

Competing in the Era of Software-Defined Warfare

Sean Maday

Google Cloud



Google Proprietary

Why Software Is Eating The World

By **MARC ANDREESSEN**

This week, Hewlett-Packard (where I am on the board) announced that it is exploring jettisoning its struggling PC business in favor of investing more heavily in software, where it sees better potential for growth. Meanwhile, Google plans to buy up the cellphone handset maker Motorola Mobility. Both moves surprised the tech world. But both moves are also in line with a trend I've observed, one that makes me optimistic about the future growth of the American and world economies, despite the recent turmoil in the stock market.



In an interview with WSJ's Kevin Delaney, Groupon and LinkedIn investor Marc Andreessen insists that the recent popularity of tech companies does not constitute a bubble. He also stressed that both Apple and Google are undervalued and that "the market doesn't like tech."

In short, software is eating the world.

2011: Marc Andreessen predicts that software companies would disrupt traditional industries

2022: Every company is software intensive and lines of code are still revamping industry dynamics

These same conditions have ushered in the era of

Software-Defined Warfare



Early Lessons We Can Draw from Ukraine

1

**Rapid Deployment of
Starlink Led to Battlefield
Successes**

2

**Poor Usability of Enterprise
Systems Led to In-Field
Makeshift Solutions**

3

**Depending on Sovereign
Digital Infrastructure Led to
Existential Consequences**

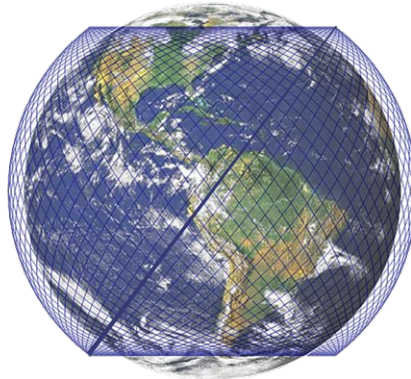
The Battlefield Success of Starlink

Elon Musk activates
Starlink service over
Ukraine and begins
shipping user terminals

February 26

February 23

Cyberattack targeting
modem hardware
degrades Viasat's
KA-SAT service



March 5

In response to Russian
jamming Starlink pushes a
software update to shift
Starlink frequencies

Lessons Learned: Starlink in Ukraine

Rapid fielding of commercial technologies

When the systems of record were degraded, Ukraine was able to quickly leverage the best of commercial innovation.

Fast iterative development and deployment

Software developers outmaneuvered a nation state by swiftly developing, testing, and deploying new feature functionality.



Poor Usability Leads to In-Field Makeshift Solutions

“In the call, you hear the Ukraine-based FSB officer ask his boss if he can talk via the secure Era system. The boss says Era is not working.”

Era phone is an expensive cryptophone system that the Russian military introduced with great fanfare in 2021.



Poor Usability Leads to In-Field Makeshift Solutions

Massive blow to Putin with reports of top Russian Major General killed in airstrike

NEWS

Russian Military Leaders Try to Lift Troop Morale As Tenth General Killed

Vladimir Putin loses ANOTHER colonel in huge blow to war effort in Ukraine

A Russian general who commanded electronic-warfare units was killed in a strike that killed 100 soldiers, Ukraine official says

High Death Toll of Russian Generals in Ukraine a Blow to Military Capability

Lessons Learned: Era Phone in Ukraine

Uniformed professionals are going to get the job done

When enterprise systems of record fail, modern combatants will revert to operating from commercially available technologies.

The mobile phone has become weaponized

Failure to understand digital device footprints can lead to movement tracking with significant kinetic consequences.



Rethinking Data Sovereignty

Russia successfully targeted Ukraine's government data centers in Kiev and Kharkiv with cruise missiles, threatening continuity of Ukrainian government operations.

Ukraine's government was able to sustain civil and military operations by disbursing digital infrastructure into commercial cloud regions across Europe.



Rethinking Data Sovereignty



Rethinking Data Sovereignty



Lessons Learned: Hiding in the Noise

Data center infrastructure makes appealing targets

Housing software and data inside of a nation's borders may offer tacit protection from some attack vectors, but can risk existential consequences during a period of armed conflict.

Create strategic dilemmas for our adversaries

Running workloads in commercial cloud alongside the digital infrastructure of global finance, commerce, and entertainment companies will change the targeting calculus for adversaries.





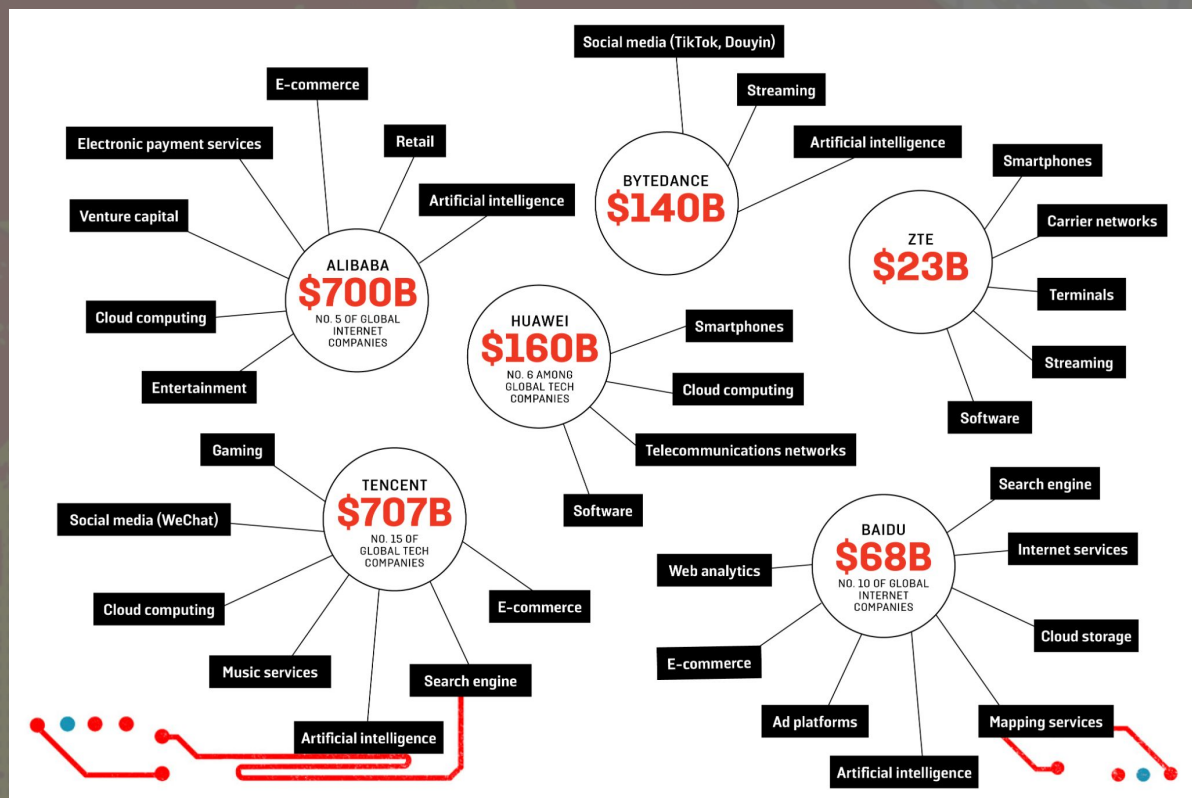
China as the Pacing Threat

What does resilience, capability, and security at speed and scale mean in the era of great power competition?

Competing Against Civ-Mil Fusion

“By outsourcing these expensive data-processing functions to private companies, Chinese intelligence agencies can also exploit these commercial capabilities at a scale they don’t possess themselves or don’t want to build in-house, officials say.”

Foreign Policy - 23 Dec 2020





1
BILLION
users



You Tube



Google in 1 minute



**5.5M
Searches**

You Tube

500 Hours



**1000 new
devices**



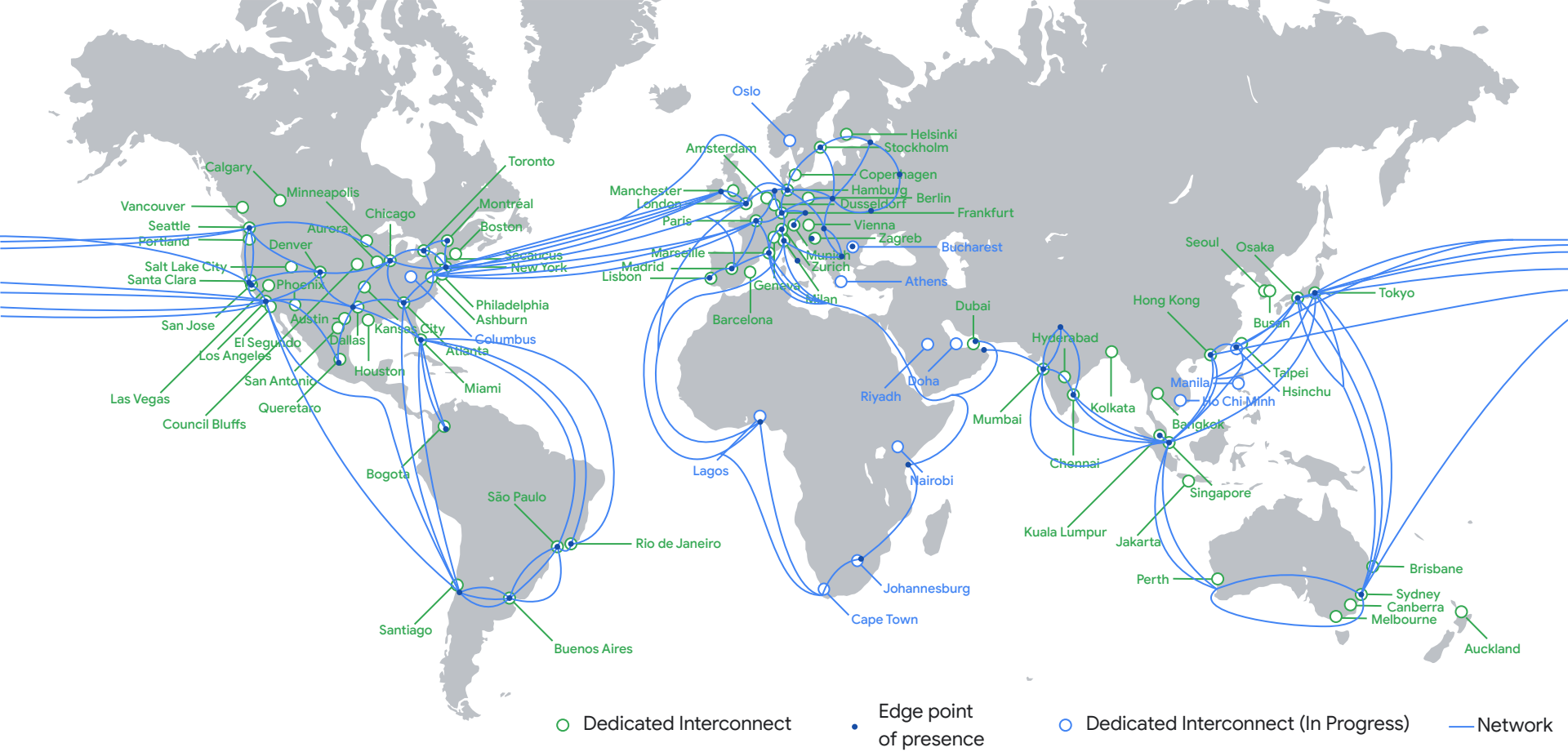
**450k Miles
Driven**



10B API Calls

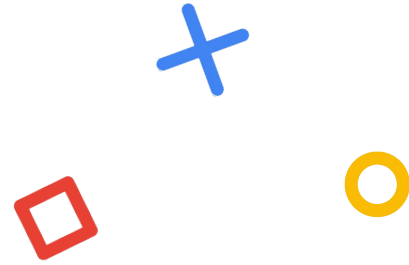


**3M+ Photos
Uploaded**



PoPs, network, and Dedicated Interconnect

Google Cloud pushed more than



2,000

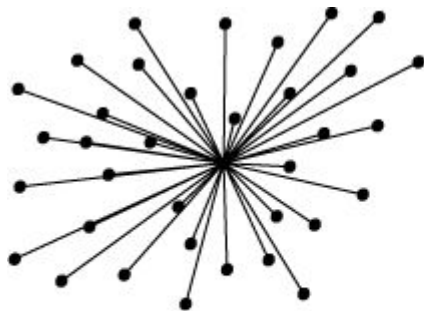
product and feature releases

in 2021

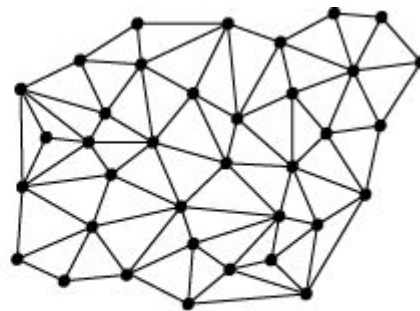
The key is an API-first integration approach

An API-first integration strategy allows organizations to leverage existing data and systems to build APIs that serve all applications, and applications can be developed and maintained efficiently for all devices, platforms, and operating systems.

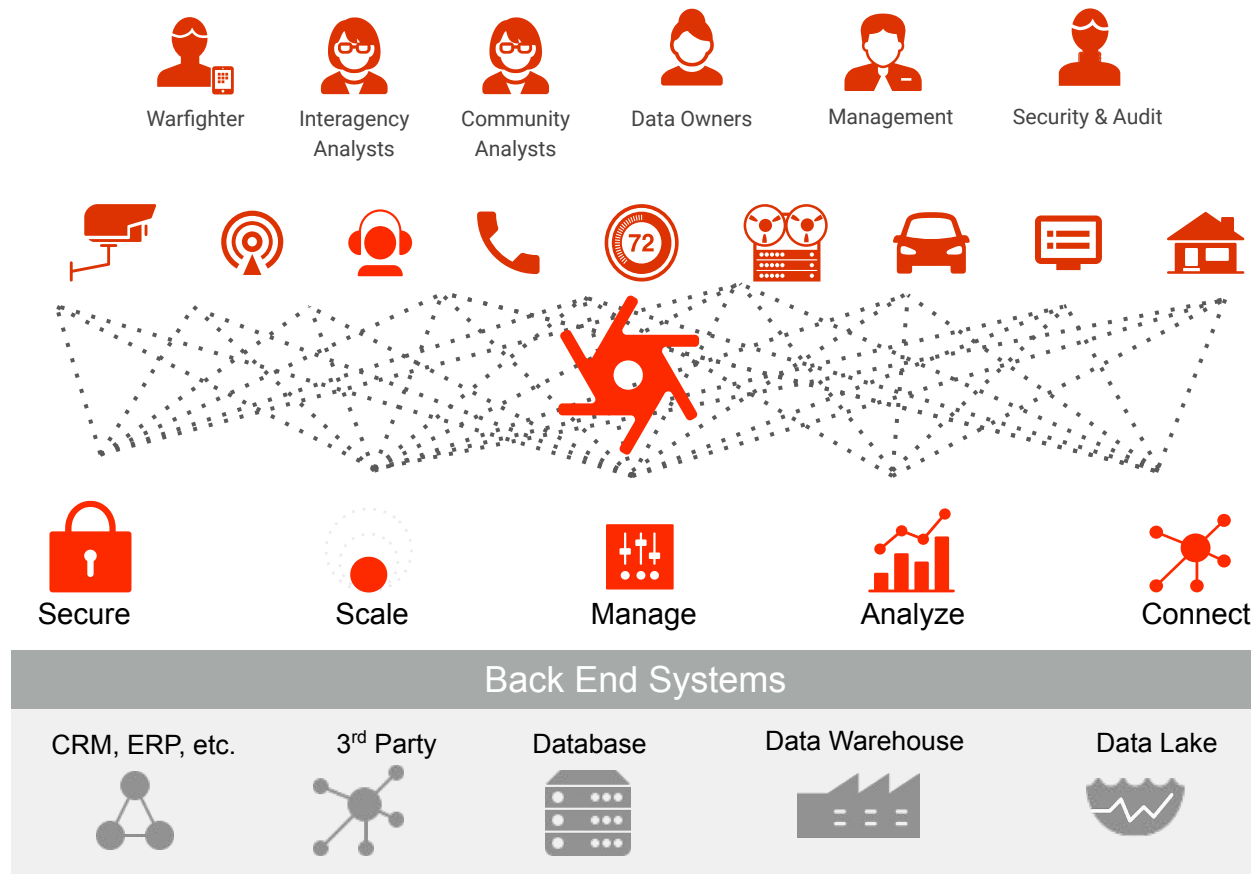
- 
- 1 Accelerate developer velocity
 - 2 Increases the speed to release
 - 3 Reduces cost | risk



Central ***vs.*** ***Distributed***



DoD Platform & Ecosystem



Platform Participants consist of internal and potentially external consumers, producers, and partners

Systems of Interaction provide channels for consumption and creation

The API Platform

- 1) provides a participative, plug-and-play infrastructure for producers and consumers to plug into and interact with each other,
- 2) curates participants on the platform, secures and governs interactions

Systems of Record take advantage of the API platform to access channels of demand

APIs Power Experiences

Picture: content management system

Reviews: 3rd party system

Q&A: microservices

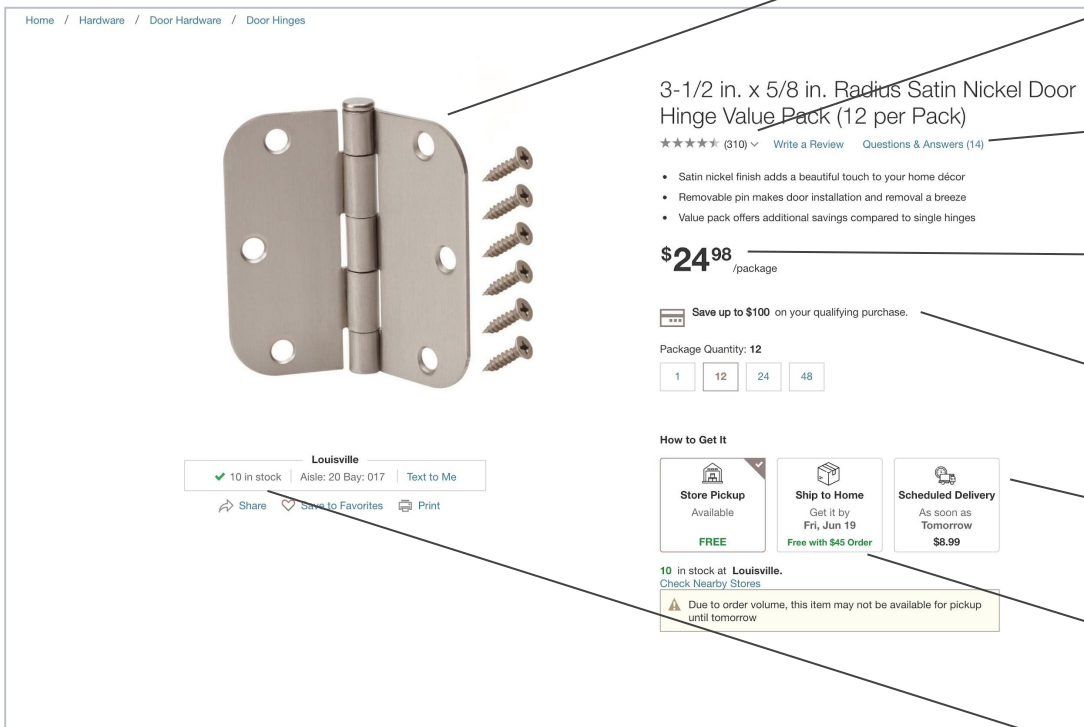
Price: ecommerce system

Promotion: ecommerce system

Shipping estimate: shipping partner

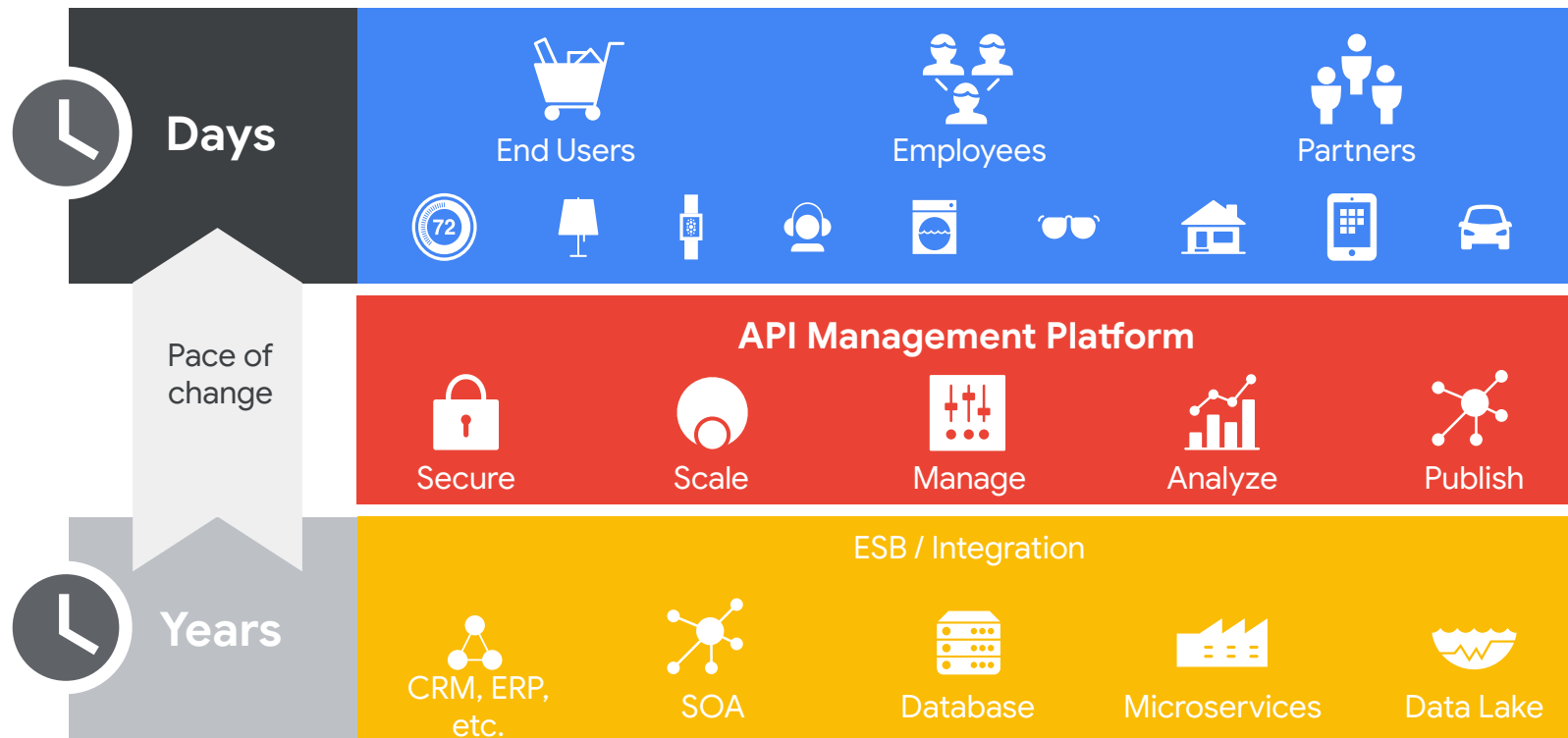
Delivery estimate: shipping partner

Inventory: inventory system



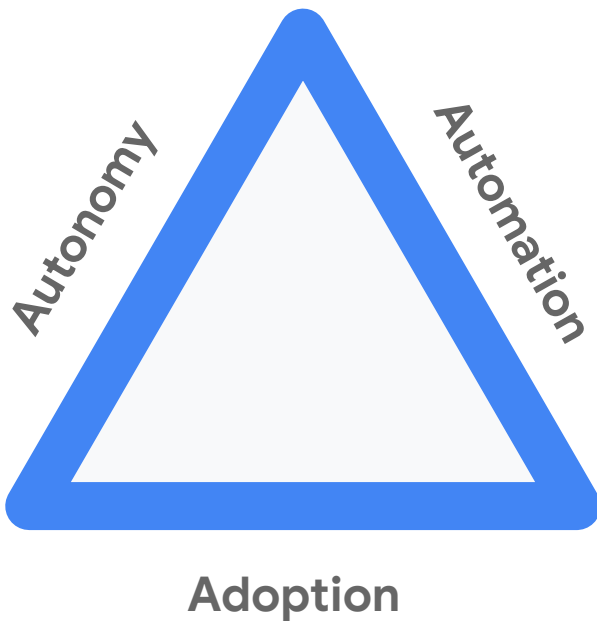
APIs Bridge the Gap

Connected Digital Experiences





API governance
is **reducing risk**
while enabling
teams to **go**
faster



Big G vs. little g culture

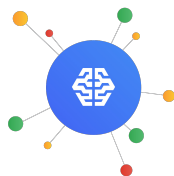
Governance

- Rules, Gates, Enforcement
- Top-down design and planning
- Approvals for releases
- Strict permissioning
- MS Word documents
- Distinct function teams
- Project-based funding

governance

- Principles, Standards, Empowerment
- Team- and Customer-driven design
- Release continuously
- Self service tools
- Collaborative documentation (wiki)
- Cross-functional teams
- Automated compliance via CI/CD and pre-built tools

Put PEO BES on a Path to Lead AI/ML in the DoD



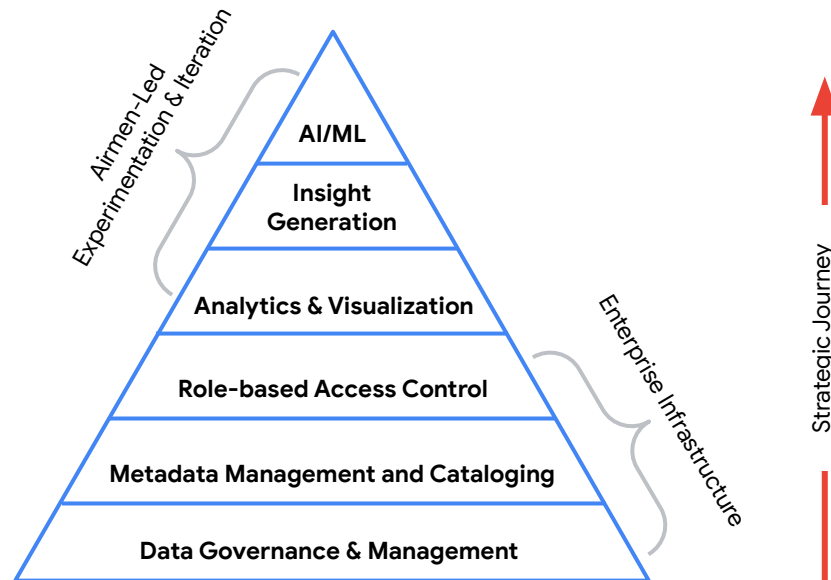
Baked-in intelligence

Software features that leverage AI/ML to deliver automations and smart workflow suggestions to make the day-to-day lives of users easier



ML for everyone

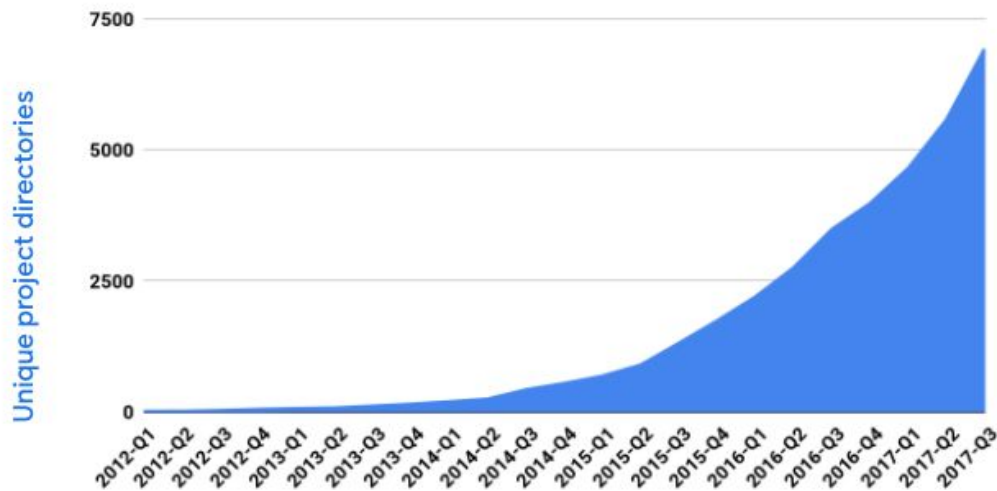
Tools to put AI/ML capabilities - such as OCR, sentiment analysis, and outcome prediction – in the hands of the USAF developers



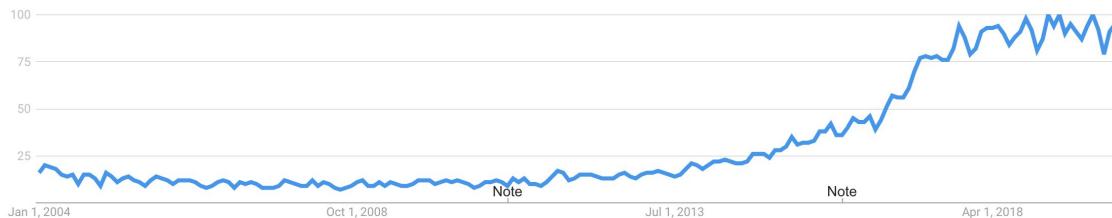
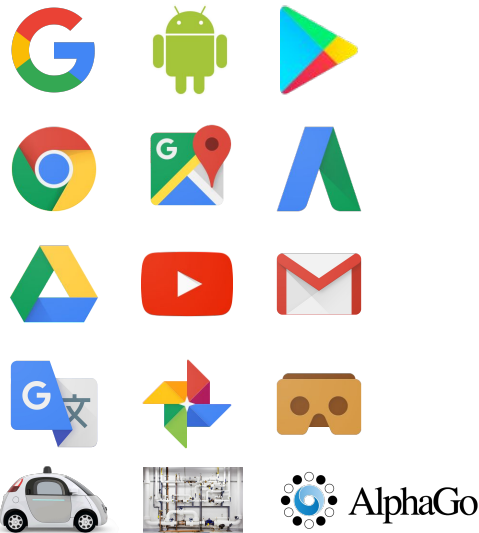
Adapted from *The AI Hierarchy of Needs* by Monica Rogati

AI In Everything You Do

Google directories containing Brain's deep learning models



Used across products:

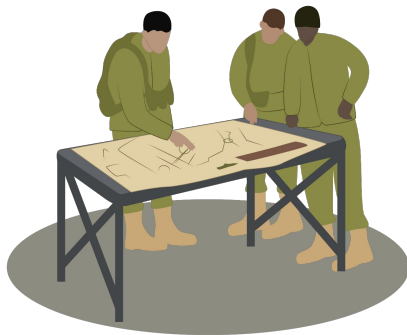


Democratic Response to Civ-Mil Fusion

1. Partner w/ hyperscale commercial companies to accelerate speed & scale
2. API First - build ecosystems through abstraction, governance, and integration
3. Optimize for the user experience of mission owners and end users
4. Embrace ML Ops - success is continuously trained/deployed AI models



That's a wrap.



Google Cloud