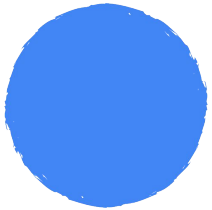
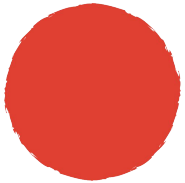


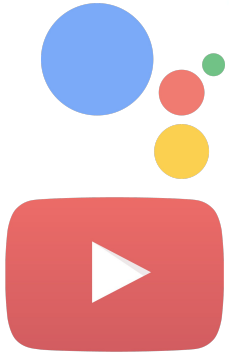
Impact Journey

Lessons learned through an engineer's lens

irwin@google.com

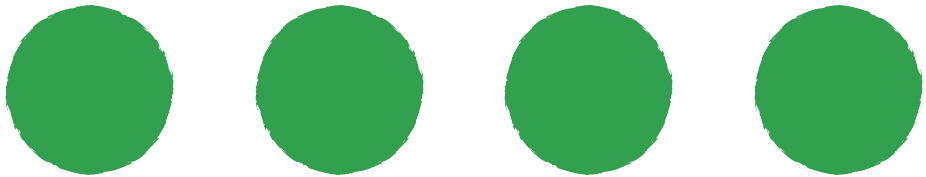


Irwin Boutboul



Google
Startups for
Sustainable
Development

What’s impact?



Impact definition

Corporate social responsibility

Sustainable Development Goals

Environmental Social Corporate Governance

?

Unfulfilled promise

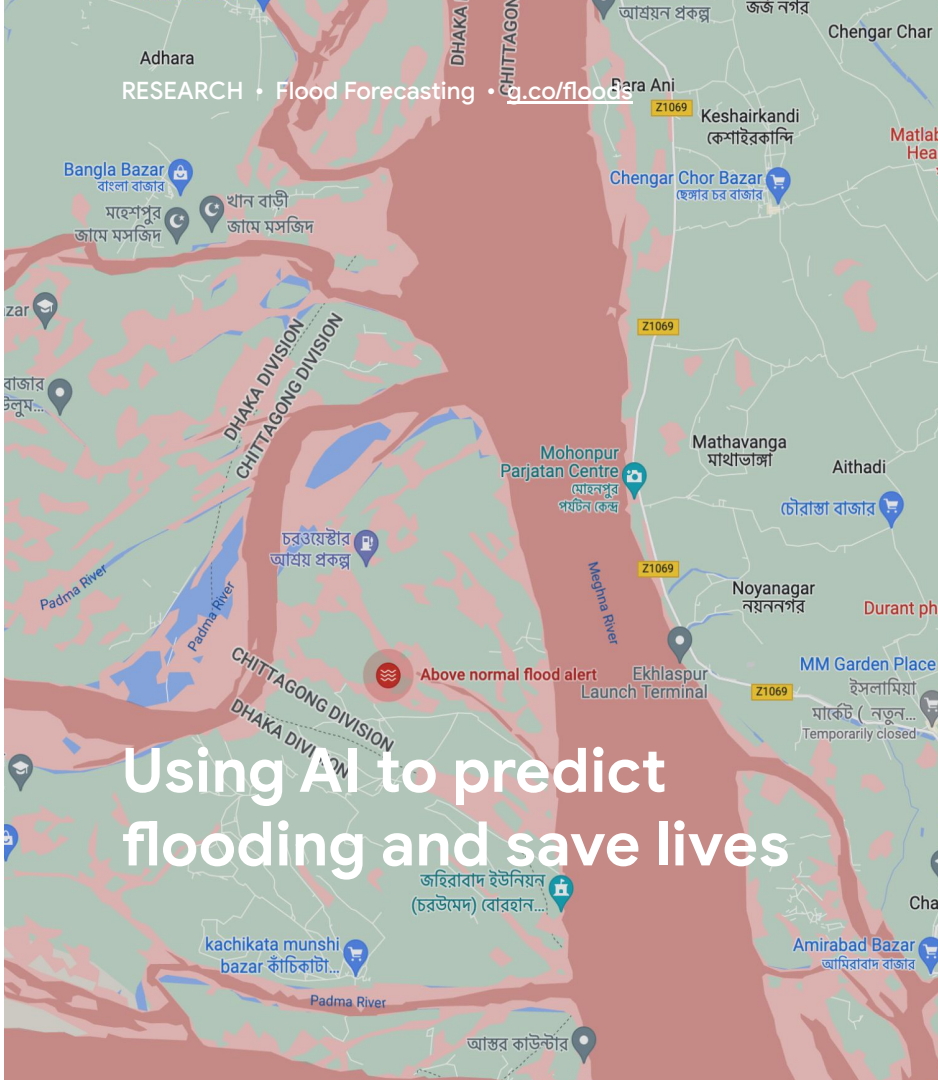
Engineering
1% positive impact

RESEARCH • ARDA •
https://about.google/stories/seeingpotential/

Increasing access to diabetic eye screening with AI

RESEARCH • Flood Forecasting • g.co/floods

Using AI to predict flooding and save lives



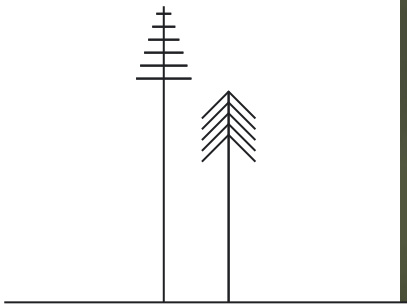
RESEARCH • Read Along • readalong.google.com

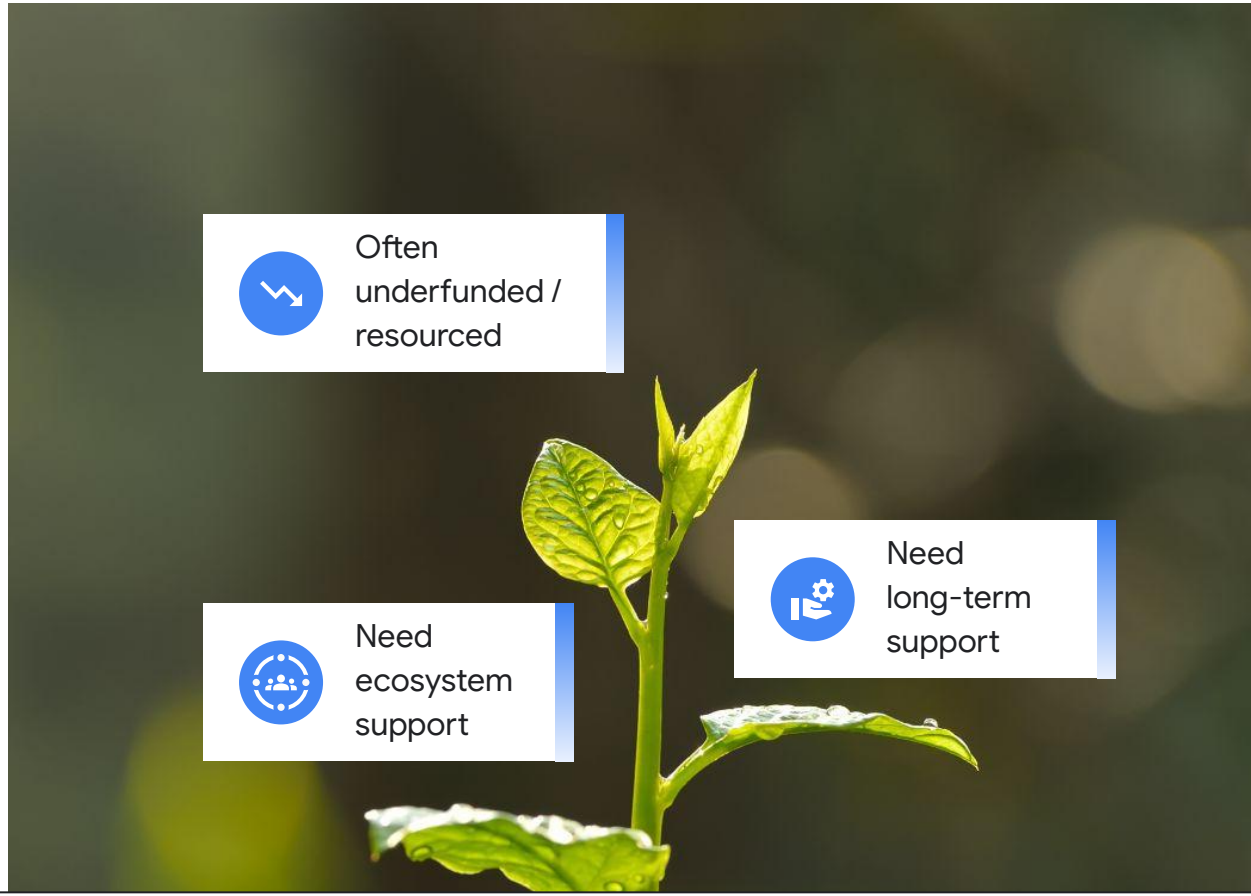
Learning to read with AI

RESEARCH • Green Light

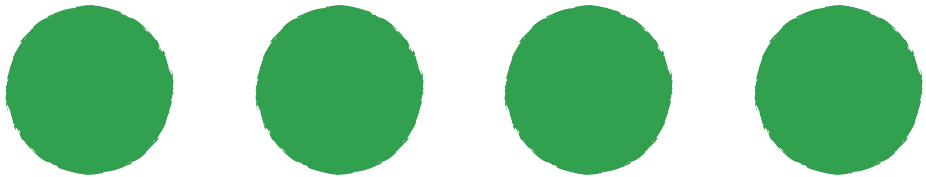
Using AI to optimize traffic lights and reduce emissions

The impact startup ecosystem

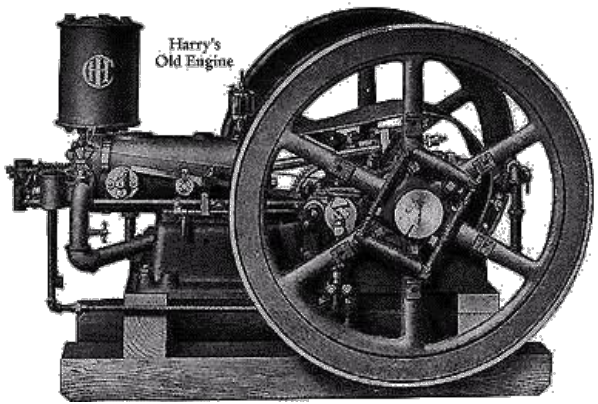


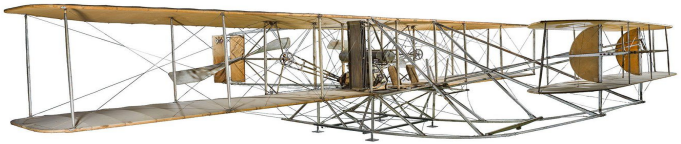


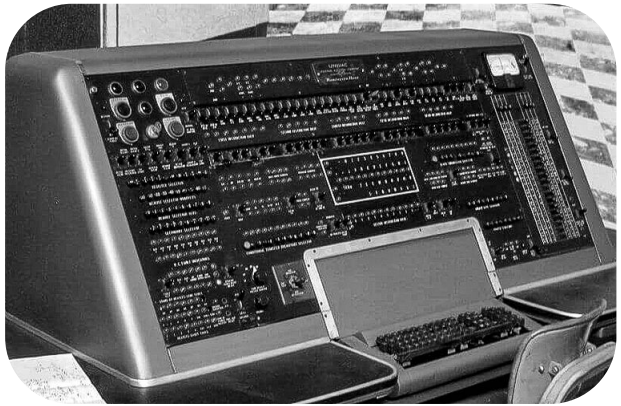
The impact of the other 99% engineering



Unprecedented innovation







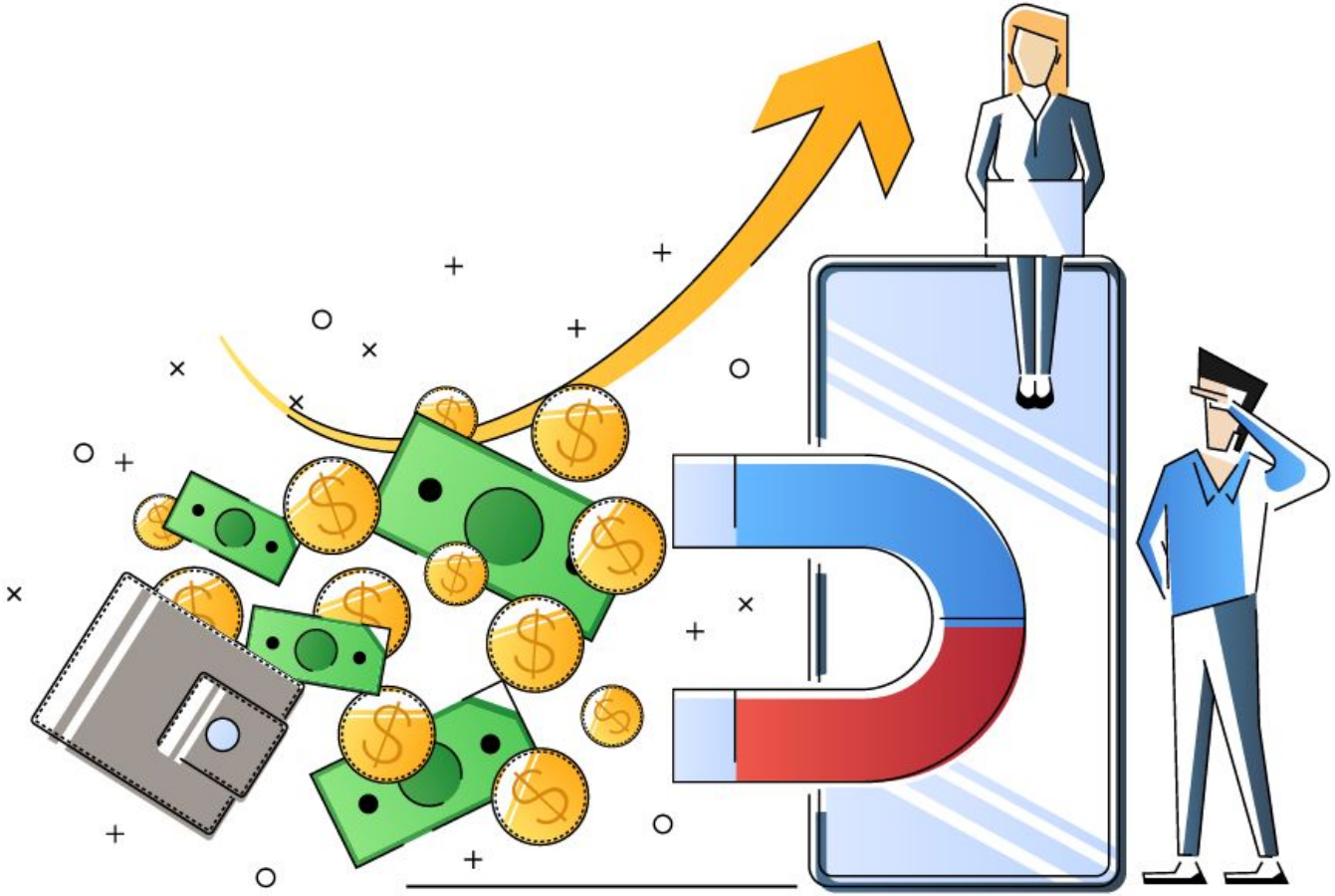
Unprecedented speed of penetration

75 years

12 years

12 years

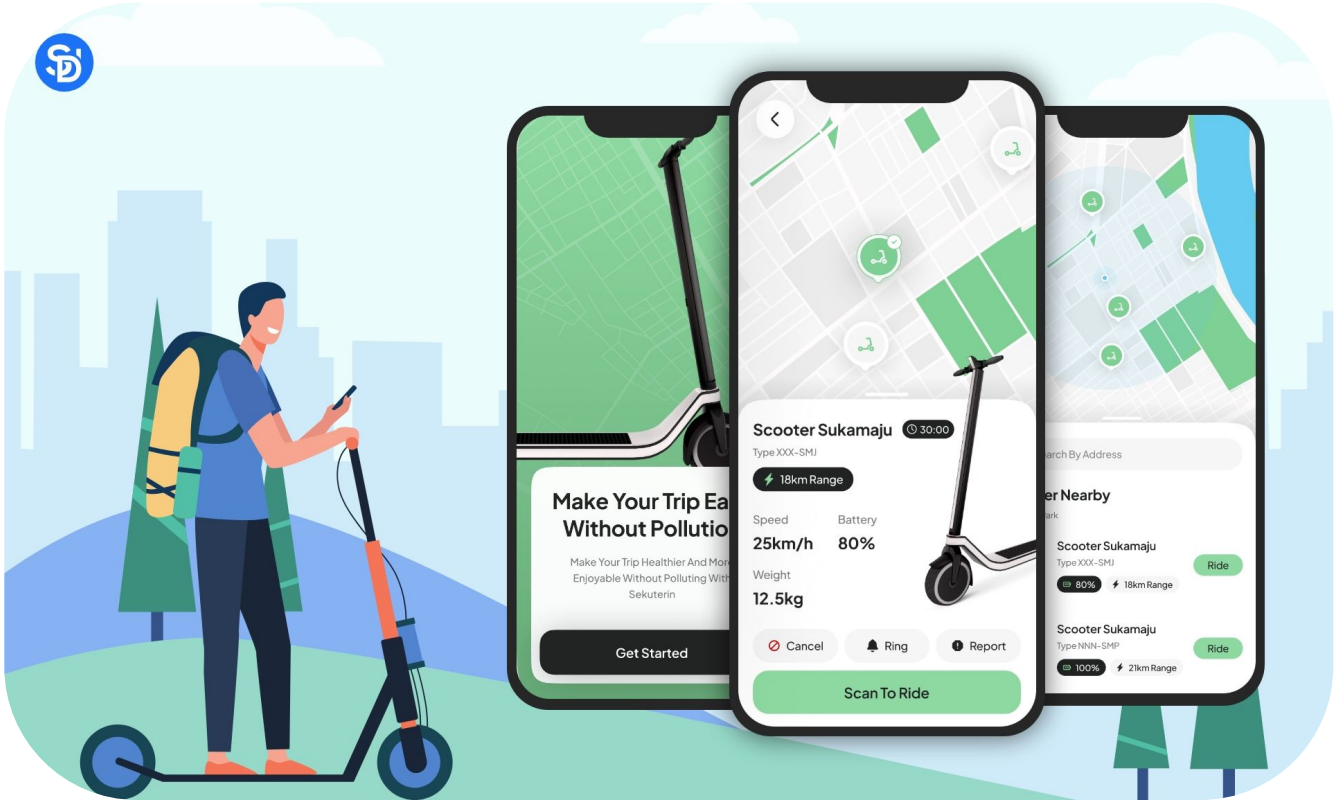
50% penetration



Uber

wework

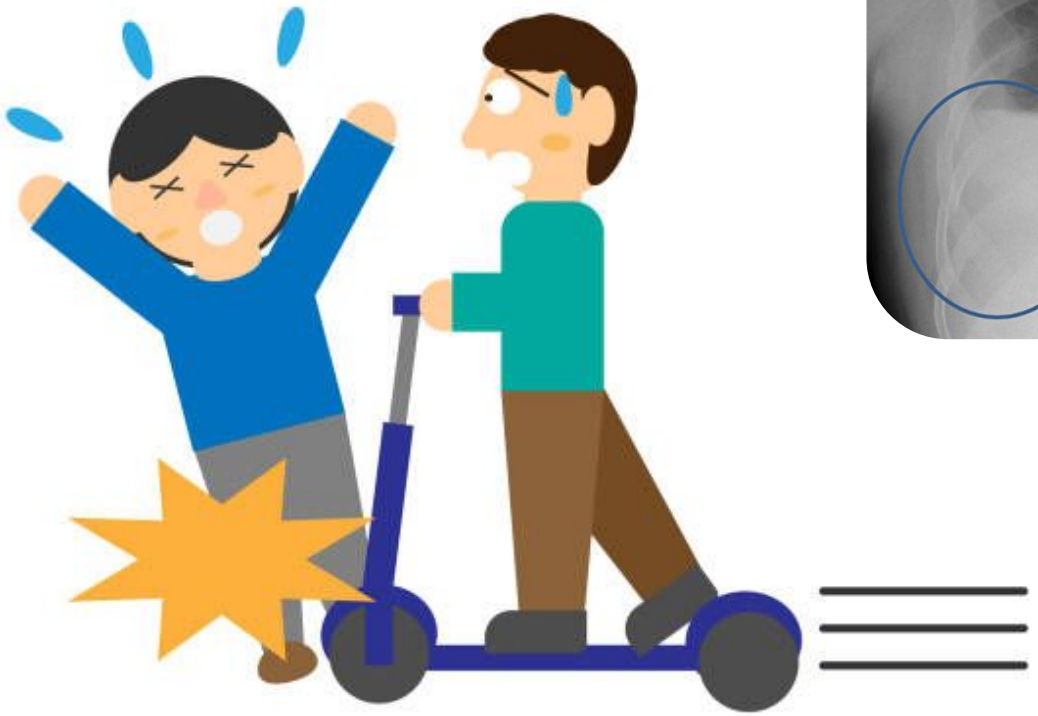
Impact tech case study

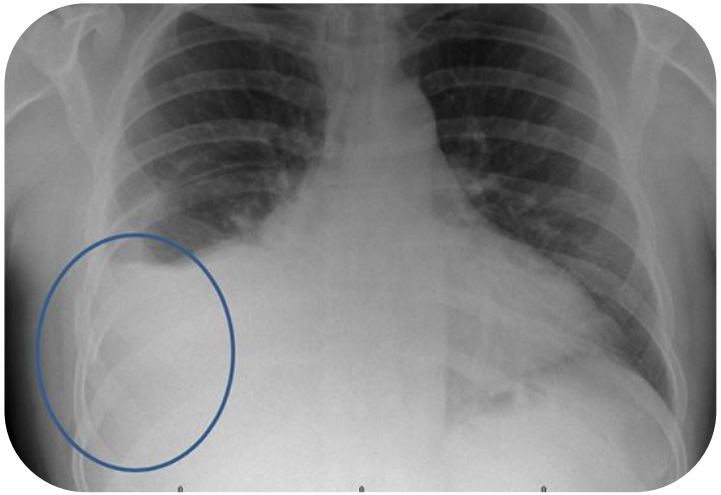


#1 environmental impact

#1 environmental impact

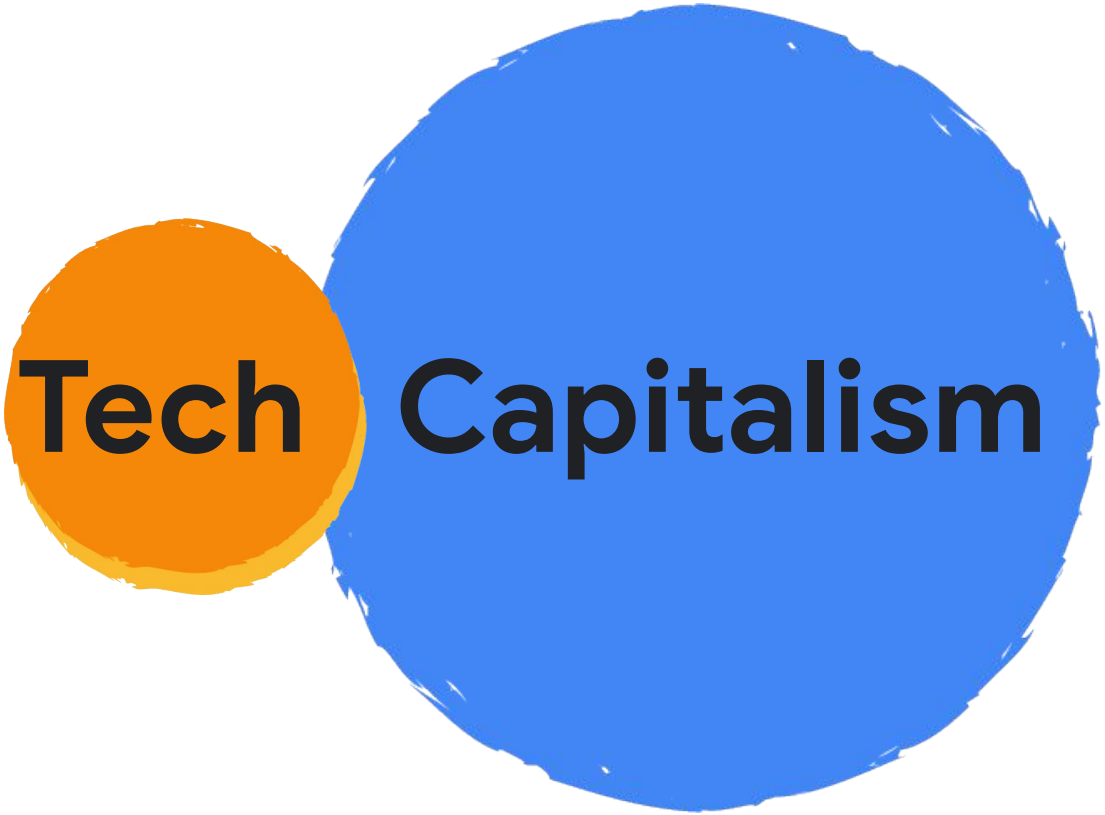
#2 societal impact



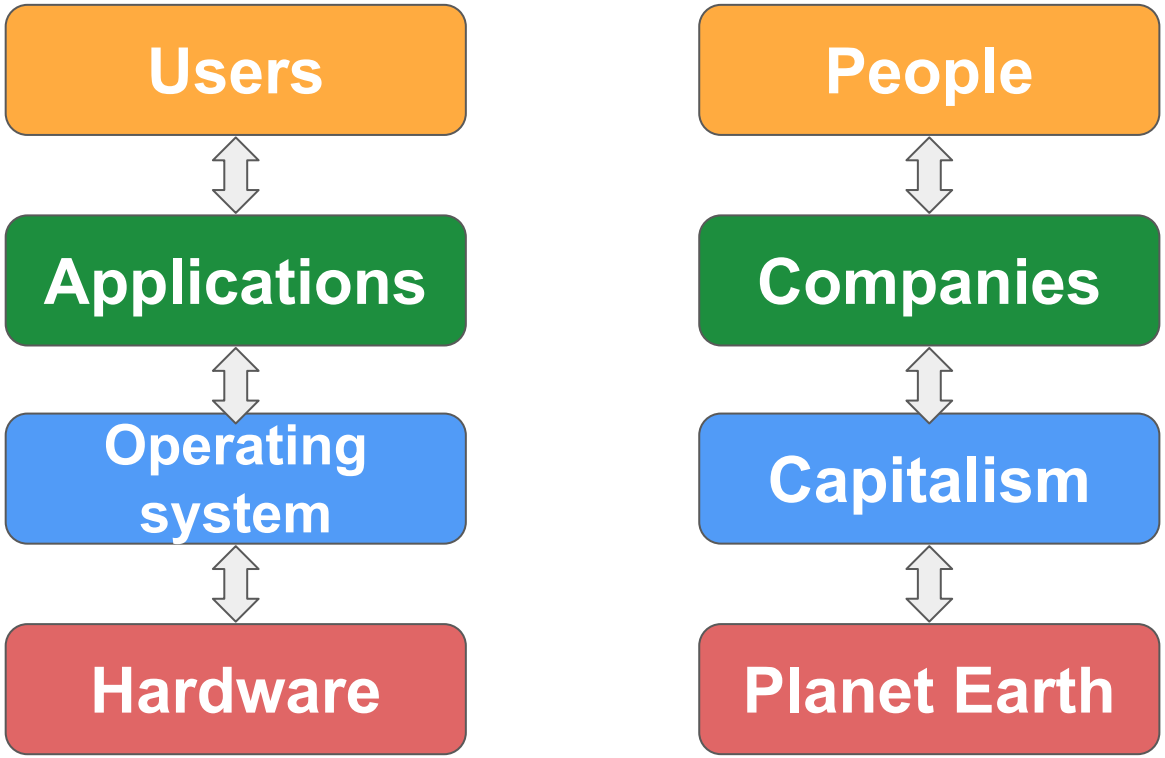


#3 Long term impact

Bottom line?

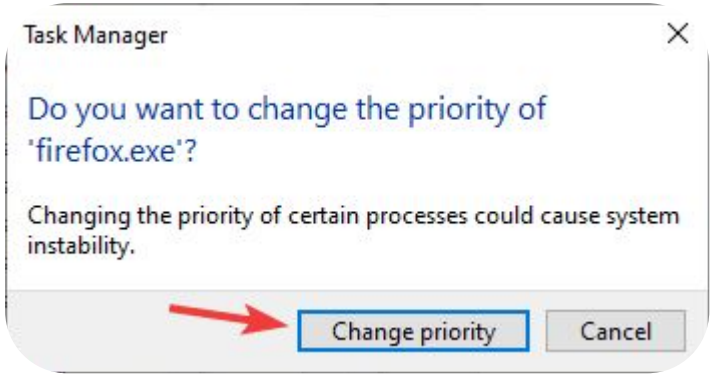

Tech
Capitalism

Complex systems

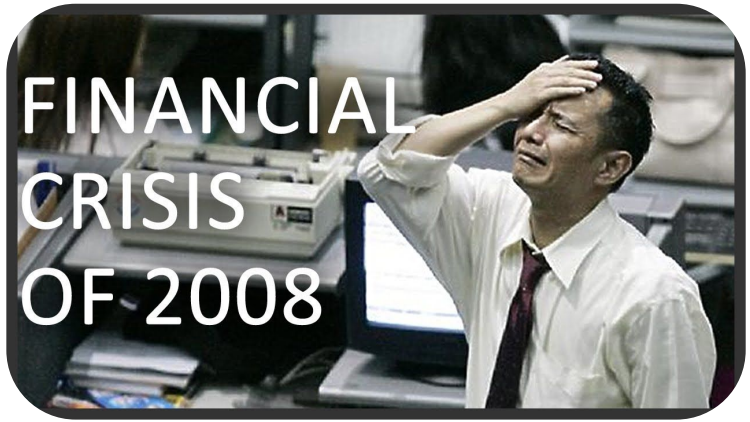


Capitalism issues

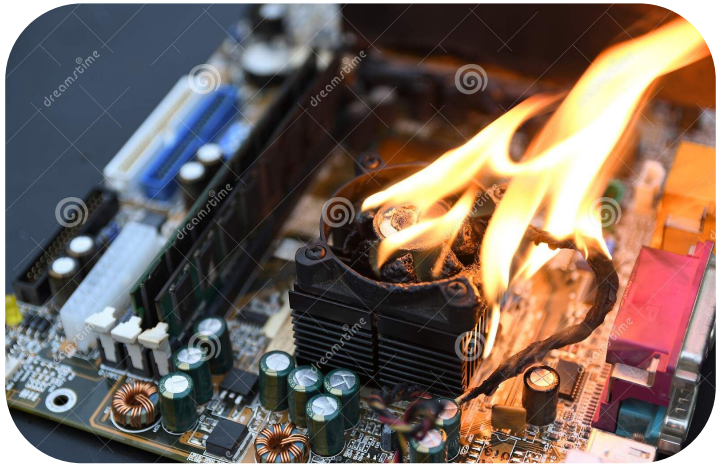
Issue #1 - Some apps are impacted more than others



Issue #2 - System crashes!



Issue #3 - Sometimes the hardware is destroyed



Learnings for Engineers

Observation #1

Engineers are building for a

a deprecated C

Observation #2

Everything is connected,
but we engineer
without understanding
relationships

Observation #3

We are engineering solutions without taking impact into account

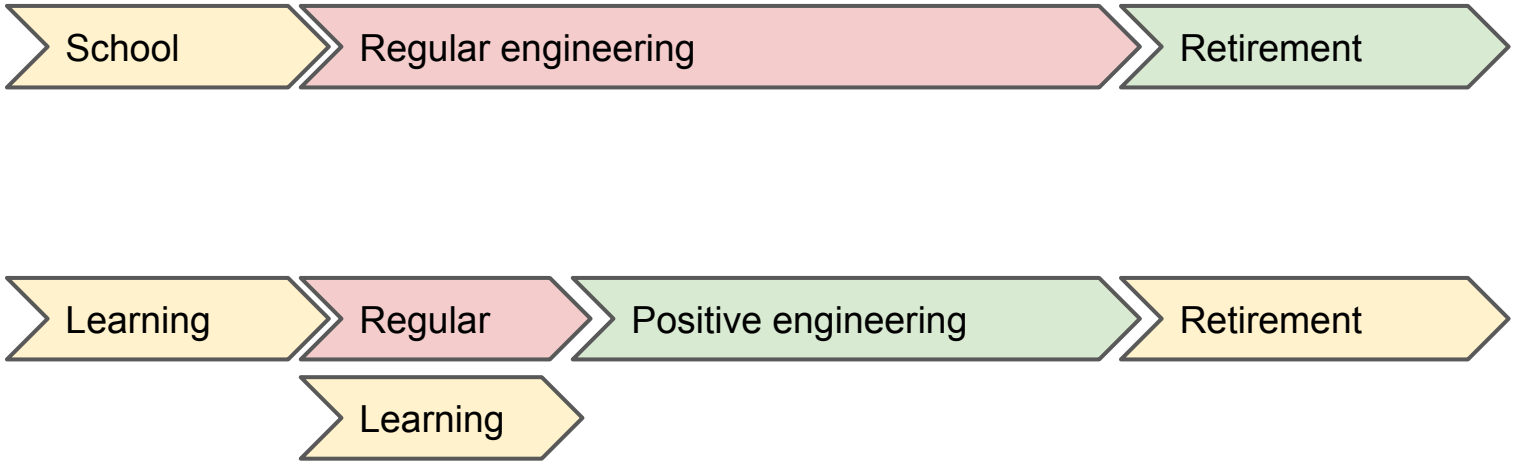
Observation #4

Our society
is not paying attention to
the first 3 observations

A multi-disciplinary approach

- Engineering
- Law & Economics
- User behavior
- Natural resources
- Philosophy

Learning journey



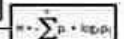
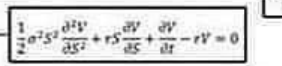
Ask questions

Highlight problems

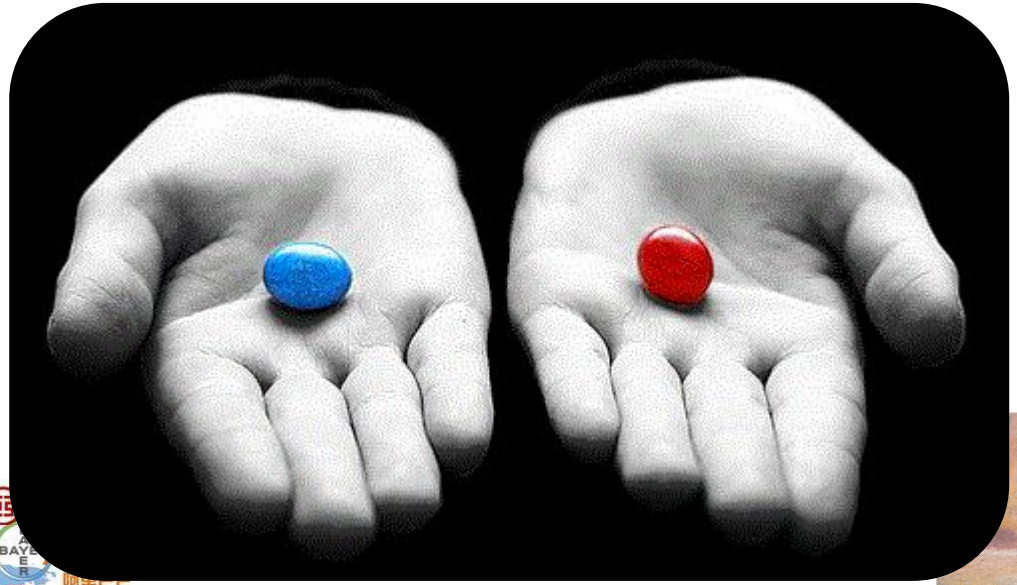
Challenge status quo

Focus on impact

Equations that changed our world

1. Pythagorean's Theorem — $a^2 + b^2 = c^2$
2. Logarithms — $\log_a b = c \Leftrightarrow a^c = b$
3. Derivatives — $\frac{df}{dt} = \lim_{h \to 0} = \frac{f(t+h) - f(t)}{h}$
4. Law of Gravity — $F = G\frac{m_1 m_2}{r^2}$
5. Imaginary Numbers — $i = \sqrt{-1}$
6. Euler's Formula — $V - E + F = 2$
7. Normal Distribution — $f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{\frac{-(x-\mu)^2}{2\sigma^2}}$
8. Wave Equation — $\frac{\partial^2 y}{\partial t^2} = \frac{1}{v^2}\frac{\partial^2 y}{dt^2}$
9. Fourier Transformation — $F(k) = \int_{-\infty}^{\infty} f(x) e^{-2\pi i k x} dx$
10. Navier-Stokes Equation — $\rho\frac{D\vec{V}}{Dt} = -\nabla p + \rho\vec{g} + \mu\nabla^2\vec{V}$
11. Maxwell's Equation —
12. 2nd Law of Thermodynamics — $dS \geq 0$
13. Relativity — $E = mc^2$
14. Schrodinger's Equation — $\hat{H}\Psi = i\hbar\frac{\partial\Psi}{\partial t}$
15. Information Theory — 
16. Chaos Theory — $x_{t+1} = kx_t(1 - x_t)$
17. Black Scholes Equation — 

Conclusion



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orange
HSBC
WELLS FARGO
SAMSUNG

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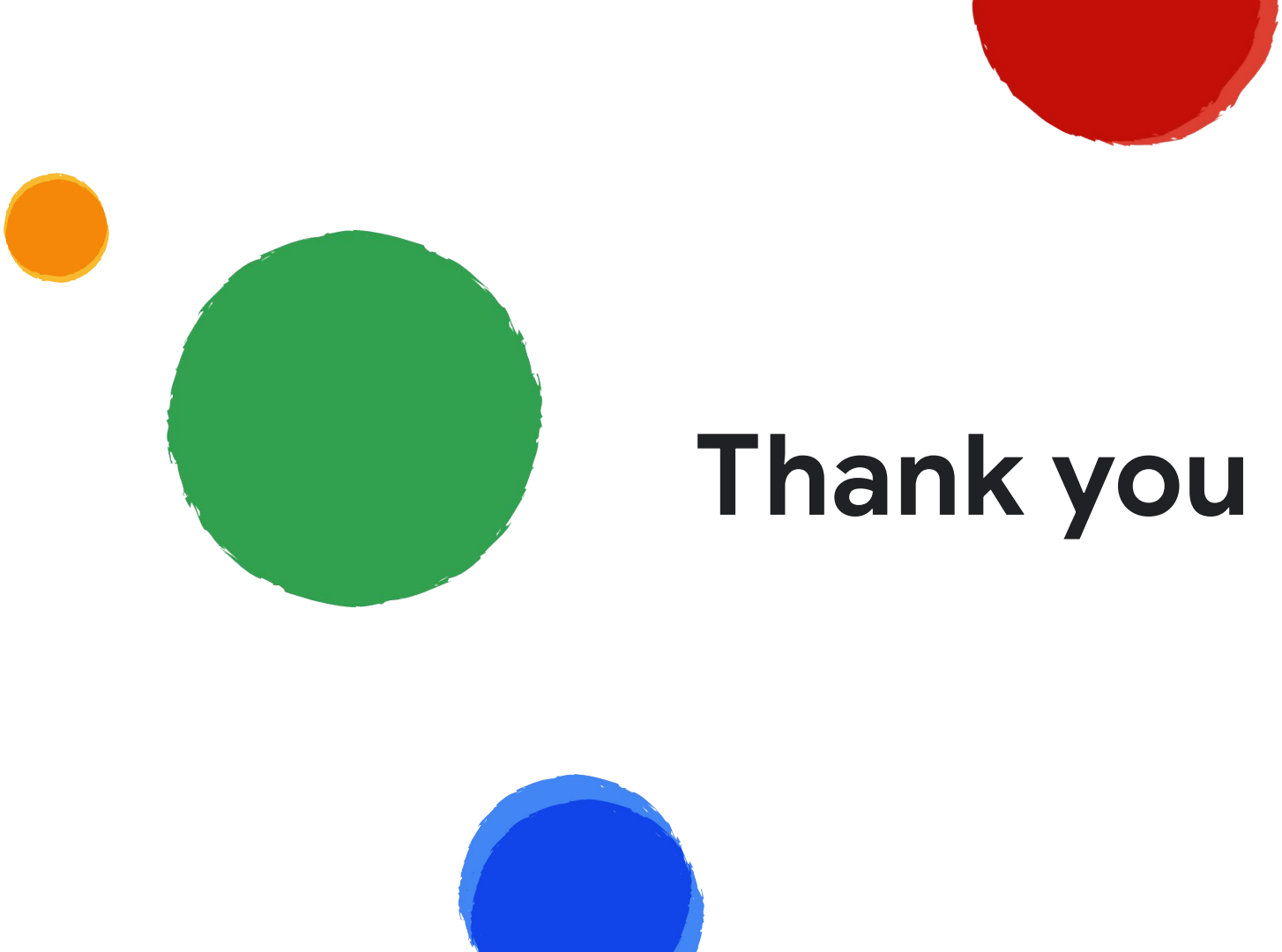
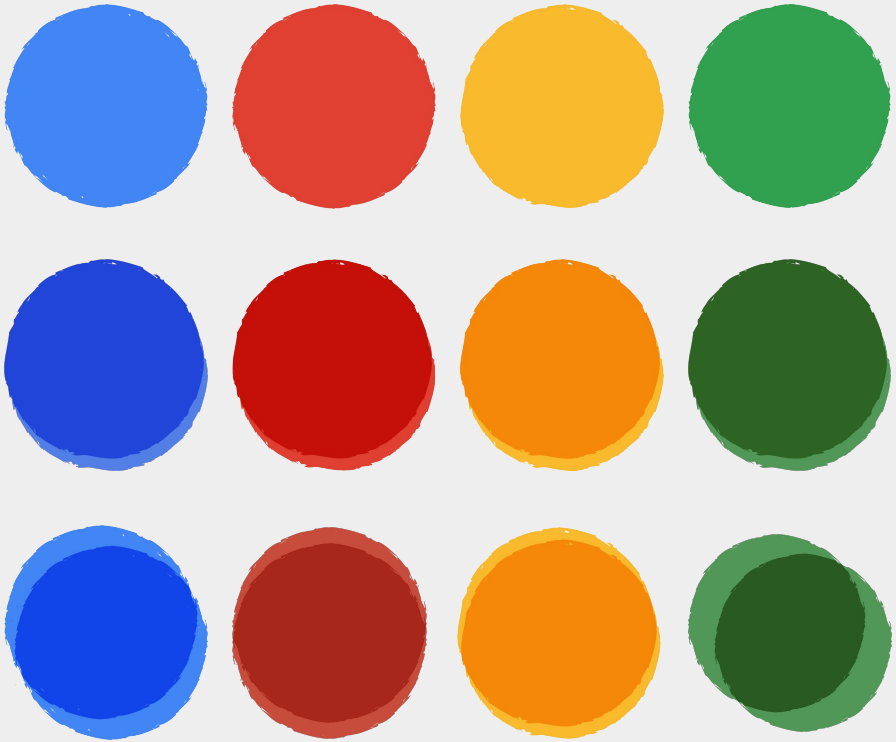
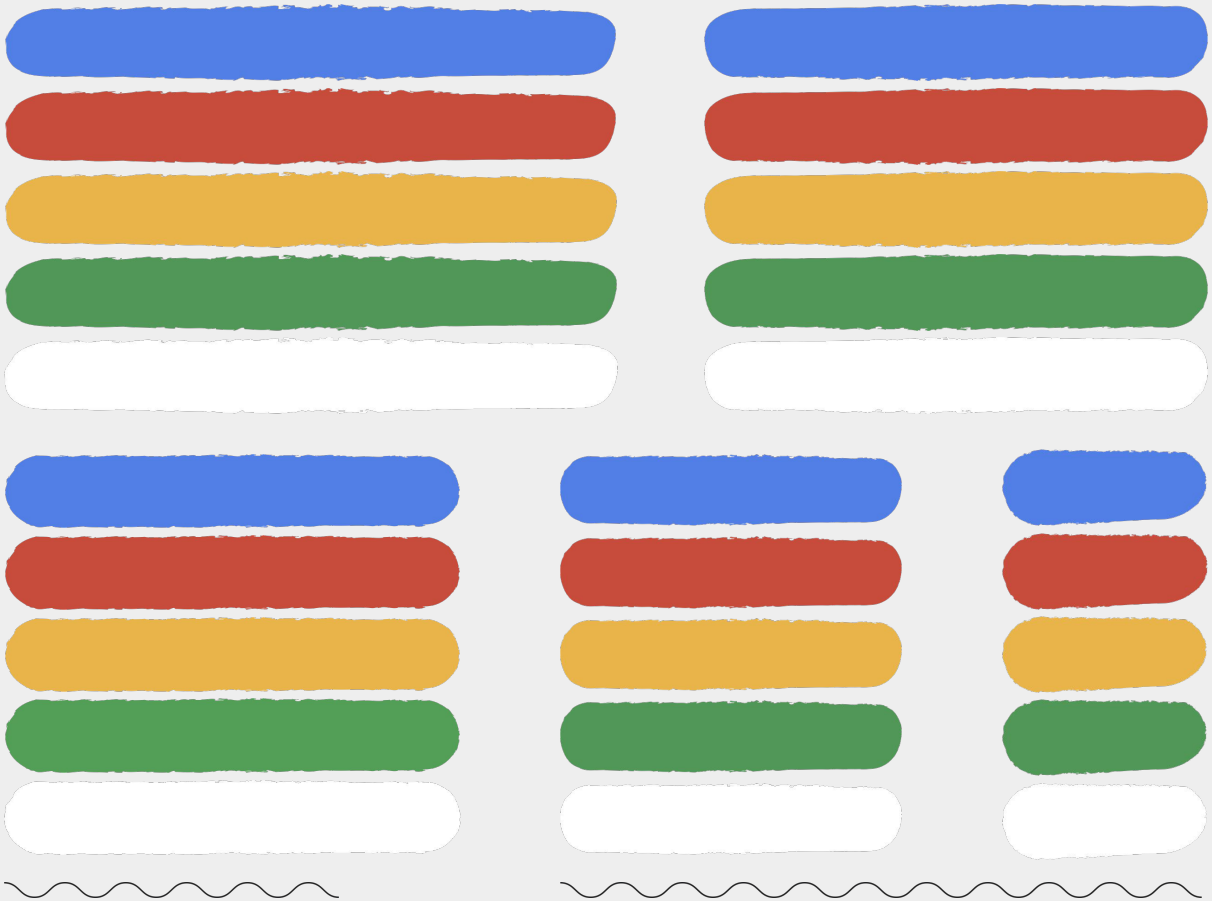
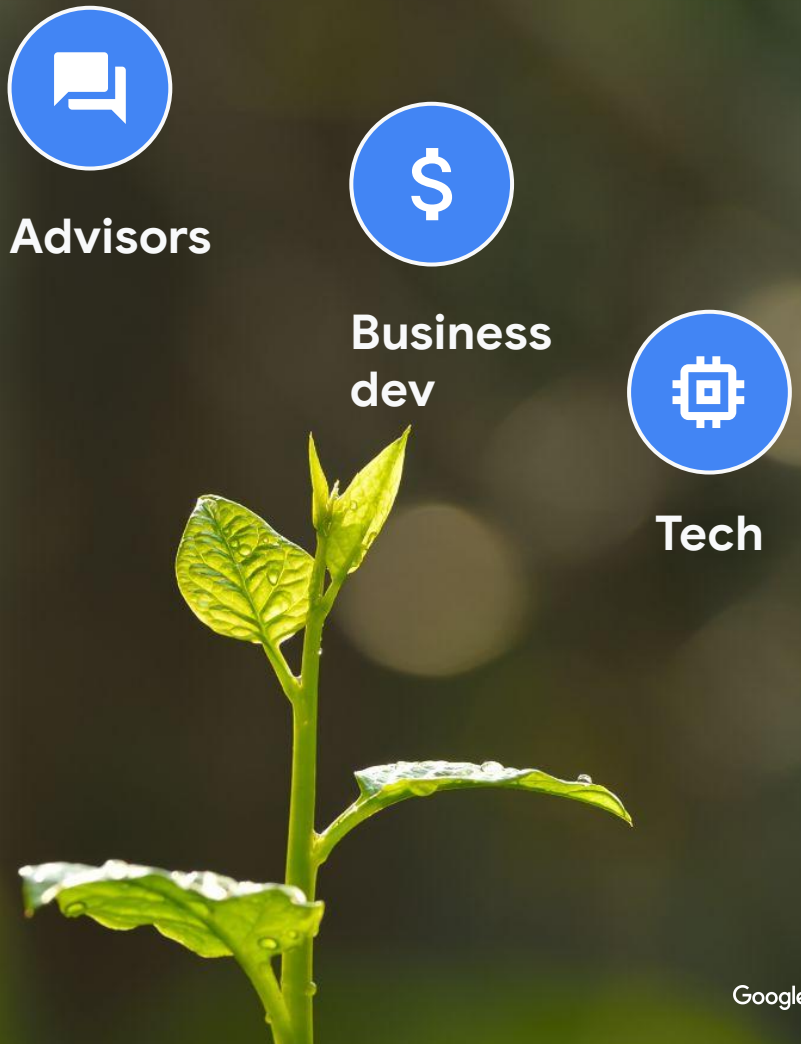

Thank you





Startups for Sustainable Development

Support a global ecosystem of impact-focused startups. Leverage the Sustainable Development Goals as a guiding framework to measure positive impact.



Google

Startups for Sustainable Development

400
Startups

70
Countries

140
Partners

300+
Advisors

1000+
Mentoring sessions

17
SDGs

#GoogleSustainability