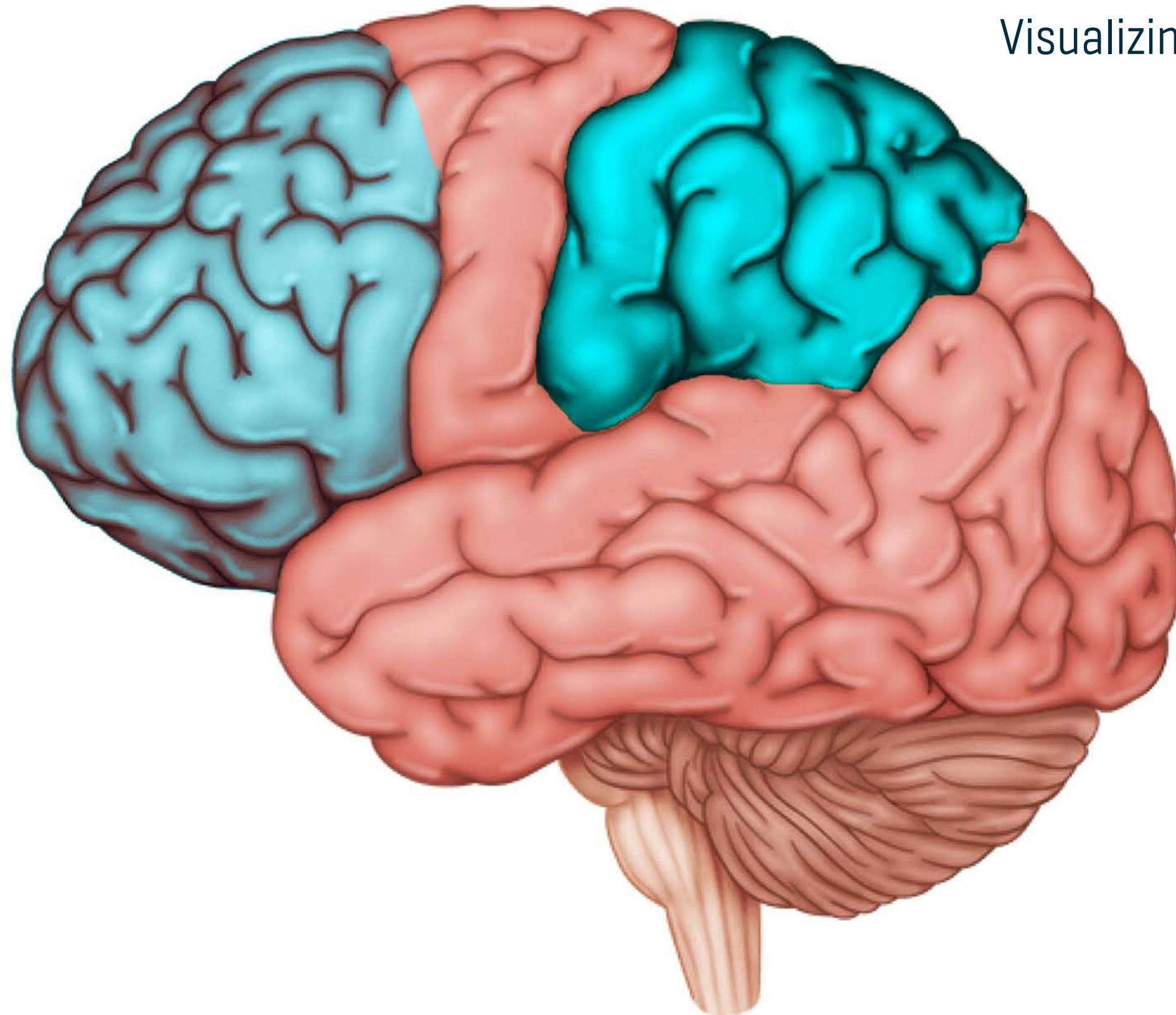
The longer answer is human interaction with technology.

How do developers interact with generative AI?

Writing Code

Prefrontal Cortex

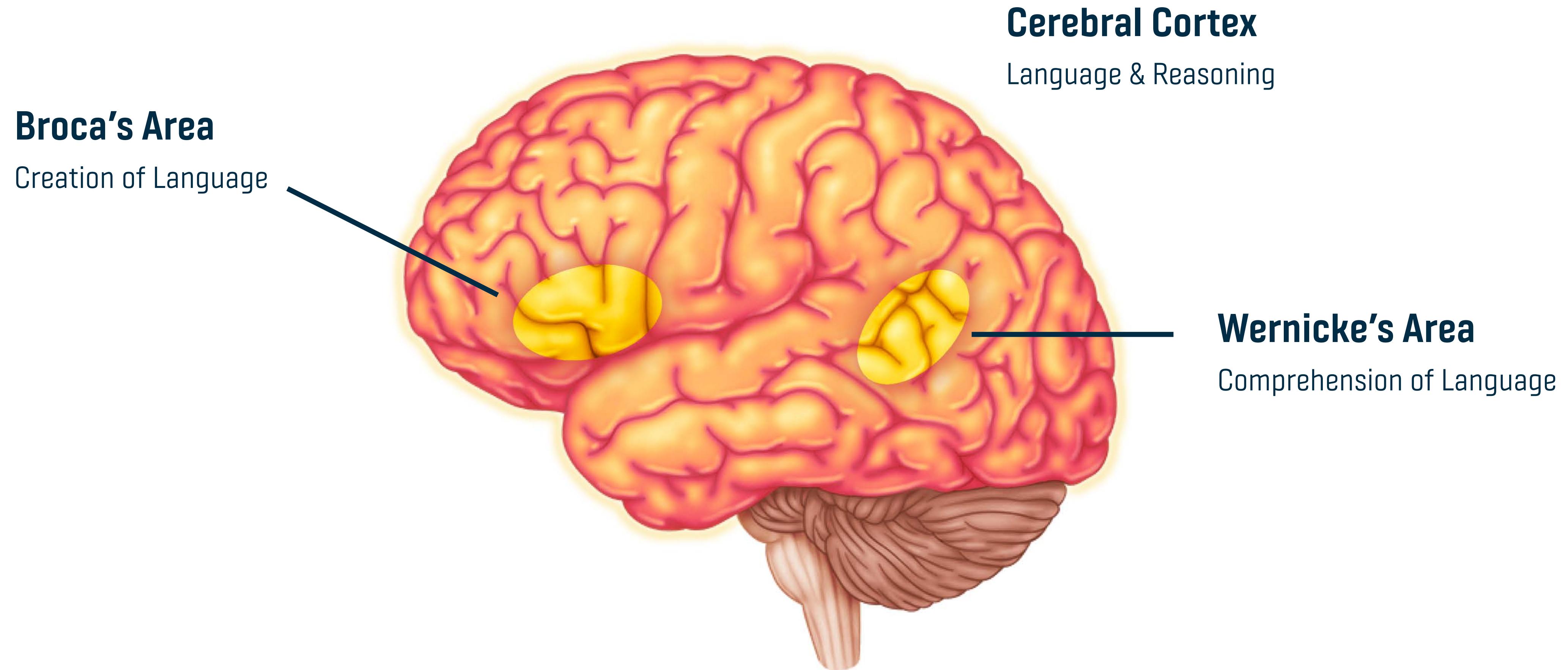
Strategy & Problem Solving



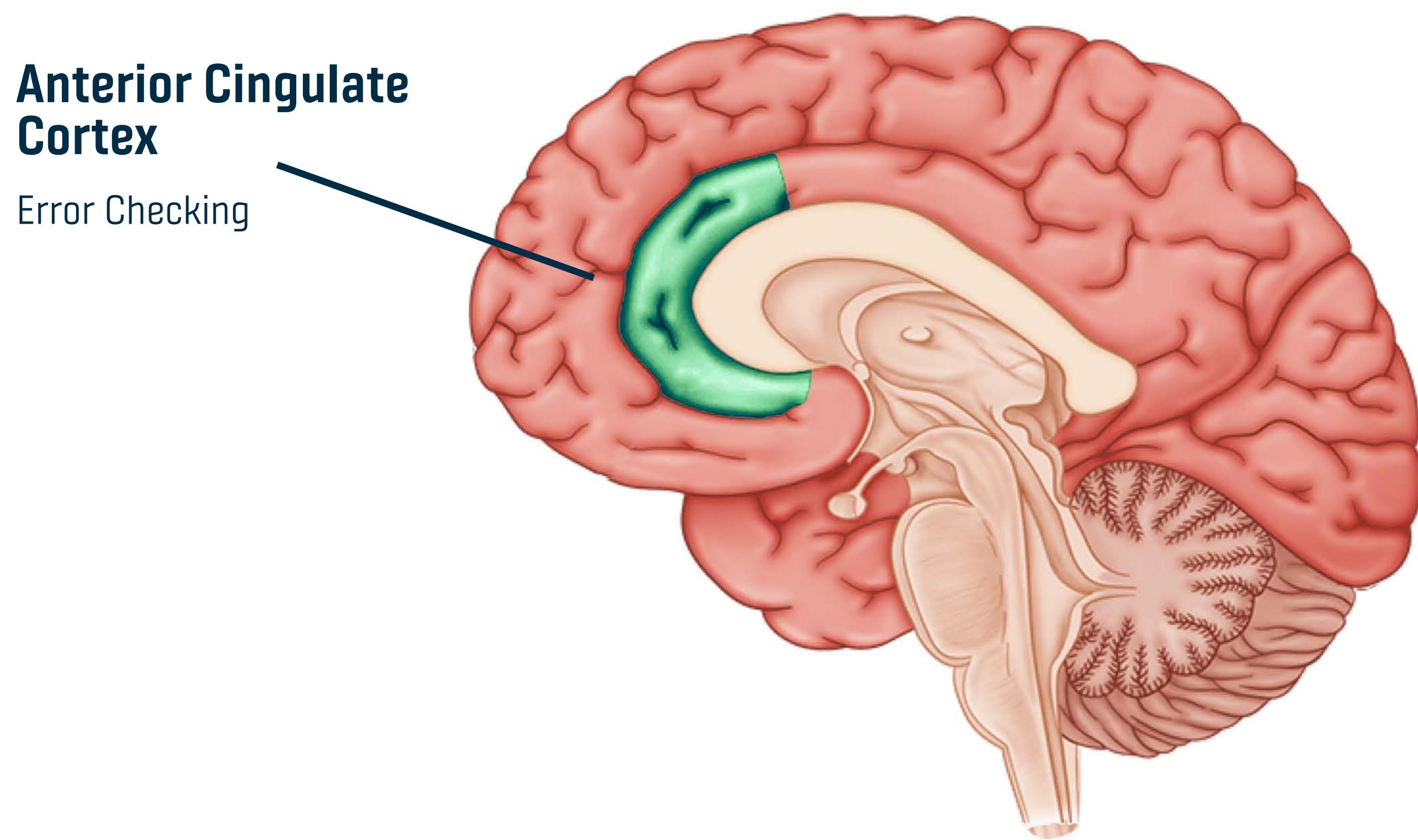
Parietal Lobe

Visualizing Complex Systems

Writing Prompts



The Shared Region



The Handoff Problem

A screenshot of the ChatGPT interface on a Mac OS X desktop. The window title is "chat.openai.com". The top bar shows the OpenAI logo, a padlock icon, and the text "chat.openai.com". The top right corner has icons for sharing, adding, and closing the window.

The main conversation area shows a user message from a yellow profile icon asking "What is the handoff problem?". Below it, GPT-4's response is shown with a purple profile icon, explaining the handoff problem as the challenge of transferring control between an automated system and a human operator in a seamless and safe manner, particularly in fields like autonomous driving or aviation. The response highlights the critical nature of this issue, mentioning potential accidents or operational failures if mishandled, and notes the complexity of solutions involving design, human psychology, and real-time communication protocols.

At the bottom of the screen, there is a toolbar with a "Stop generating" button and a "Send a message" input field. A small note at the bottom center states: "ChatGPT may produce inaccurate information about people, places, or facts. [ChatGPT September 25 Version](#)". A question mark icon is also present in the bottom right corner.

The Handoff Problem

The New York Times

Robot Cars Can't Count on Us in an Emergency



A driving simulator at the Toyota Research Institute. One possible new feature being designed by Toyota adds the ability to stop not just when a pedestrian is detected, but also to swerve to avoid an accident. Christie Hemm Klok for The New York Times

By [John Markoff](#)
June 7, 2017

SAN FRANCISCO — Three years ago, Google's self-driving car project abruptly shifted from designing a vehicle that would drive autonomously most of the time while occasionally requiring human oversight, to a slow-speed robot without a brake pedal, accelerator or steering wheel. In other words, human driving was no longer permitted.

The company made the decision after giving self-driving cars to

Bloomberg

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CityLab | Transportation

Behind the Uber Self-Driving Car Crash: a Failure to Communicate

The preliminary findings into a fatal crash in Tempe by the National Transportation Safety Board highlight the serious "handoff problem" in vehicle automation.



An interior view of operator Rafaela Vasquez moments before an Uber SUV hit a woman in Tempe, Arizona, in March 2018. Tempe Police Department/AP

By [Laura Bliss](#)
May 25, 2018 at 1:30 PM EDT

The first rule of safe flying: Pay attention, even when you think you don't need to. According to a [1994 review by the National Transportation Safety Board](#), 31 of the 37 serious accidents that occurred on U.S. air carriers between 1978 and 1990 involved "inadequate monitoring." Pilots, officers, and other crew members neglected to crosscheck instruments, confirm inputs, or speak up when they caught an error.

Over the period of that study, aviation had moved into the automation era, as Maria Konnikova reported for *The New Yorker* in

The Guardian

News | Opinion | Sport | Culture | Lifestyle

Self-driving cars

Who's driving? Autonomous cars may be entering the most dangerous phase

Autopilot controls are not yet fully capable of functioning without human intervention - but they're good enough to lull us into a false sense of security



Inside a Tesla Model S car equipped with autopilot in Palo Alto, California. Photograph: Bloomberg/Bloomberg via Getty Images

Olivia Solon
@oliviolasolon
Wed 24 Jan 2018 03.01 EST

When California police officers approached a [Tesla](#) stopped in the centre of a five-lane highway outside San Francisco last week, they found a man asleep at the wheel. The driver, who was arrested on suspicion of drunk driving, told them his car was in "autopilot", Tesla's semi-autonomous driver assist system.

In a separate incident this week, [firefighters in Culver City reported](#) that a Tesla rear-ended their parked fire truck as it attended an accident on the freeway. Again, the driver said the vehicle was in autopilot.

The Handoff Problem



Colgan Air Flight 3407 (2009)



Air France Flight 447 (2009)



**U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
National Policy**

**ORDER
8040.4B**

Effective Date:
05/02/17

SUBJ: Safety Risk Management Policy

This order supports Federal Aviation Administration (FAA) Order 8000.369, *Safety Management System*, and establishes requirements for how to conduct Safety Risk Management (SRM) in the LOBs) and Staff Offices, and M.

**U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
National Policy**

**ORDER
8000.369C**

Effective Date:
06/24/20



Safety Management System

order establishes the Safety Management System (SMS) policy and requirements for the aviation Administration (FAA). The requirements contained within this document are intended A organizations incorporate SMS and/or International Civil Aviation Organization (ICAO) FAA organization SMSs work



**U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
National Policy**

SUBJ: AVS Safety Management System (AVSSMS) Requirements

1. This order provides requirements to be met by all Aviation Safety (AVS) support of the AVS Safety Management System (AVSSMS). The focus of this order does not address occupational safety, health, or personnel safety issues, unless aviation safety. This order enables the continued evolution of AVS's proactive and safety performance through requirements for services and offices to:

- a. Maintain organizations capable of overseeing aviation safety;
 - b. Identify hazards that can impact the safety of the aerospace system and controls/mitigations to reduce safety risk in a prioritized manner;
 - c. Track identified hazards to ensure that risk remains known and acceptable;
 - d. Oversee aviation product/service providers' implementation of a Safety Management System (SMS) to identify safety priorities, reduce safety risk, and monitor safety performance.
2. Each service and office play a role in the AVSSMS. Therefore, AVS service processes must ensure full conformance with this order, as well as proper alignment:

- a. SMS processes in other AVS services and offices; and
- b. SMS processes in product/service provider organizations for which the AVS has oversight responsibility, if applicable.



**U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
National Policy**

**ORDER
8040.6A**

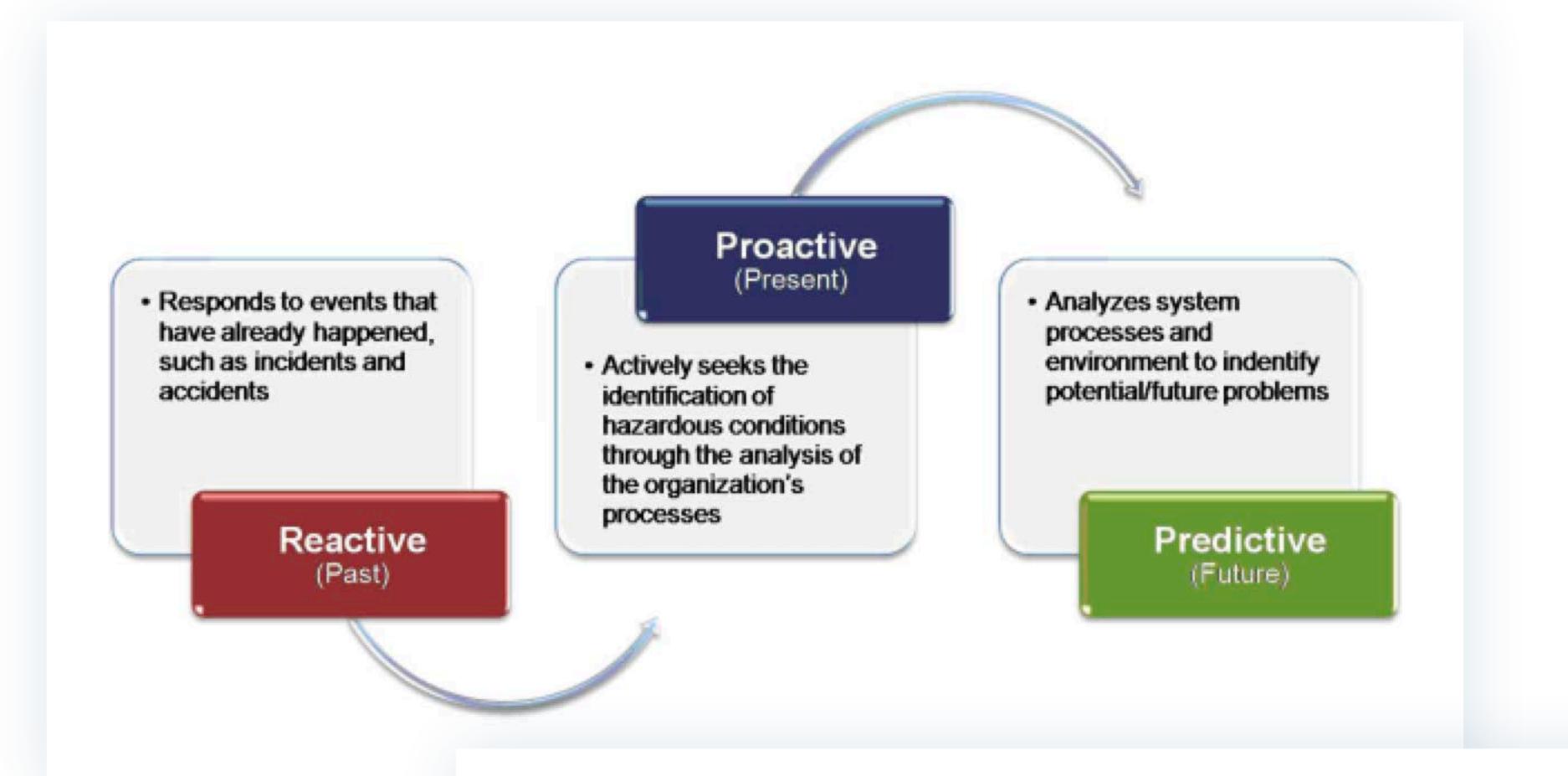
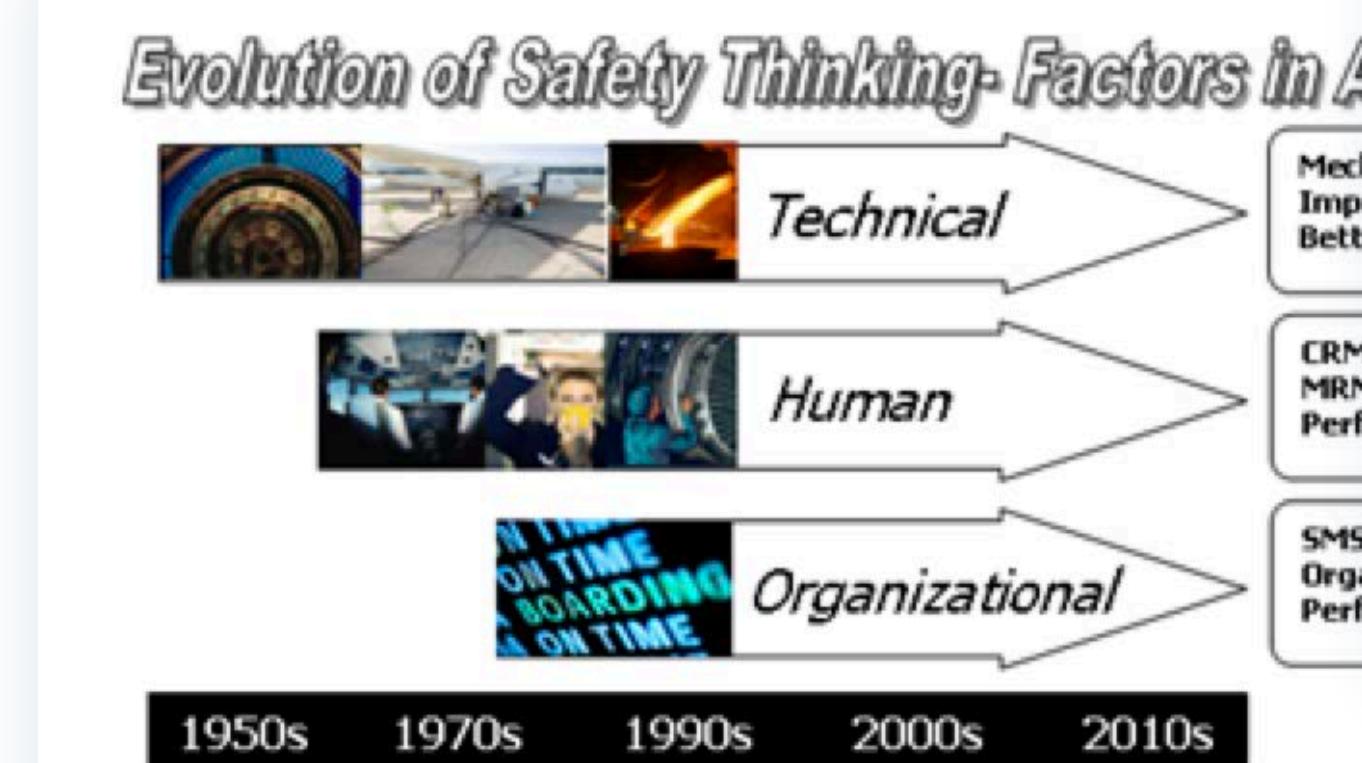
Effective date:
09/01/2023

SUBJ: Unmanned Aircraft Systems (UAS) Safety Risk Management (SRM) Policy

Safety Risk Management (SRM) is one of the four components of a Safety Management System (SMS). The objective of SRM is to provide information regarding hazards, safety risks, and safety risk controls to decision-makers to enhance the Federal Aviation Administration's (FAA) ability to address safety risks in the National Aerospace System (NAS).

The FAA has been tasked with safely integrating unmanned aircraft systems (UAS) operations in the NAS. This Order supplements FAA Order 8040.4, Safety Risk Management Policy by establishing a methodology for conducting SRM when required. This Order establishes governance and triage steps for all requests to operate UAS received by FAA lines of business (LOB) and defines SRM steps for the Aviation Safety (AVS) organization.

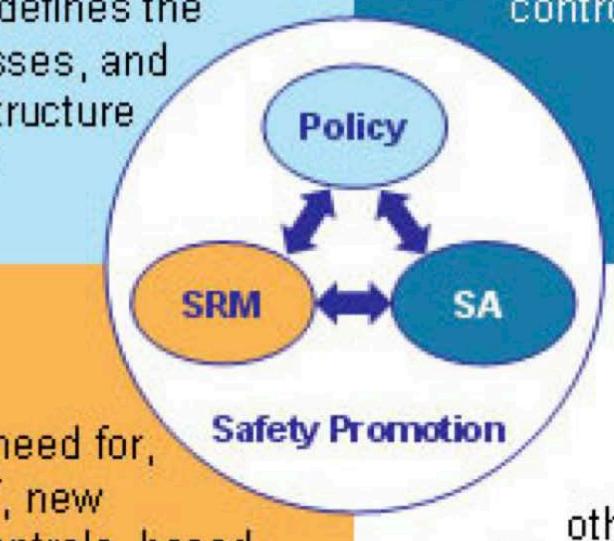
Polly Trottenberg
Acting Administrator



The Four SMS Components

Safety Policy

Establishes senior management's commitment to continually improve safety; defines the methods, processes, and organizational structure needed to meet safety goals



Safety Assurance

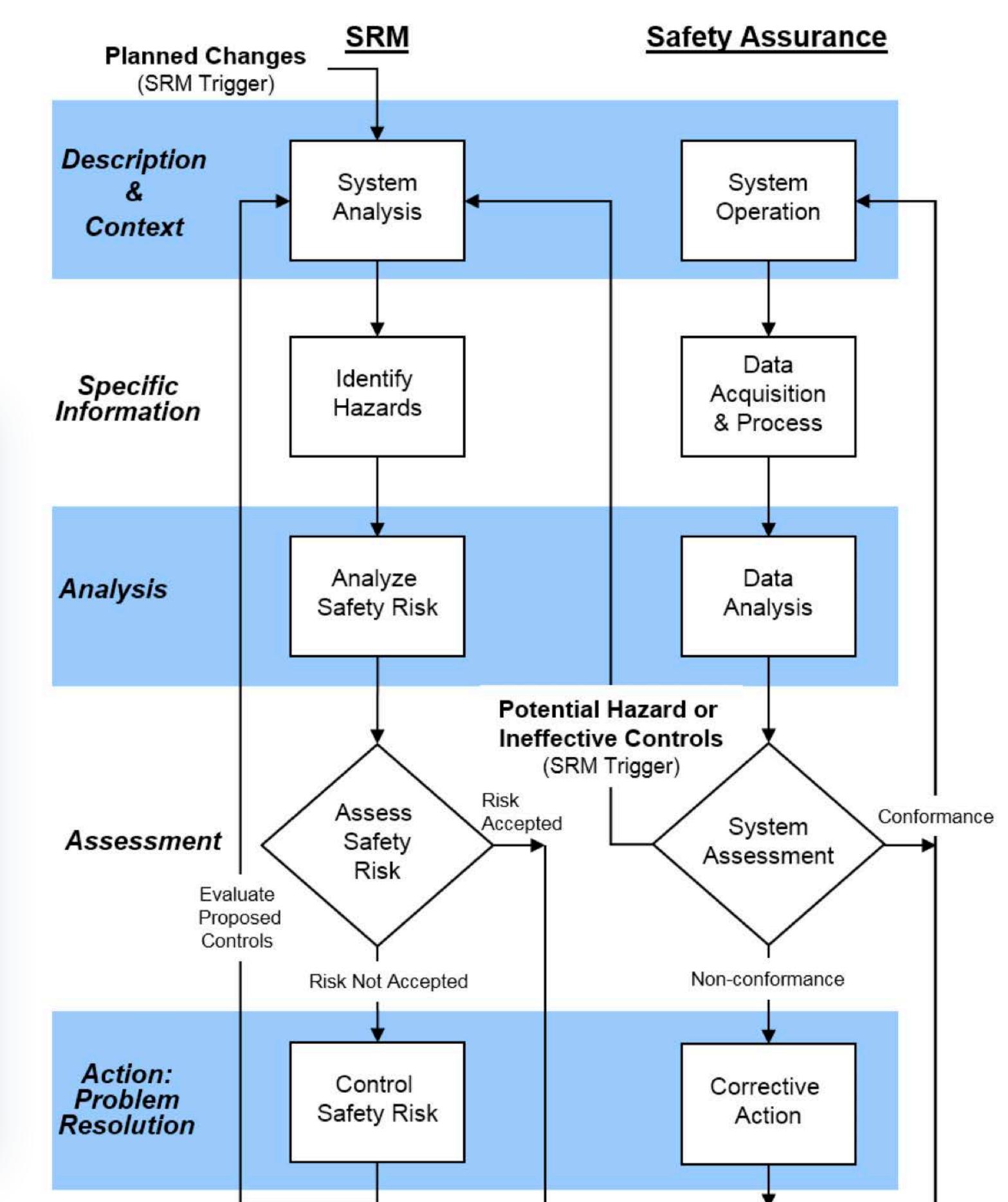
Evaluates the continued effectiveness of implemented risk control strategies; supports the identification of new hazards

Safety Promotion

Includes training, communication, and other actions to create a positive safety culture within all levels of the workforce

Safety Risk Management

Determines the need for, and adequacy of, new or revised risk controls based on the assessment of acceptable risk



What can be learned? A framework is needed.

What controls should be included in a
UCS and SRM framework for
AI-assisted coding?