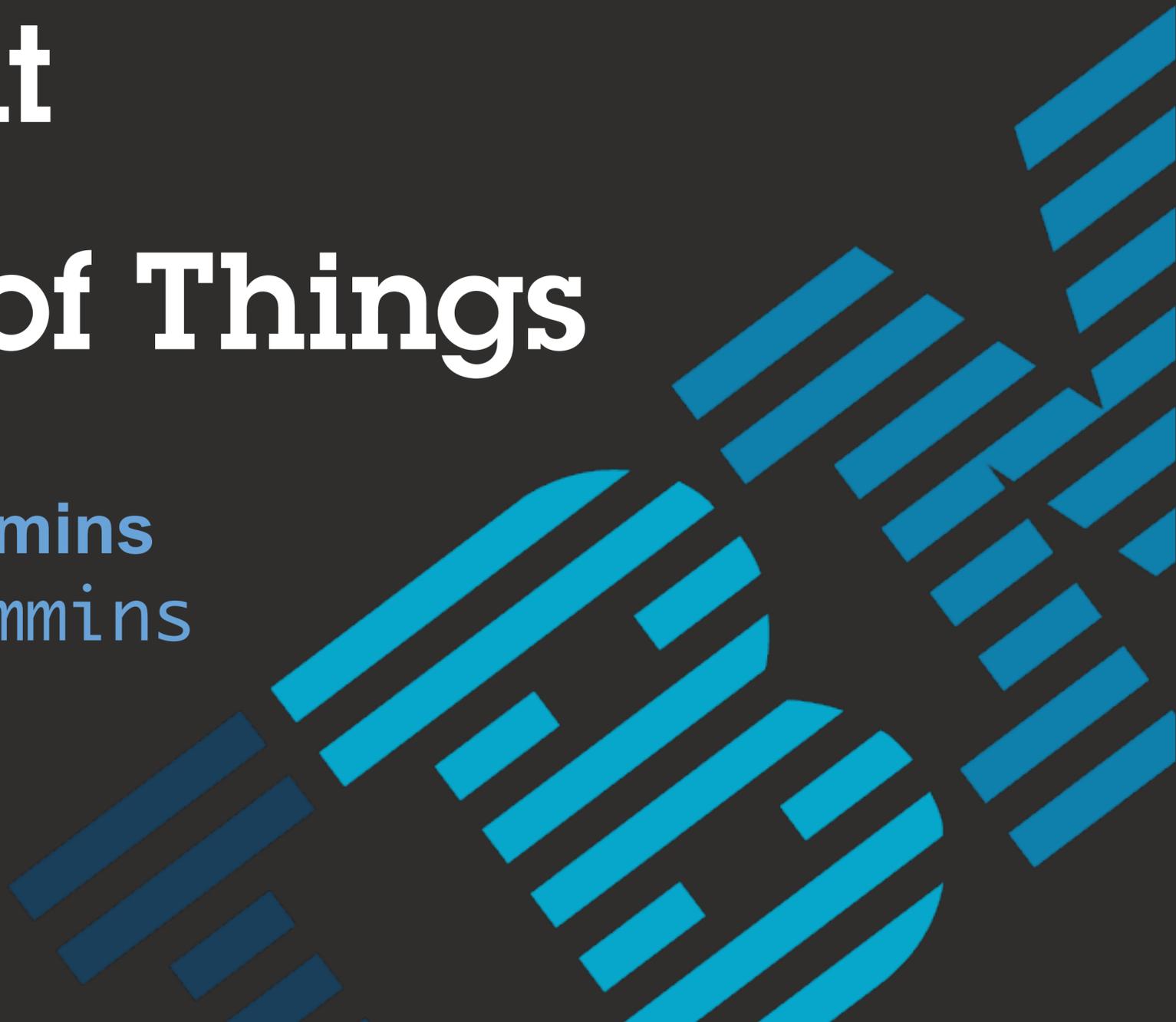


Thinking Strategically about The Internet of Things

Holly Cummins
@holly_cummins



A GARAGE THAT DEVELOPERS CAN CALL HOME FOR CLOUD INNOVATION

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LAST MONTH MY company opened the first [Bluemix Garage](#), a place where developers, product managers and designers from the smallest startups to the largest companies can congregate, network and collaborate to build the

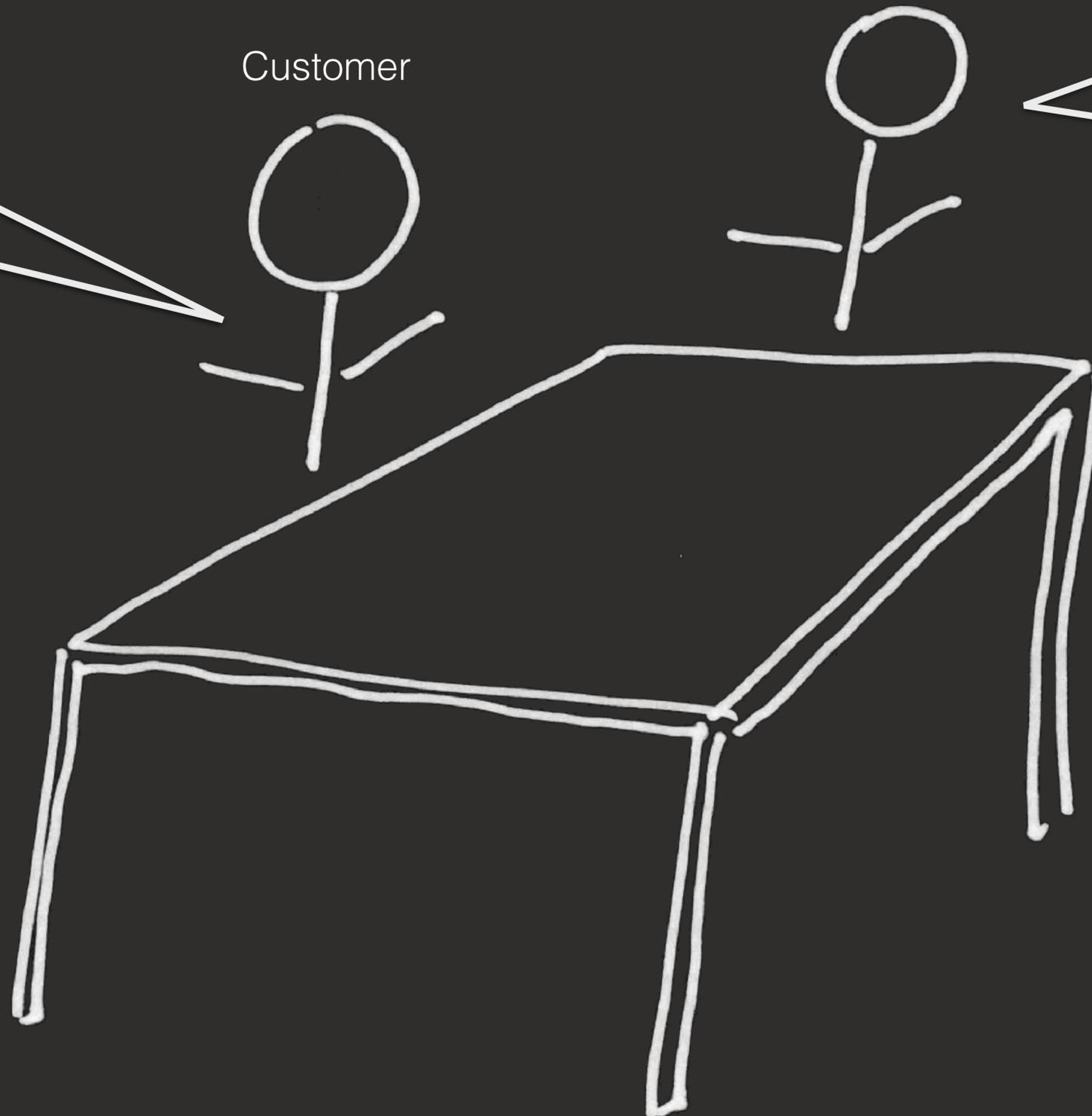
I'm from IBM's Bluemix Garage.

I would like the Bluemix Garage to help me with an IoT project.

Customer

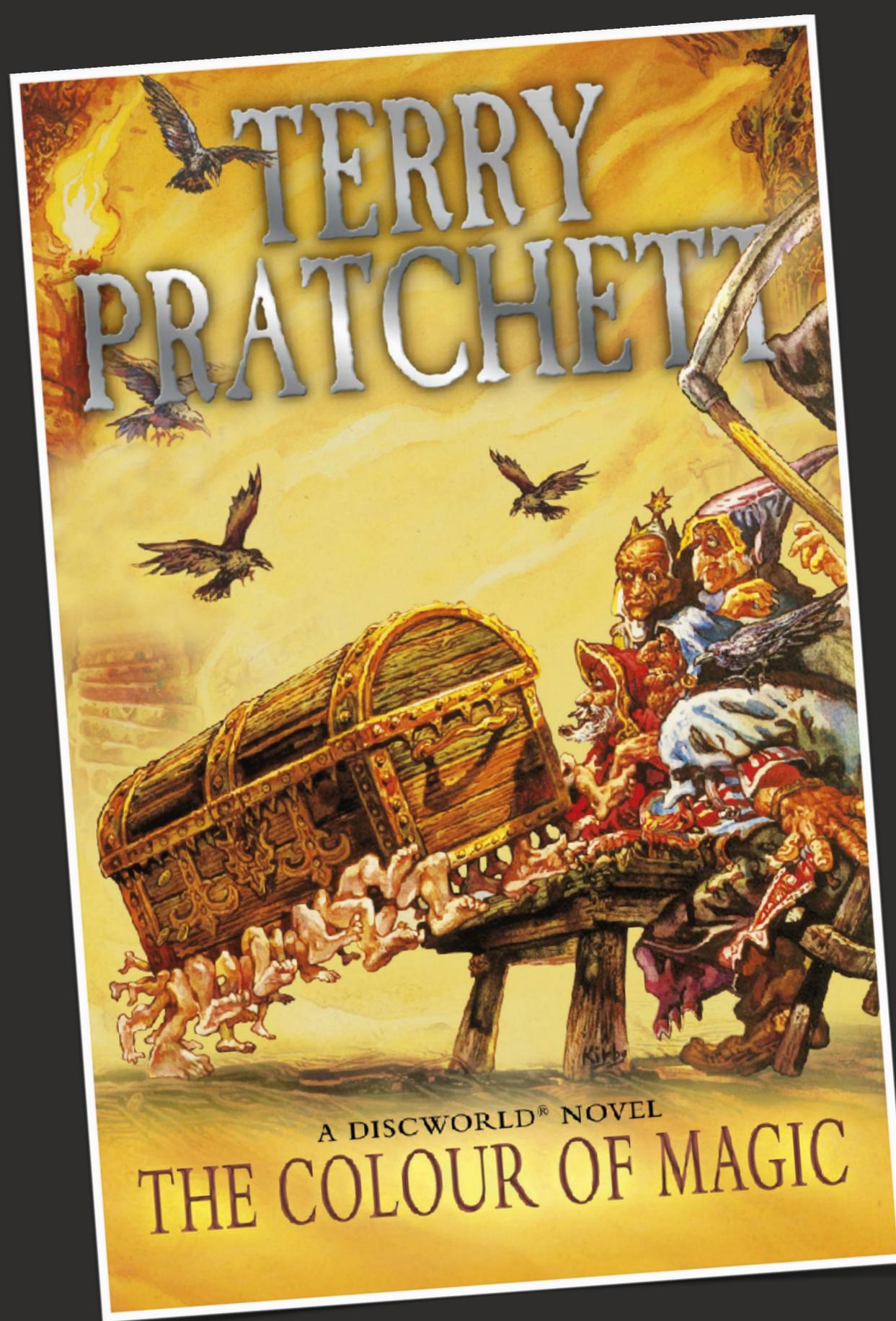
Me

Oooh! I *love* the internet of things!



This is what I'm imagining when
I hear 'Internet of Things.'

This is what I'm imagining when
I hear 'Internet of Things.'



You must take the time to
pivot to be creative.

John Cohn

Entrance, IBM IoT Lab, Munich

IBM Watson IoT Centre, Munich



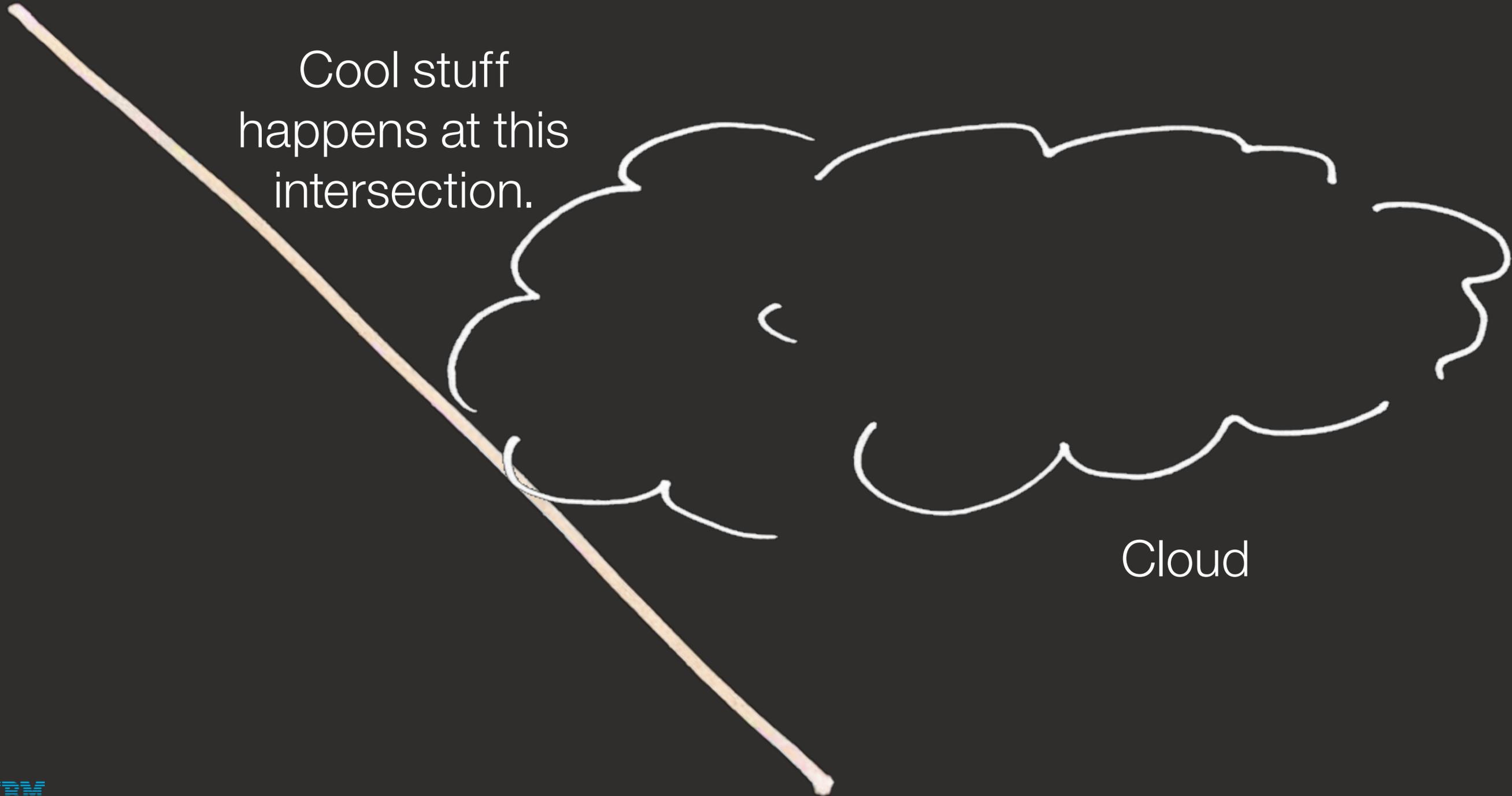
Watson IoT Center

IBM



Edge

Cool stuff
happens at this
intersection.



Cloud

Edge

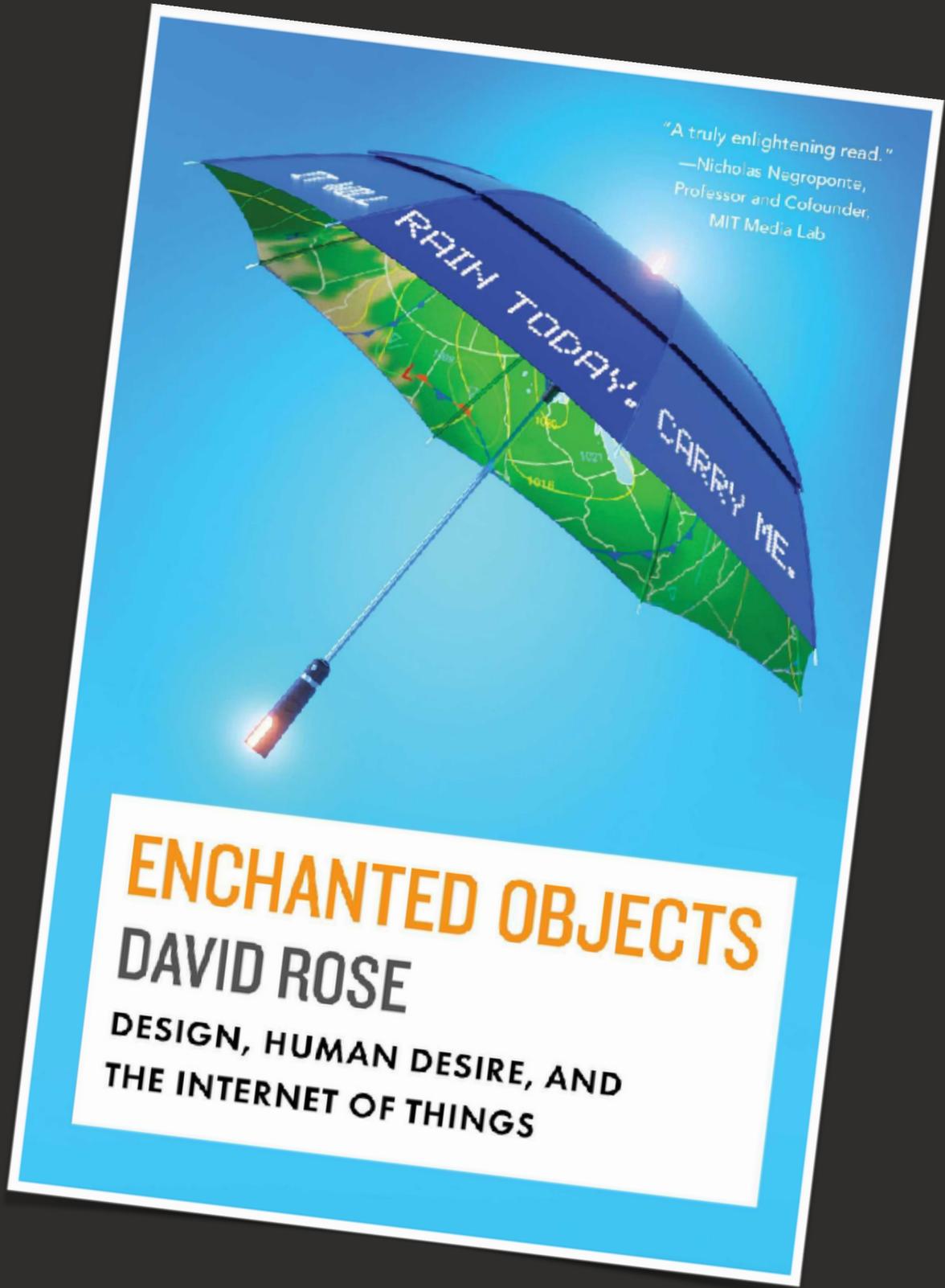
Cool stuff happens at this intersection.



Cloud

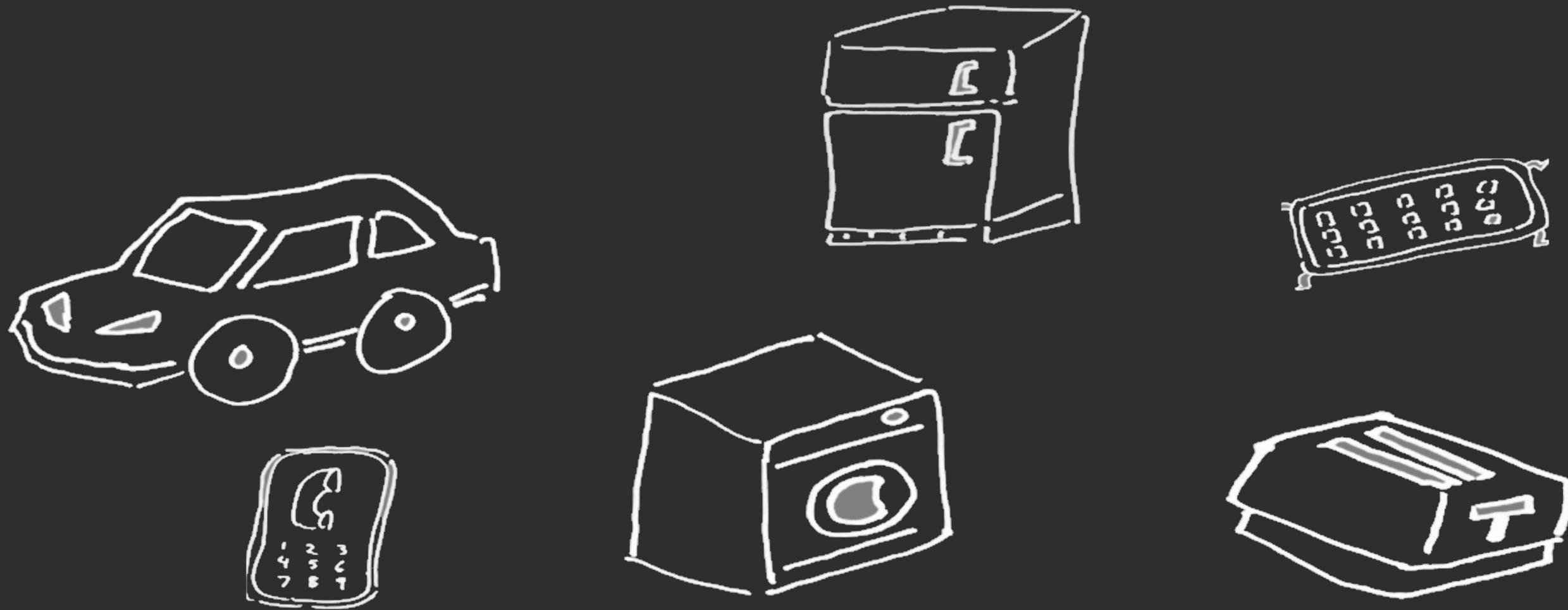
Any sufficiently advanced technology
is indistinguishable from magic.

- Arthur C. Clarke

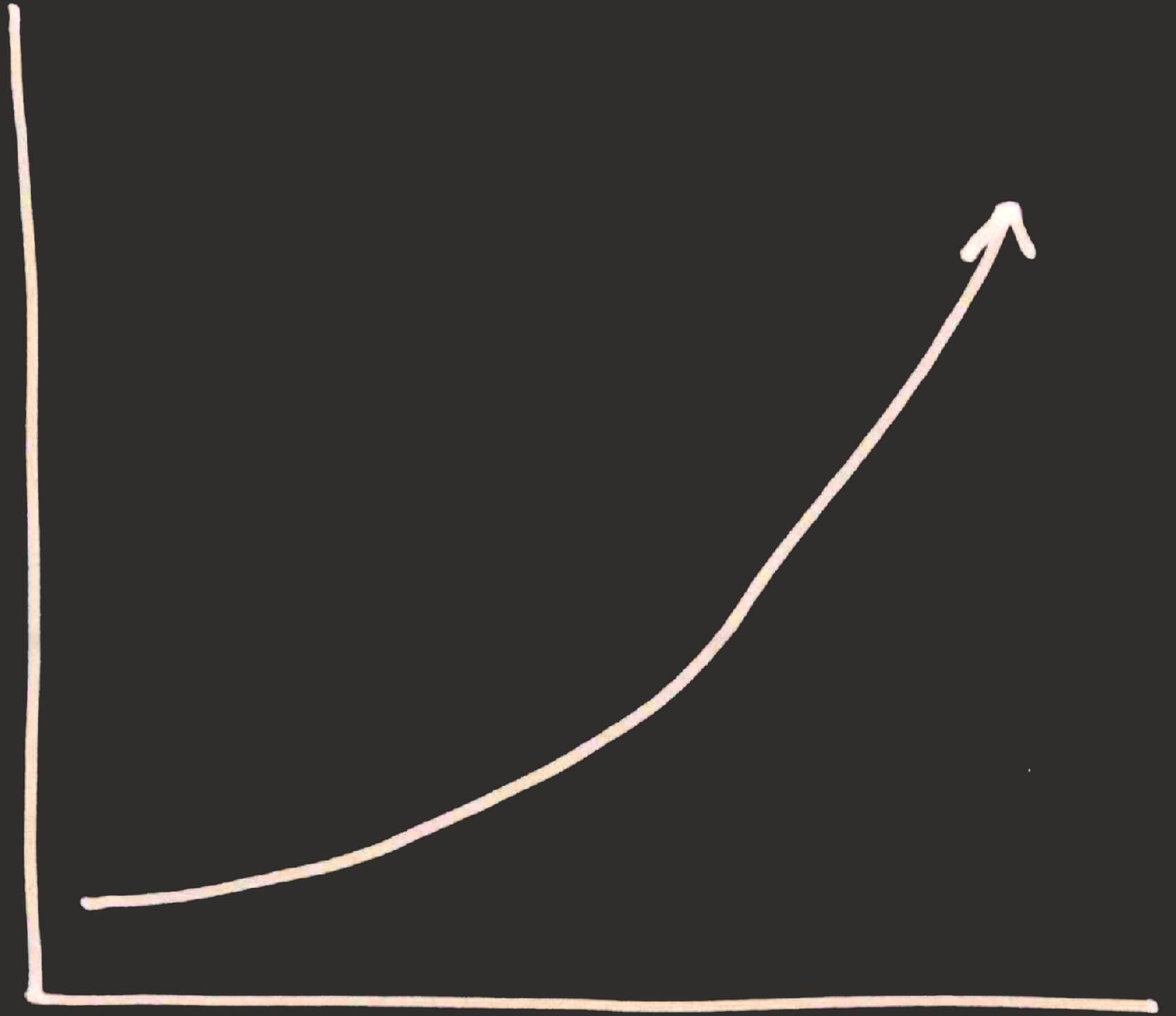


"A truly enlightening read."
—Nicholas Negroponte,
Professor and Co-founder,
MIT Media Lab

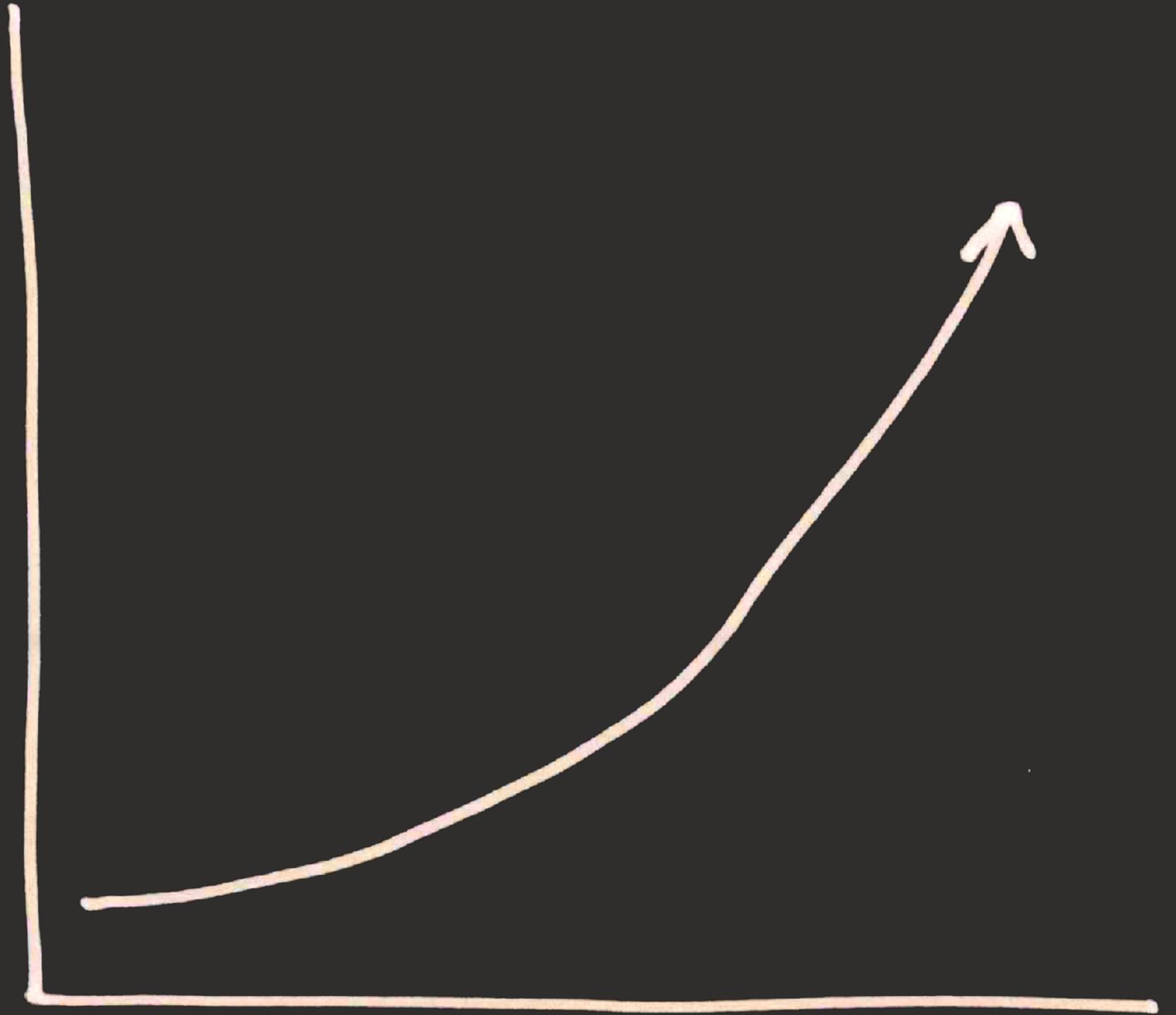
ENCHANTED OBJECTS
DAVID ROSE
DESIGN, HUMAN DESIRE, AND
THE INTERNET OF THINGS



Computers are now ubiquitous in almost everything we interact with.

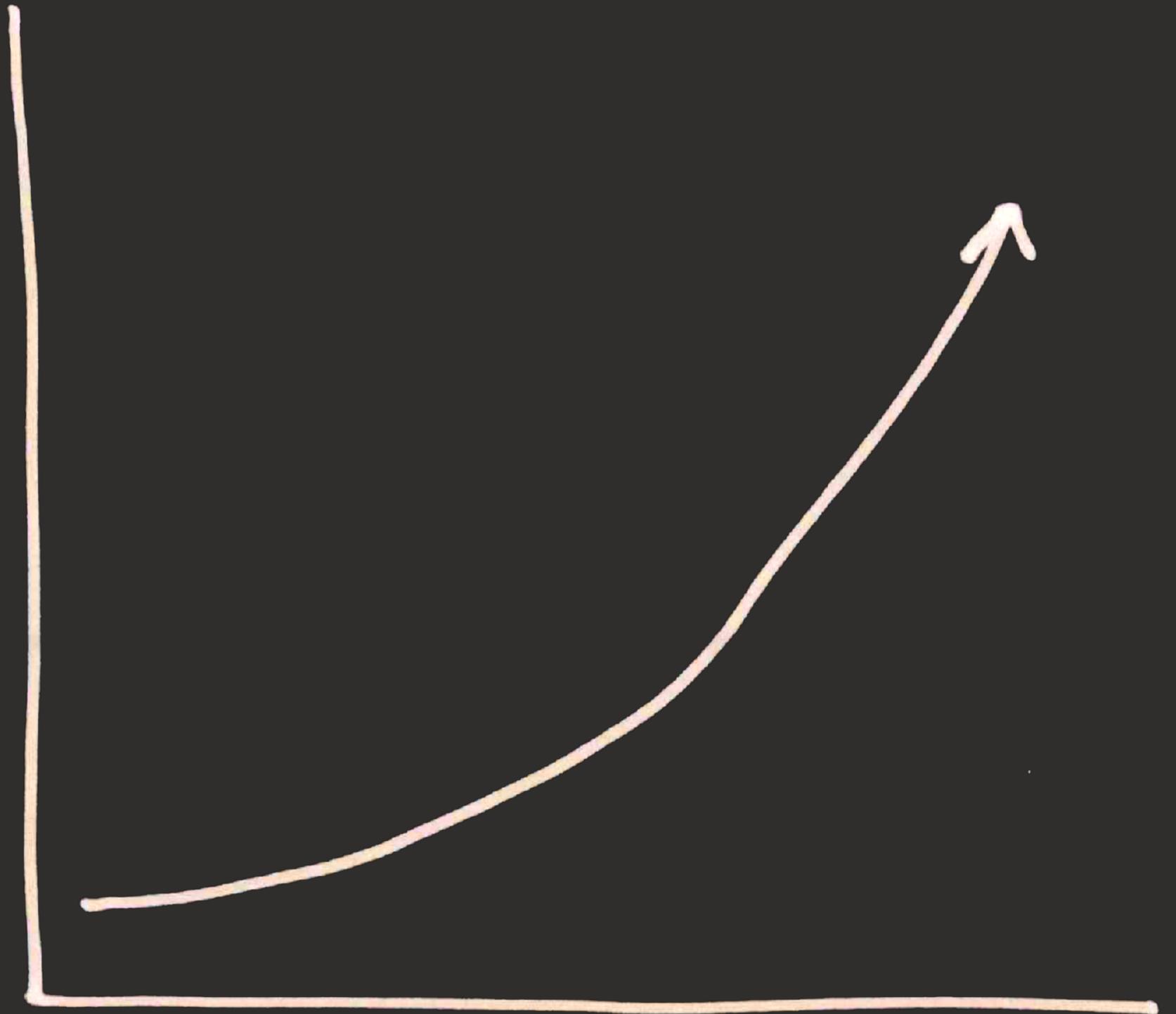


These computers are now going online.



These computers are now going online.

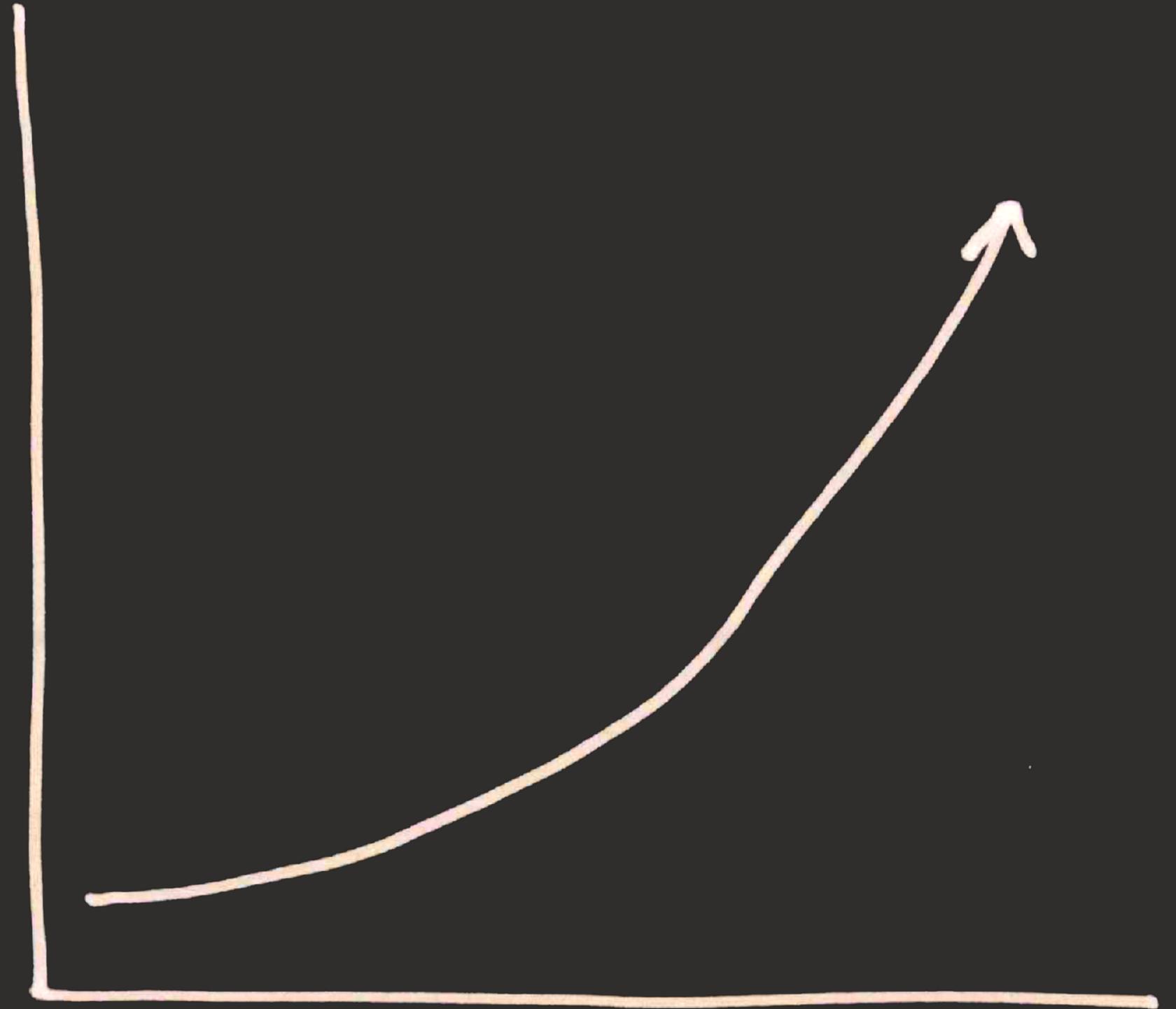
9 billion of them are online now.



These computers are now going online.

9 billion of them are online now.

There will be 20 - 50 billion connected devices by 2020.





Build the Perfect API

Learn how to plan, design, build, manage and share the perfect API.



6 Signs That Reality is Catching Up with Science-Fiction



College Weekend

filed under: college-weekend



IMAGE CREDIT: THINKSTOCK

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By Tousseint Egan, Aurora University

Albert Einstein once said, "I never worry about the future, it comes soon enough." He was right—it's just taken us a bit longer to get there than we expected.

Science-fiction is a genre that is synonymous with the idea of futurecasting—taking contemporary technology and ideas and extrapolating them into a not so distant future to speculate on the what-ifs of their most audacious, extreme conclusions. But what happens

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Opening Your Car Door Like the Dutch Do Can Save Cyclists' Lives



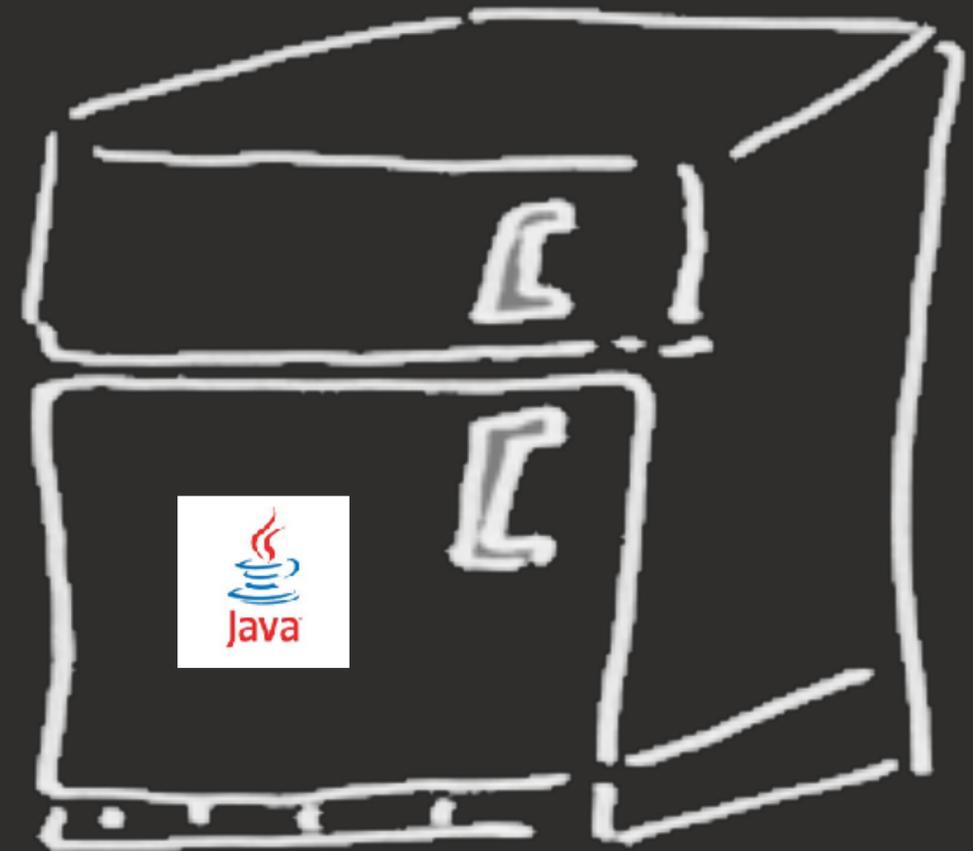
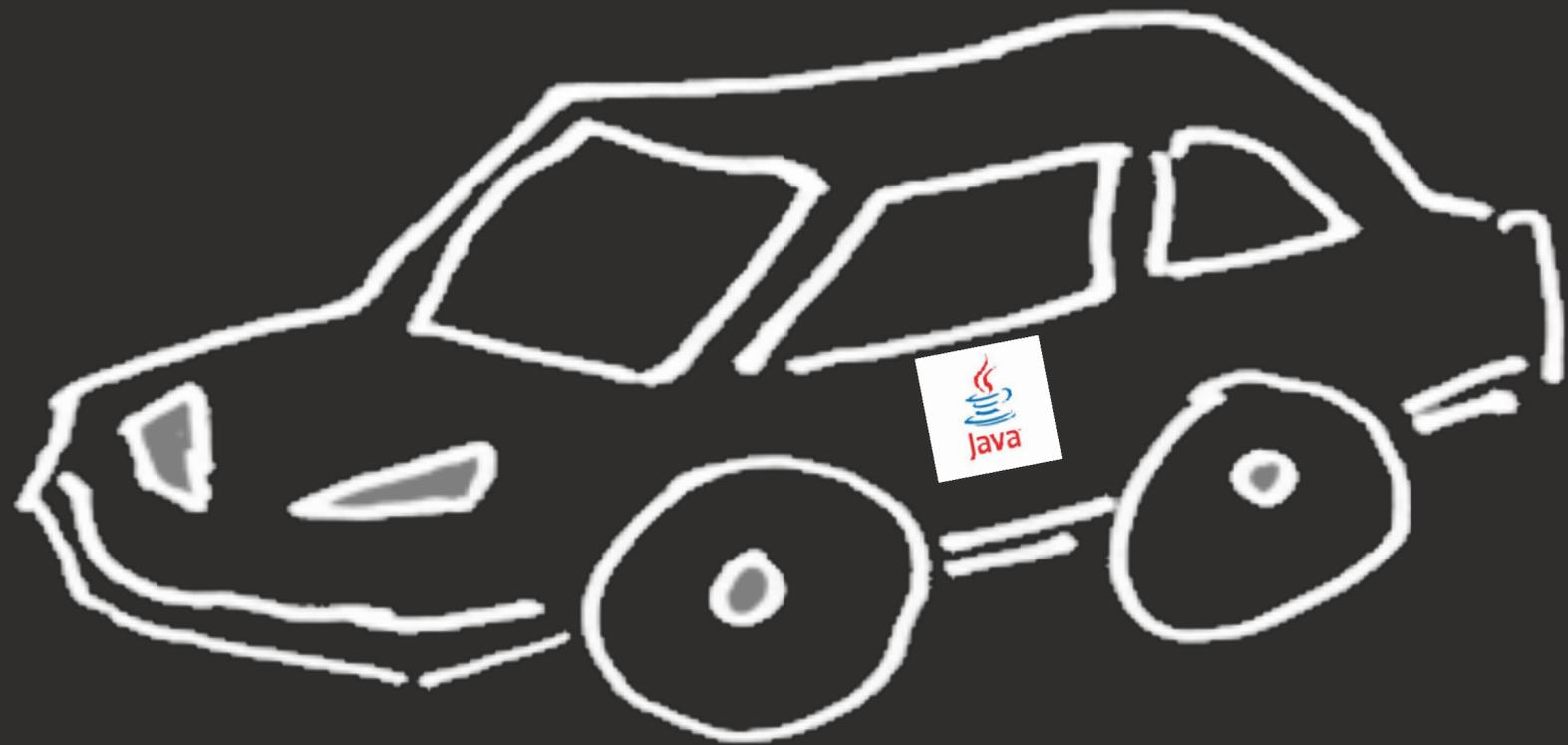
A computer.
As a free
conference
giveaway.



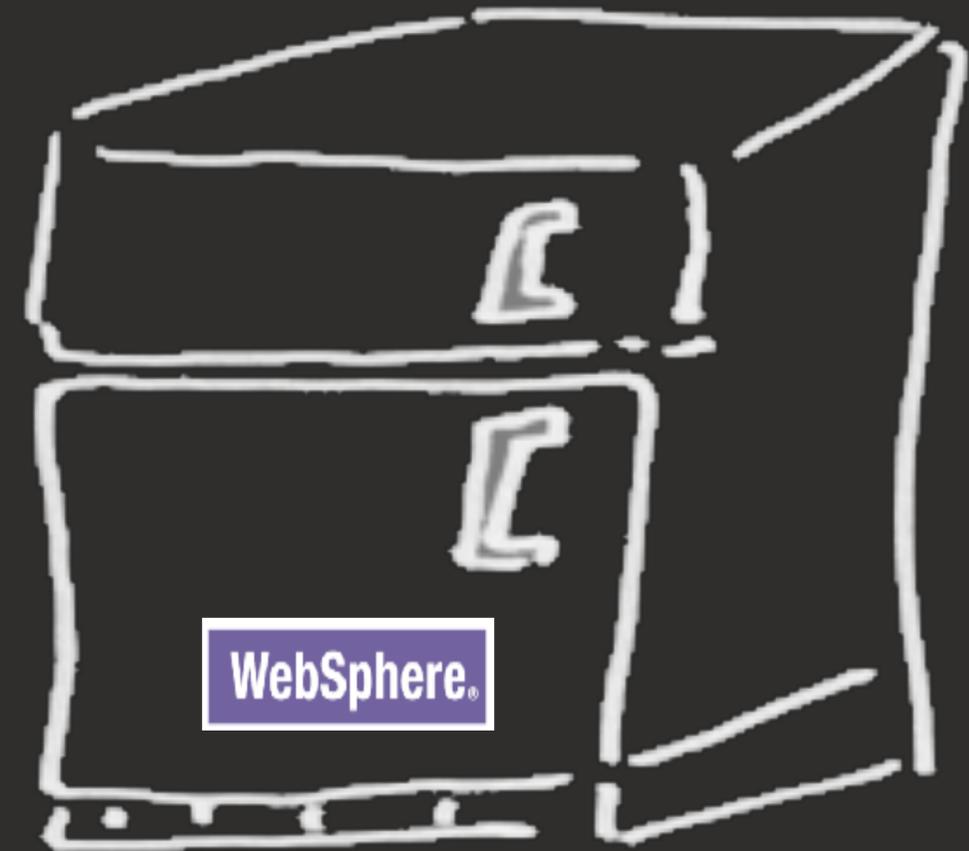
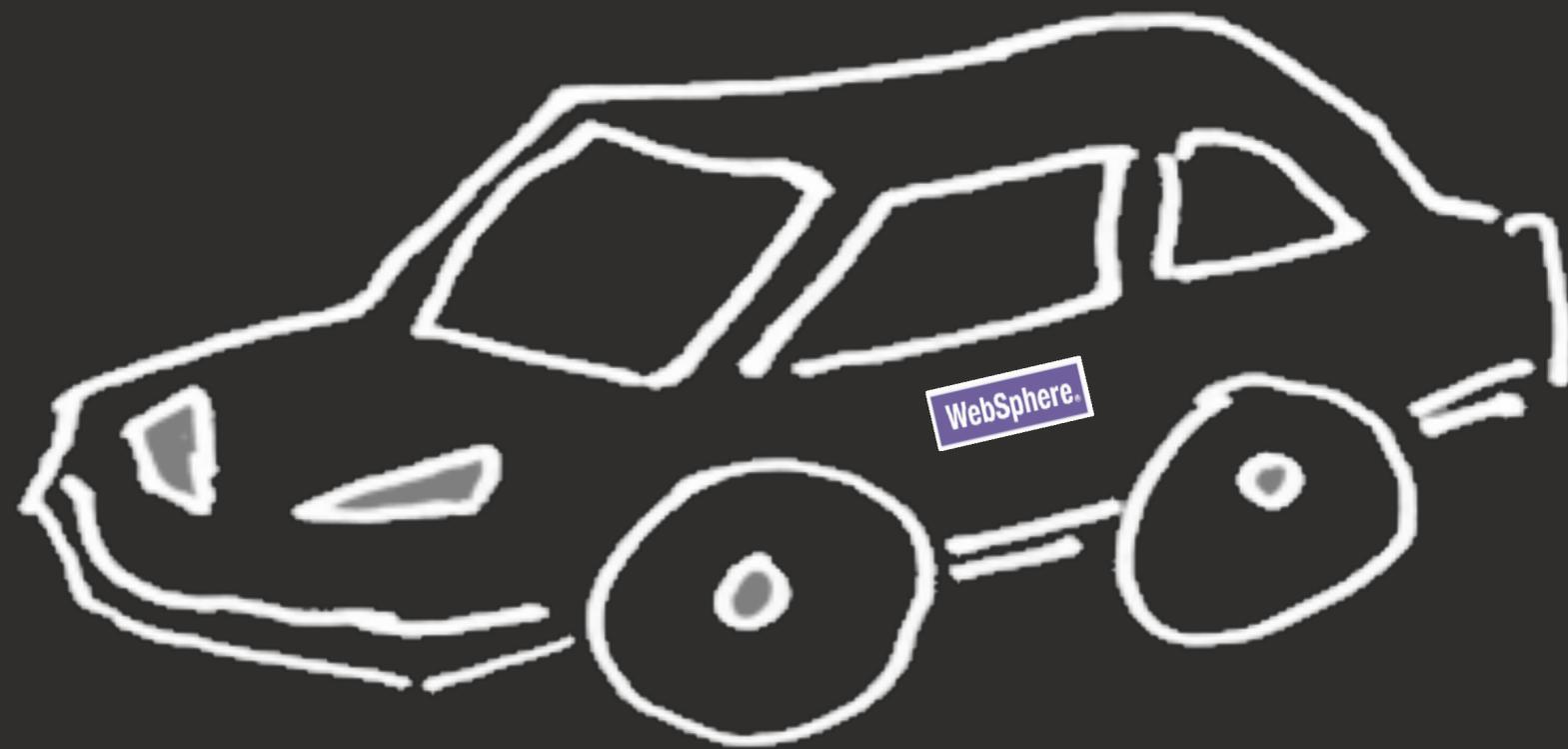
Is Java relevant
for IoT?

Java *is* relevant
for IoT.





“Write once,
run anywhere.”

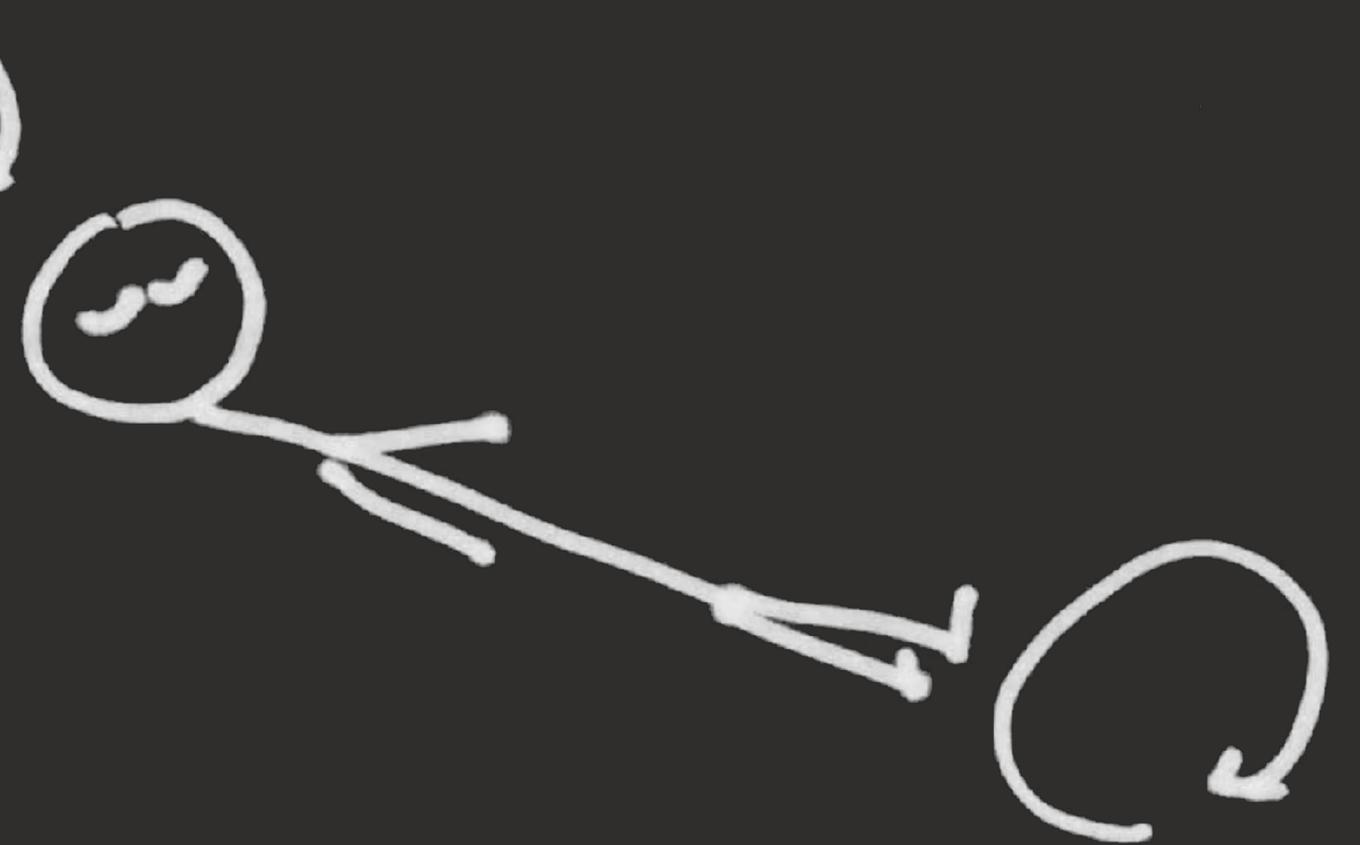
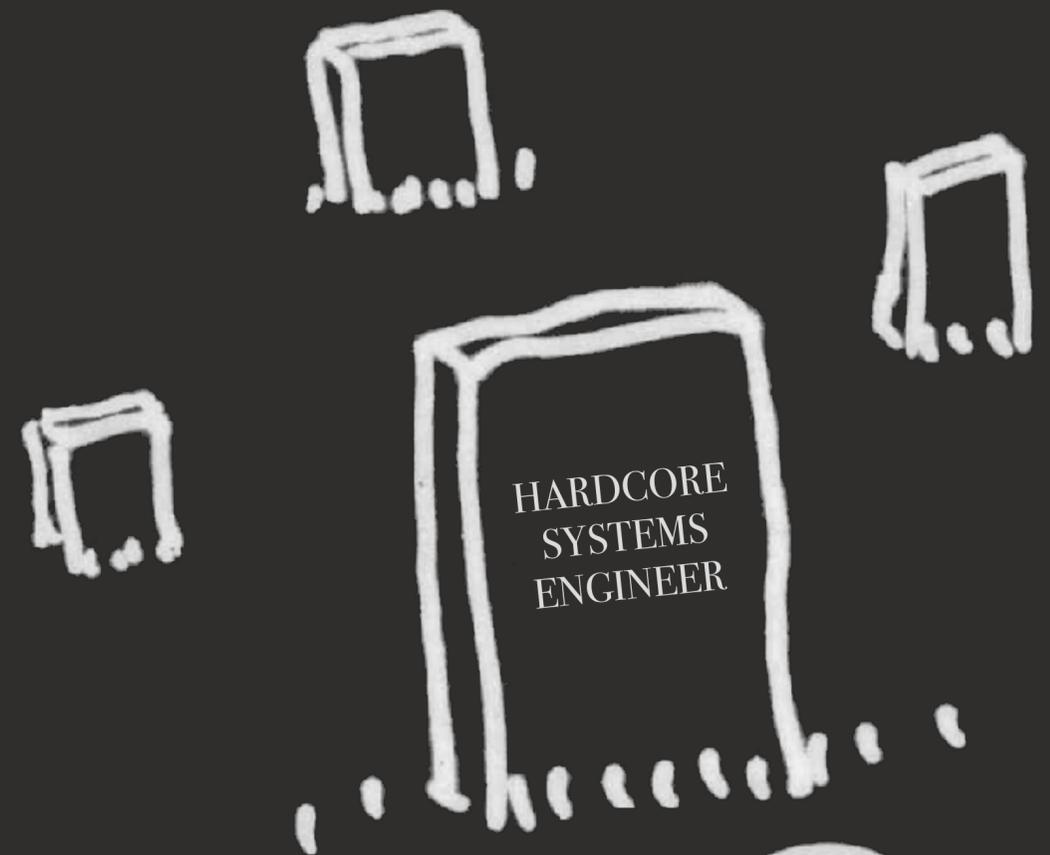


These devices can
run powerful software.

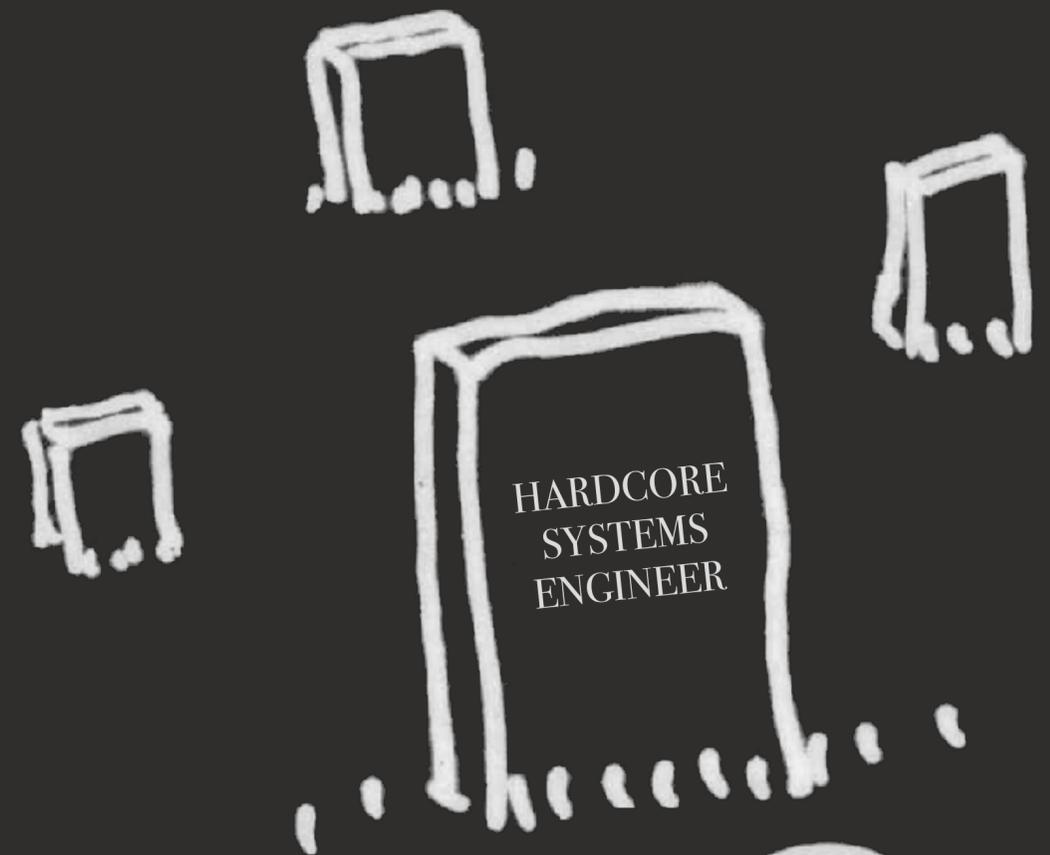
A large audience of people is seated in a conference hall, looking towards a stage. A blue spherical object, resembling a WebSphere server, is suspended from the ceiling. The scene is dimly lit, with a blue hue. The audience is diverse in age and appearance, and many are wearing blue shirts. The stage area is visible in the background, with a large screen and some equipment.

There's a WebSphere server running *in* that ball.

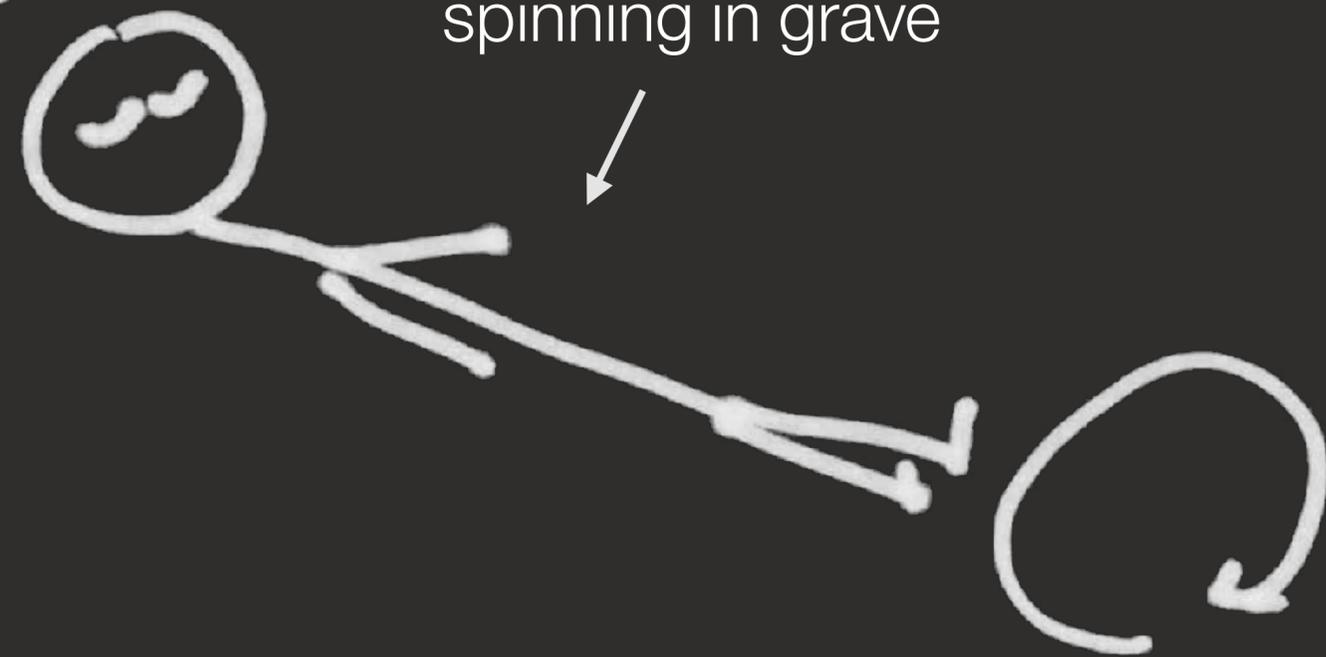
photo courtesy of re:develop conference, Bournemouth



Java is a great fit for
embedded devices ...
because it makes stuff easy.



spinning in grave



Java is a great fit for
embedded devices ...
because it makes stuff easy.



You can do IoT
if you can ...

get data in and out

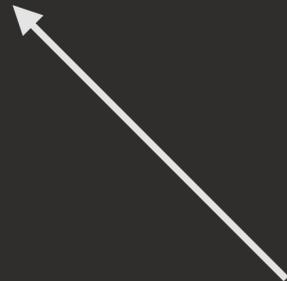


You can do IoT
if you can ...

get data in and out



read and write to pins



You can do IoT
if you can ...

```
public class PinReader {  
  
    private int pinNumber = 0;  
  
    public int analogRead(int sensorPin) throws IOException {  
  
        String pin = "/proc/adc" + pinNumber;  
        FileReader fr = new FileReader(pin);  
        BufferedReader br = new BufferedReader(fr);  
        String string = br.readLine();  
        fr.close();  
        // Strip off the name of the pin  
        int value = Integer.parseInt(string.substring(5));  
    }  
}
```

Pins are
just files

```
public class PinReader {  
    private int pinNumber = 0;  
  
    public int analogRead(int sensorPin) throws IOException {  
  
        String pin = "/proc/adc" + pinNumber;  
        FileReader fr = new FileReader(pin);  
        BufferedReader br = new BufferedReader(fr);  
        String string = br.readLine();  
        fr.close();  
        // Strip off the name of the pin  
        int value = Integer.parseInt(string.substring(5));  
    }  
}
```



mqtt.org

MQTT.ORG

News Docs Wiki Software Community FAQ

MQTT is a machine-to-machine (M2M) "Internet of Things" connectivity protocol. It was designed as an extremely lightweight publish/subscribe messaging transport. It is useful for connections with remote locations where a small code footprint is required and/or network bandwidth is at a premium. For example, it has been used in sensors communicating to a broker via satellite link, over occasional dial-up connections with healthcare providers, and in a range of home automation and small device scenarios. It is also ideal for mobile applications because of its small size, low power usage, minimised data packets, and efficient distribution of information to one or many receivers ([more...](#))

News

MQTT v3.1.1 now an OASIS Standard

November 7th, 2014 - [5 Comments](#)

Good news everyone! MQTT v3.1.1 has now become an [OASIS Standard](#).

This marks not just the result of 18 months hard work by the Technical Committee, but also the last 15 years of work started by Andy and Arlen. Congratulations to everyone involved.

You can find the standard specification as either [single page HTML](#) or [PDF](#).

console.ng.ibm.com/catalog/?taxonomyNavigation=apps&category=iot

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A new generation of applications.

- Internet of Things Platform**
This service is the hub of all things IBM IoT, it is where
IBM
- Context Mapping**
IBM Watson IoT Context Mapping Service brings the
IBM
- Driver Behavior**
IBM Watson IoT Driver Behavior Service lets you
IBM
- IoT for Electronics**
The IoT for Electronics service supports user and
IBM
- IoT for Insurance**
IBM® IoT for Insurance is an integrated IoT production
IBM
- AT&T Flow Designer**
Design, Build and Deploy IoT Solutions in Minutes
Third Party
- AT&T M2X**
Time Series IoT Data Service
Third Party
- Car Diagnostic API**
Translation service for OBD error codes.
Third Party
- flowthings.io**
agile intelligence for IoT
Third Party

Infrastructure

- Compute
- Storage
- Network
- Security

Apps

- Boilerplates
- Cloud Foundry Apps
- Containers
- OpenWhisk
- Mobile

Services

- Data & Analytics
- Watson
- Internet of Things**
- APIs
- Network
- Storage
- Security

Favorites

- Liberty RFE
- Bluemix visitor booking form
- RTC healthcheck
- DOI Dashboards
- 7 day RTC perf report (use...
- was.pok.ibm.com/wikisear...
- Build dashboard
- LibertyFS space usage
- You *
- Iteration leads dashboard
- Liberty Mailing List Archive...
- Concord Dashboard - Cha...
- Bucket Health Over Time
- Open My iNotes Mail
- Apple
- iCloud
- Facebook
- Twitter
- Wikipedia
- Yahoo
- News
- Popular

www.eclipse.org/paho/

eclipse paho Components Documentation Community Paho is an iot.eclipse.org project

paho

The Eclipse Paho project provides open-source client implementations of MQTT and MQTT-SN messaging protocols aimed at new, existing, and emerging applications for the Internet of Things (IoT).

[Download Now »](#)

 For Constrained Networks

 Devices and Embedded Platforms

 Reliable

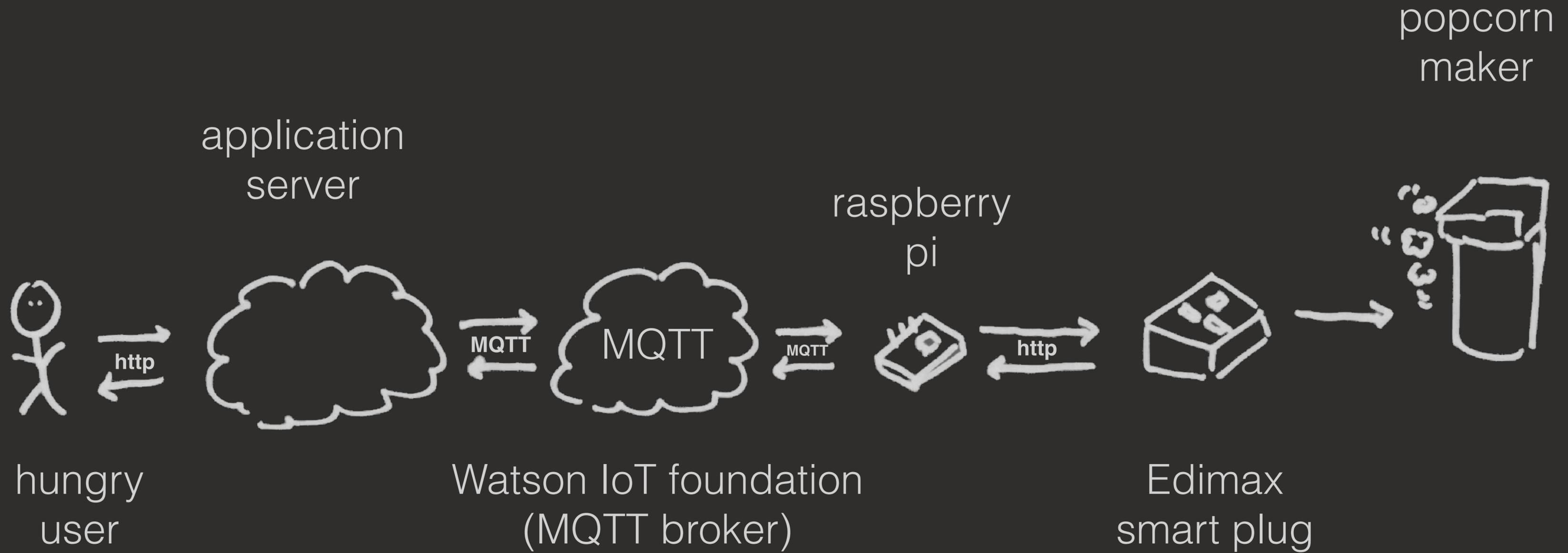
IoT systems need to deal with frequent network
Paho focuses on reliable implementations that

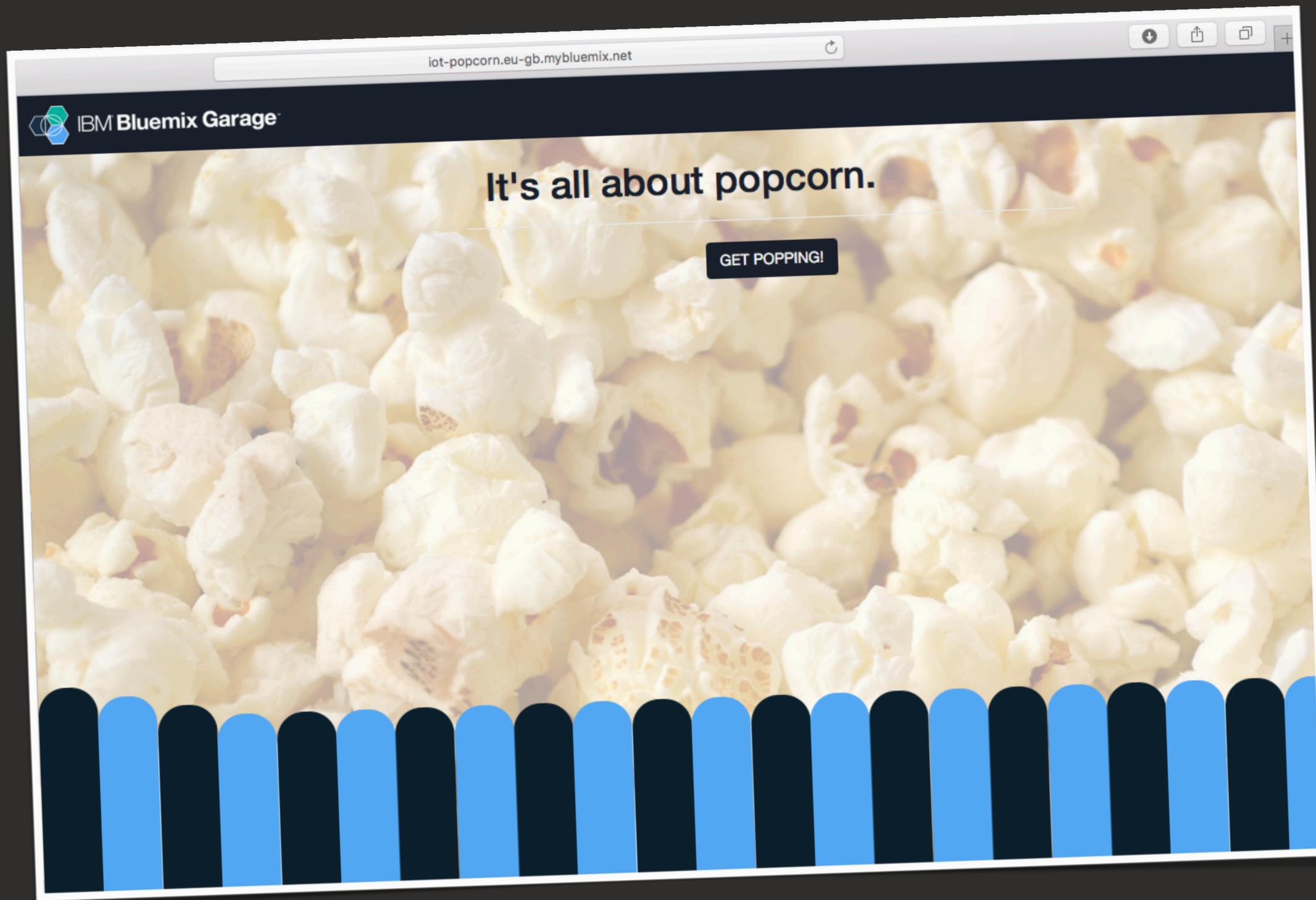
```
client.publishEvent("reading", reading);
```

```
public class LightFlasher implements CommandCallback {  
  
    @Override  
    public void processCommand(Command cmd) {  
        System.out.println("Flashing lights: " + cmd);  
        flash();  
    }  
}
```

Demo.

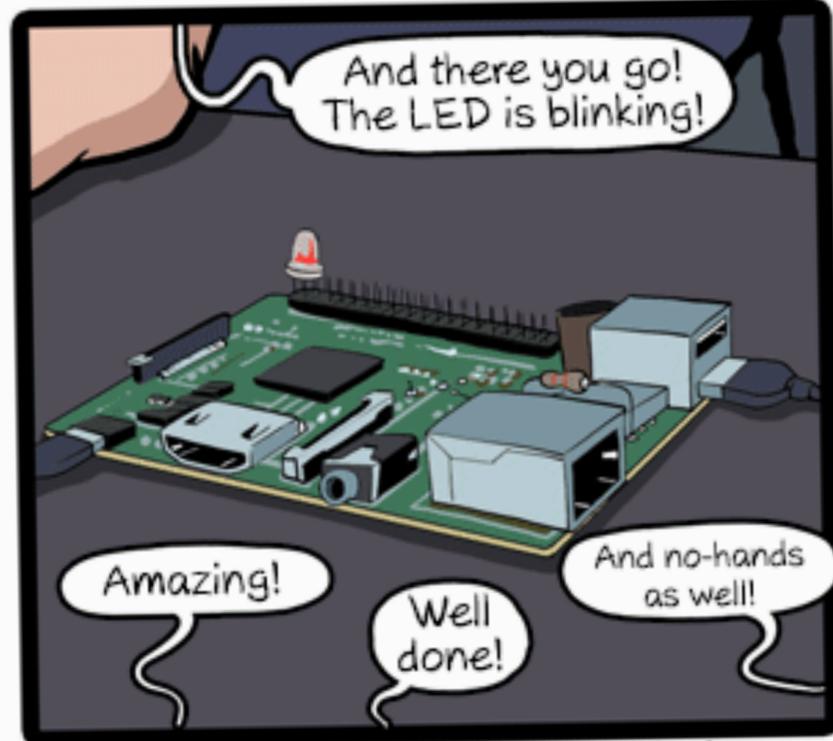
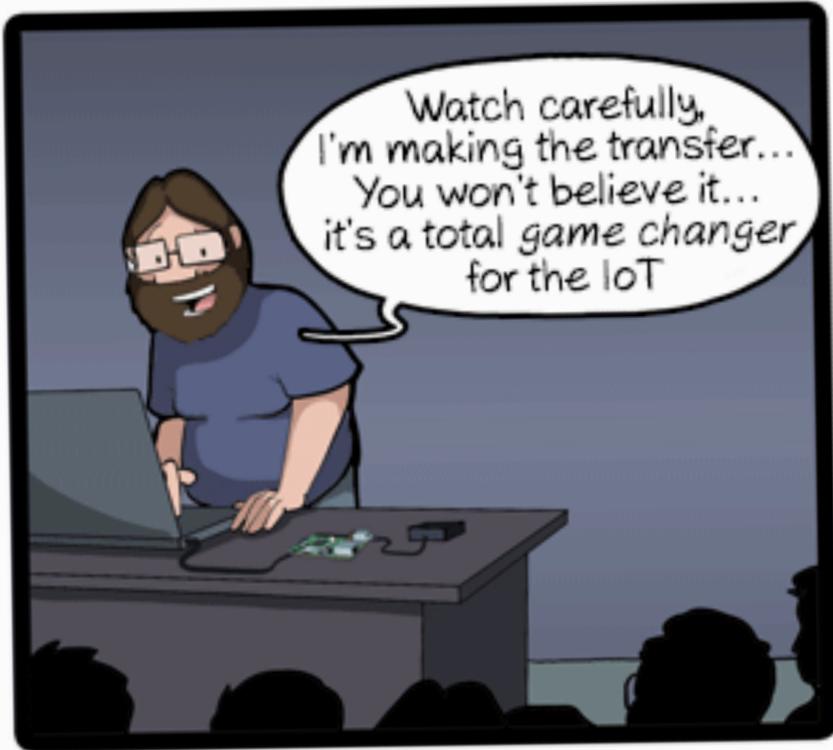
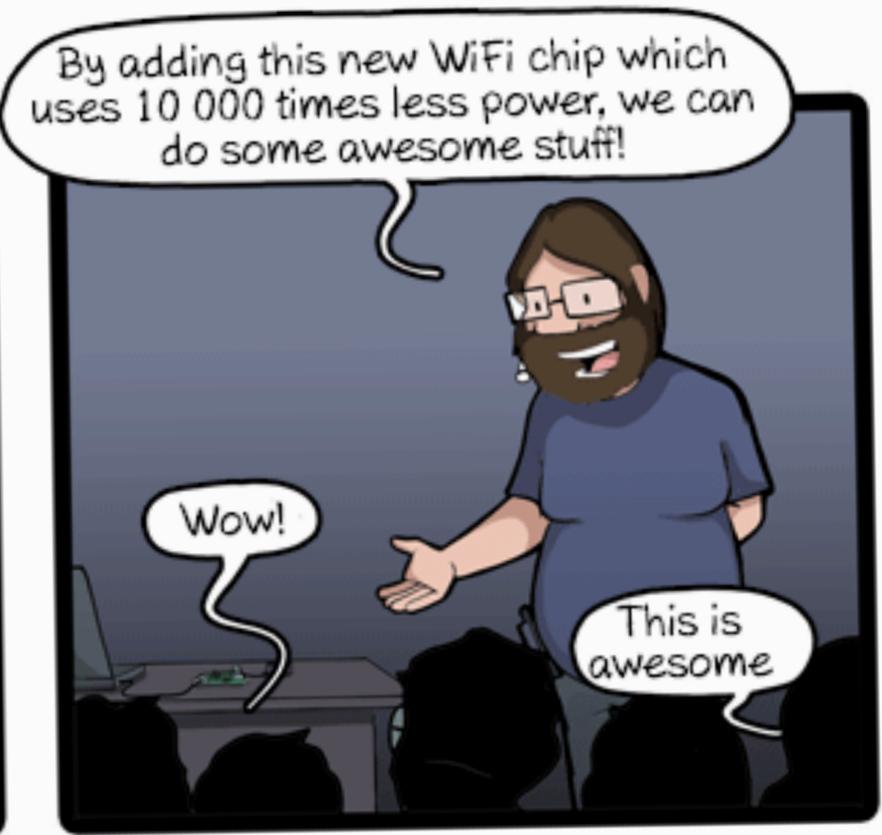
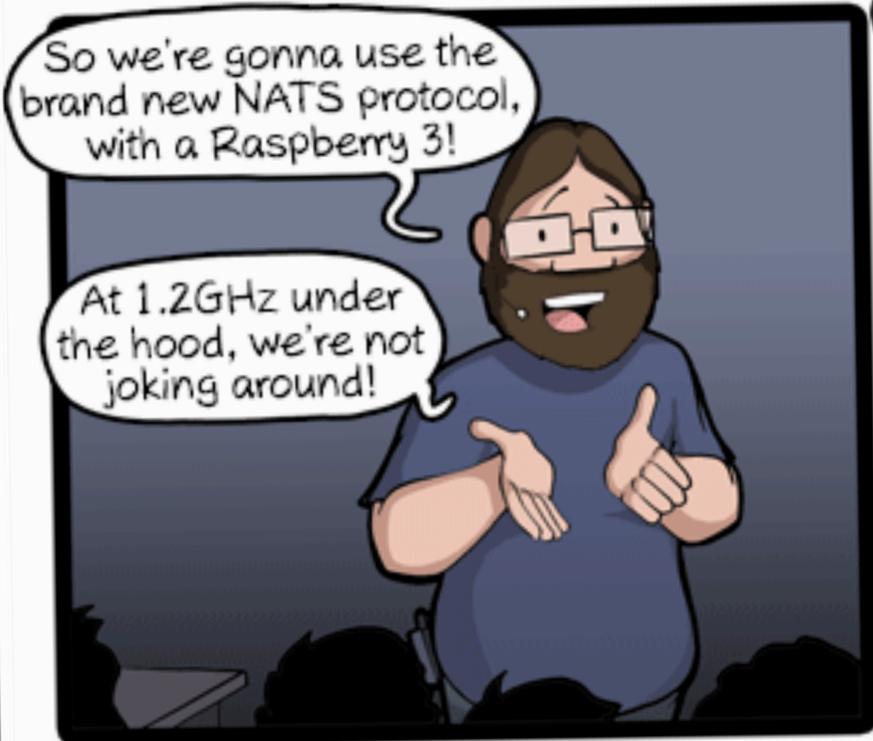
Anyone want popcorn?





Is this actually
useful?

The problem we were solving was that we needed an excuse for a popcorn maker at work. :)



CommitStrip.com

I've got form in
this area.



Johan Kaving
@jkaving



 Follow

The world's first throwable and cuddly application server at [#jfokus](#) talk by [@holly_cummins](#)

There's a WebSphere server running **in** that hat.
Very useful. Obviously.

Comments
My
Current Orders
Chocolate Identifiers Comments

...loading video into iMovie. To
...connect it to your computer.
Video Size: 1280x720

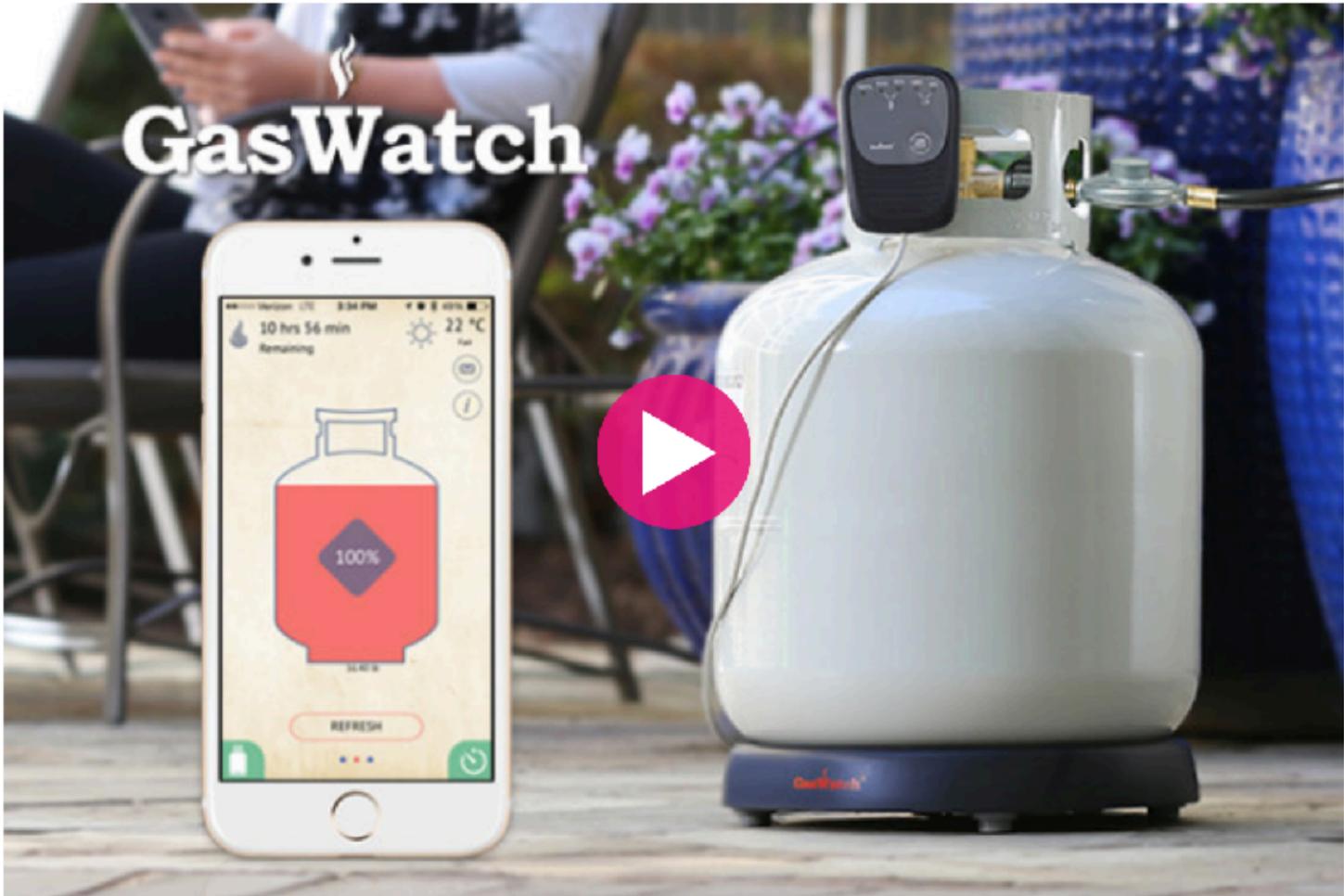




I'm not the only one.

www.indiegogo.com/projects/gaswatch-check-bbq-tank-level-from-your-phone

INDIEGOGO Explore ▾ How It Works Equity Offerings ^{NEW} [START A CAMPAIGN](#) [Sign Up](#)



Closed

GasWatch- Check BBQ tank level from your phone

The safest and most accurate way to measure your propane tank.

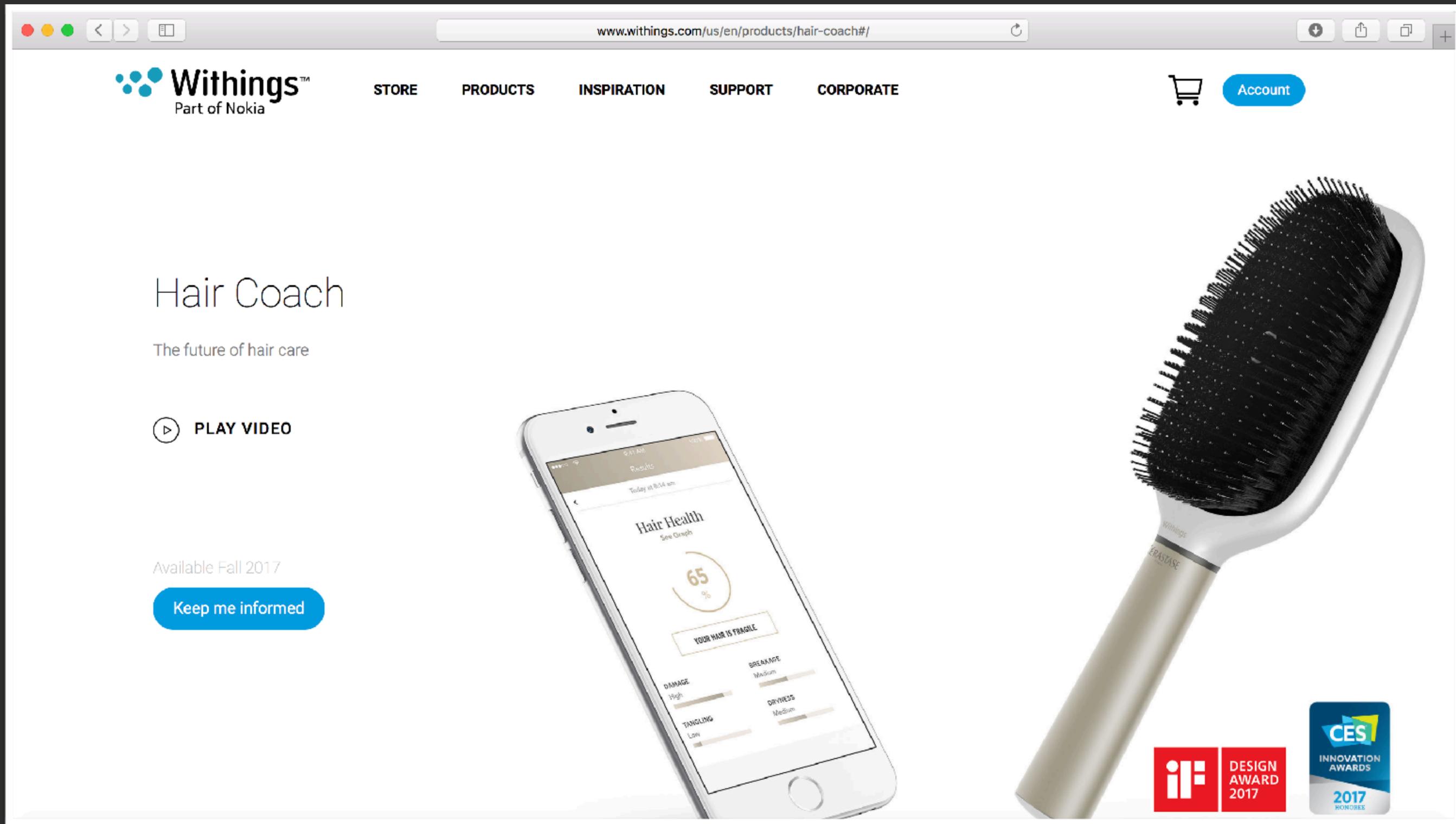
 **Shailendra Suman**
Charlotte, United States
[About](#)

\$26,267 USD raised by 361 backers

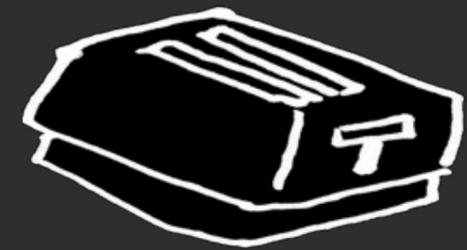
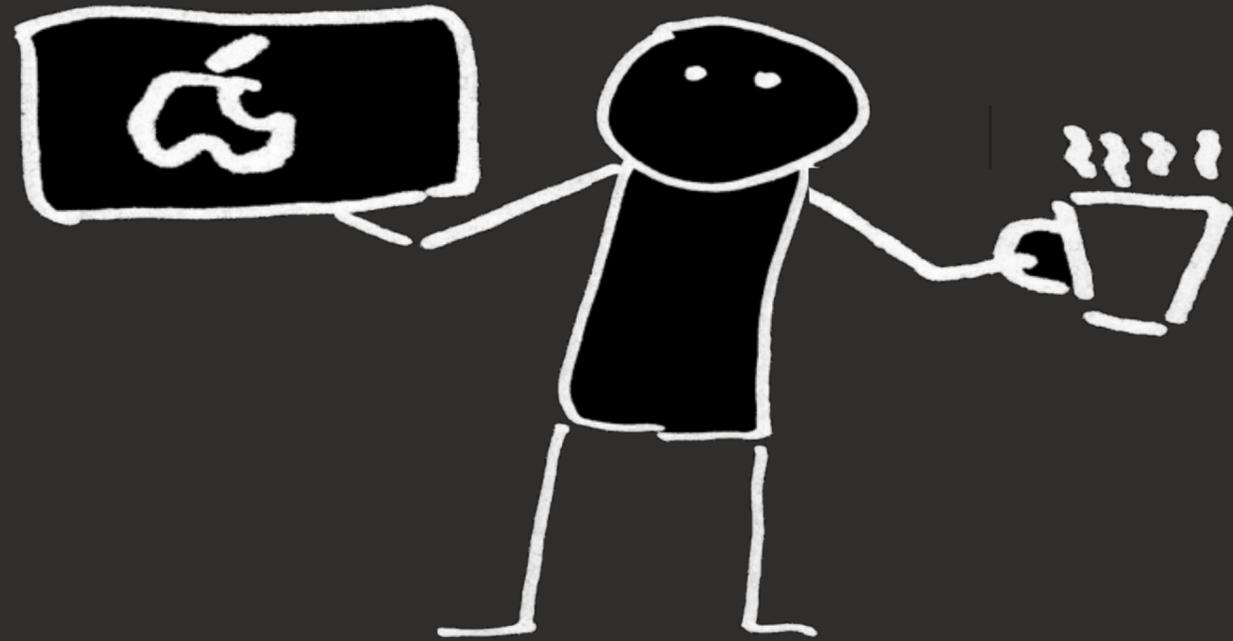
105% of \$25,000 [flexible goal](#)

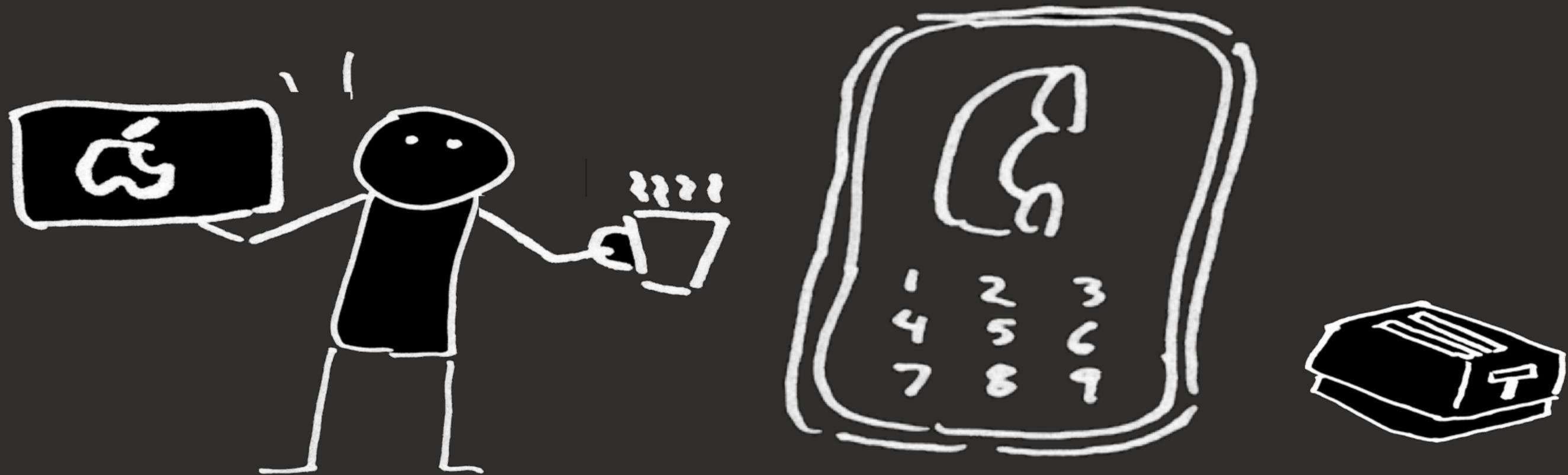


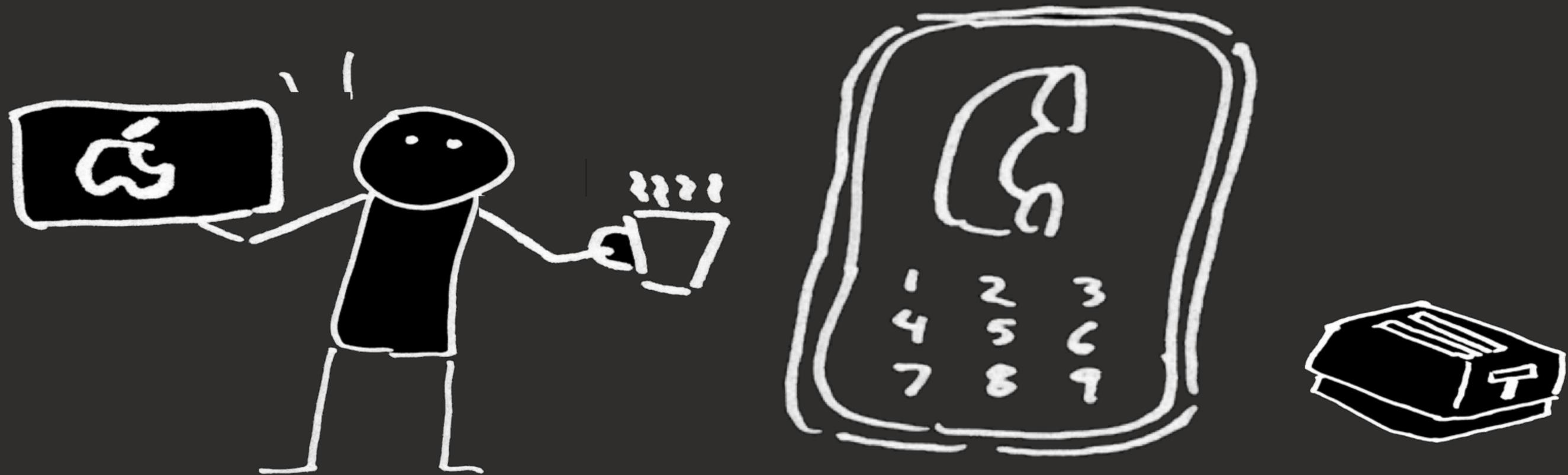
The propane gauge which is read by phone.



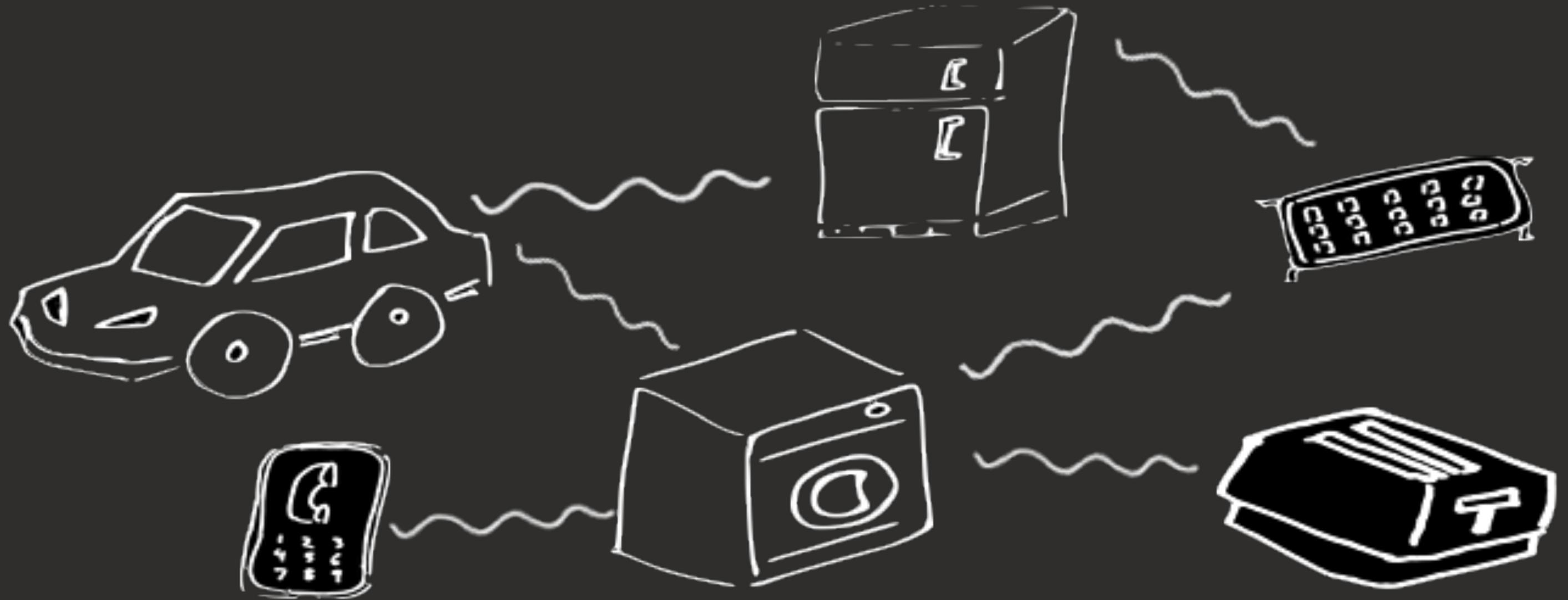
The £160 IoT hairbrush which listens to your hair.







Do we really want a future where our interaction with everything is mediated by a smartphone?



The power comes from *connections*.



etlab.hursley.ibm.com:6001/dashboard/1



IBM Workforce

← Back to Team Dashboard

Settings Logout



V. Low



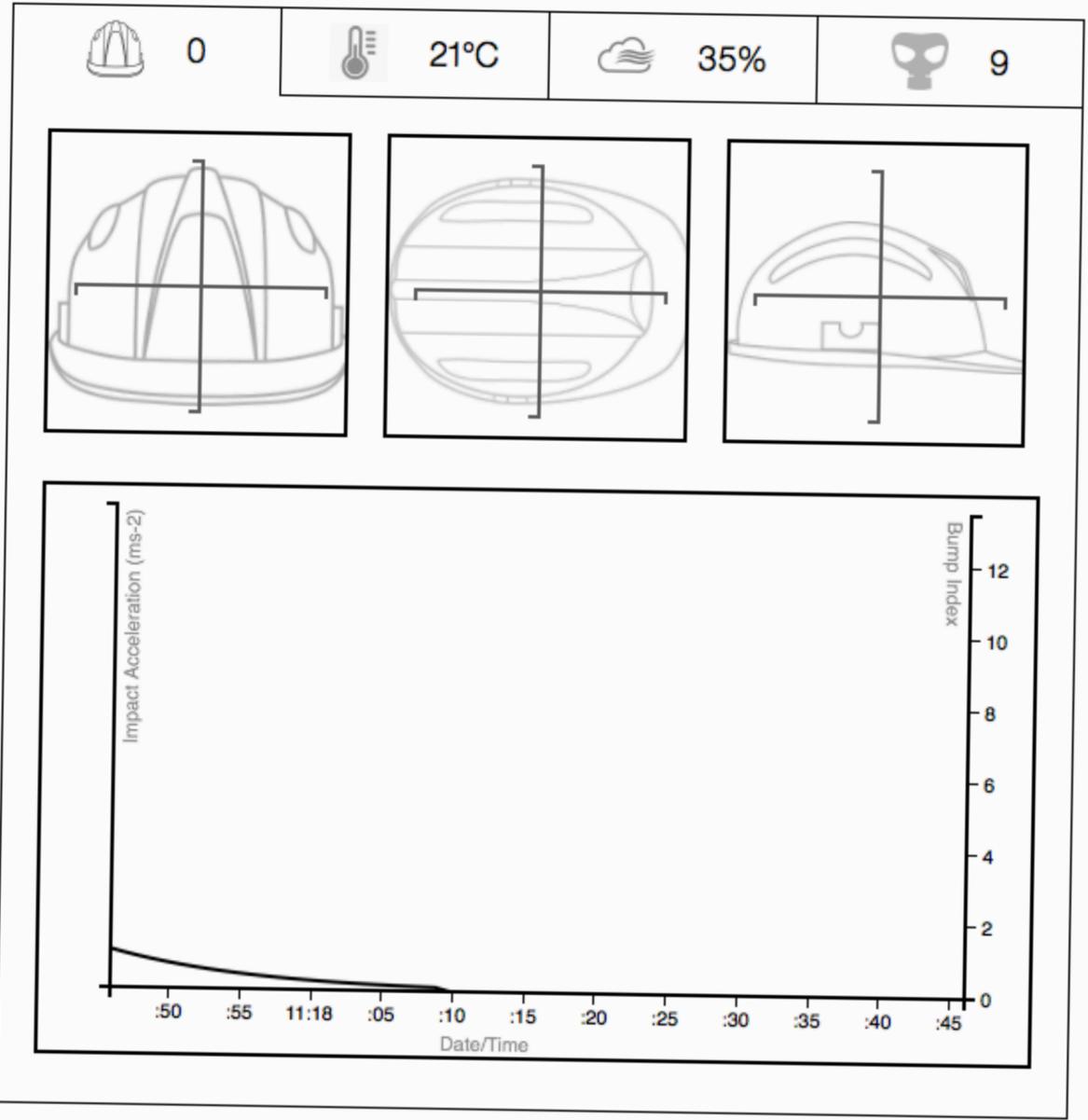
Bob Caldone
Site Manager

Risk: V. Low

Locating Staff...

Recent Issues

TYPE	TIME	SEVERITY





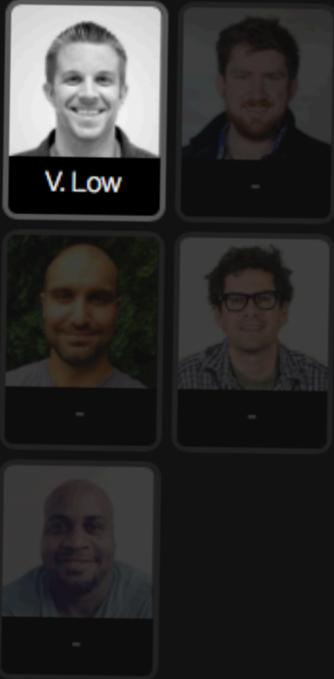
etlab.hursley.ibm.com:6001/dashboard/1



IBM Workforce

← Back to Team Dashboard

Settings Logout



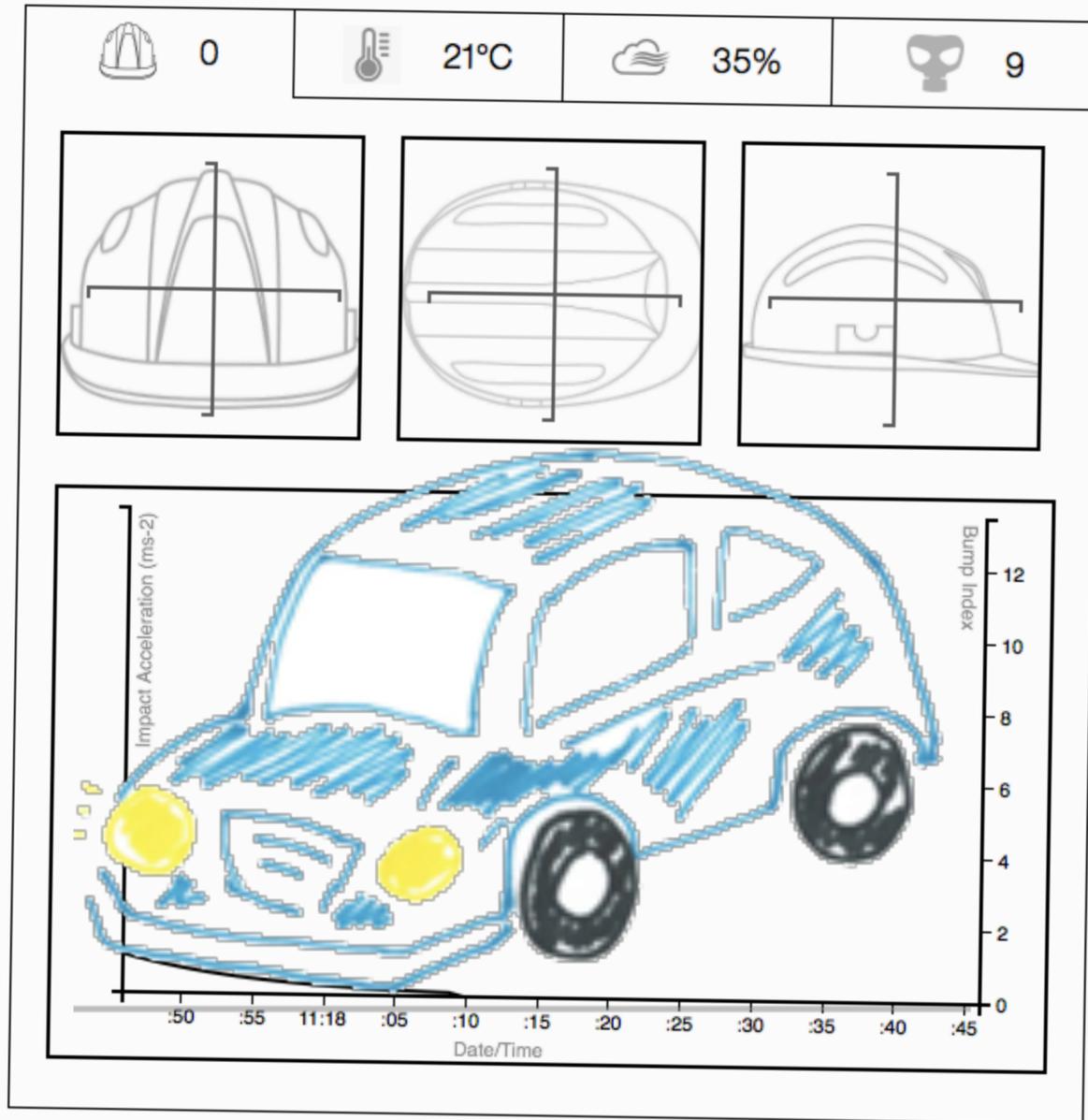
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Site Manager

Risk: V. Low

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Recent Issues

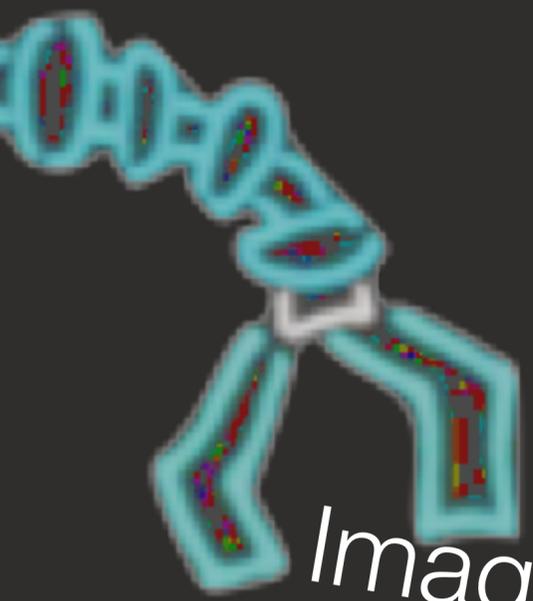
TYPE	TIME	SEVERITY
------	------	----------



We can solve so many
incredible problems.

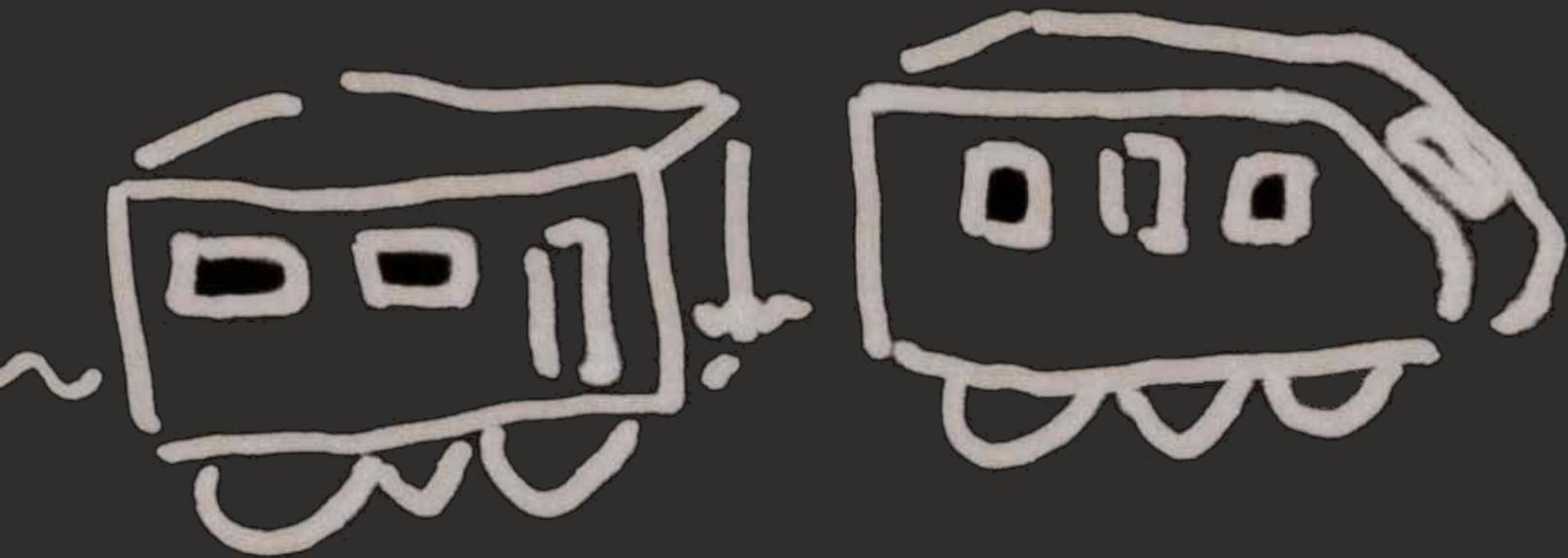
Imagine ... pill bottles that
light up when it's time to
take the medicine.





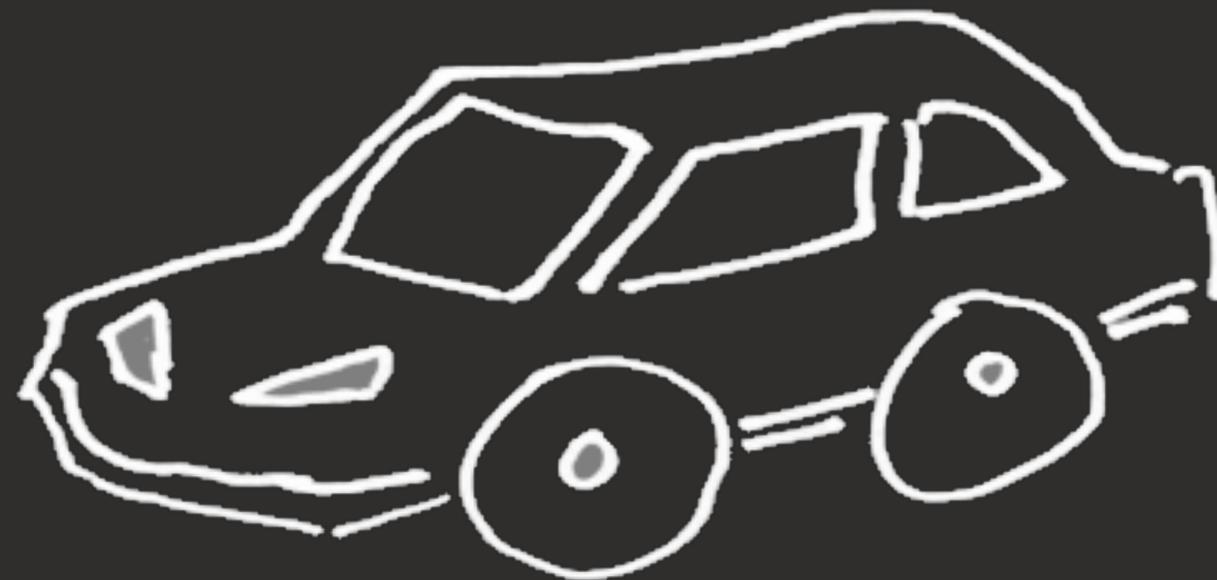
Imagine ... factories that know what's happening inside them.

(Industry 4.0)



Imagine ... cameras that detect wear in springs as a train runs by.

Imagine ... cars that figure out how the next generation of cars should be built.



Imagine ... knowing the
exact weather conditions,
everywhere.

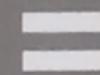


outthink storms

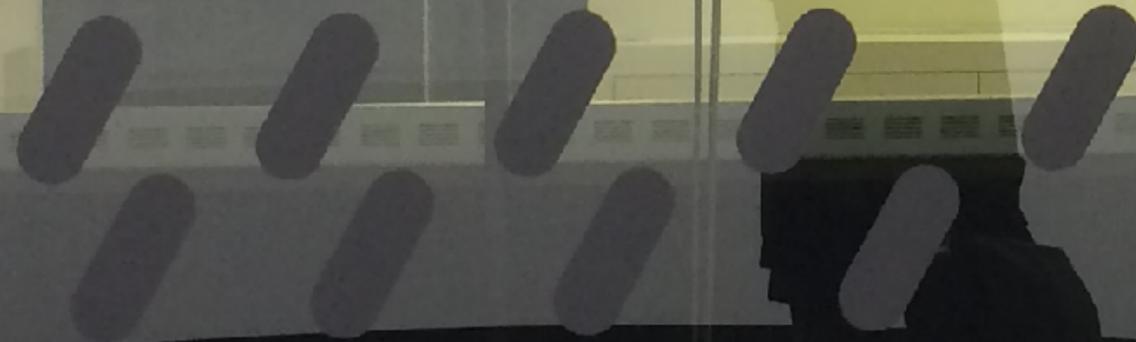
The Weather Company
utilizes over 140 000
IoT-powered
weather sensors



millions of
smartphones,
buildings
and moving
vehicles



2.2 billion
unique
forecast
points
worldwide



Macroscopes will help us understand Earth's complexity in infinite detail. Unlike the microscope, a “macroscope” harnesses data from billions of IoT devices using software and algorithms to address large-scale challenges such as availability of food, water and energy.



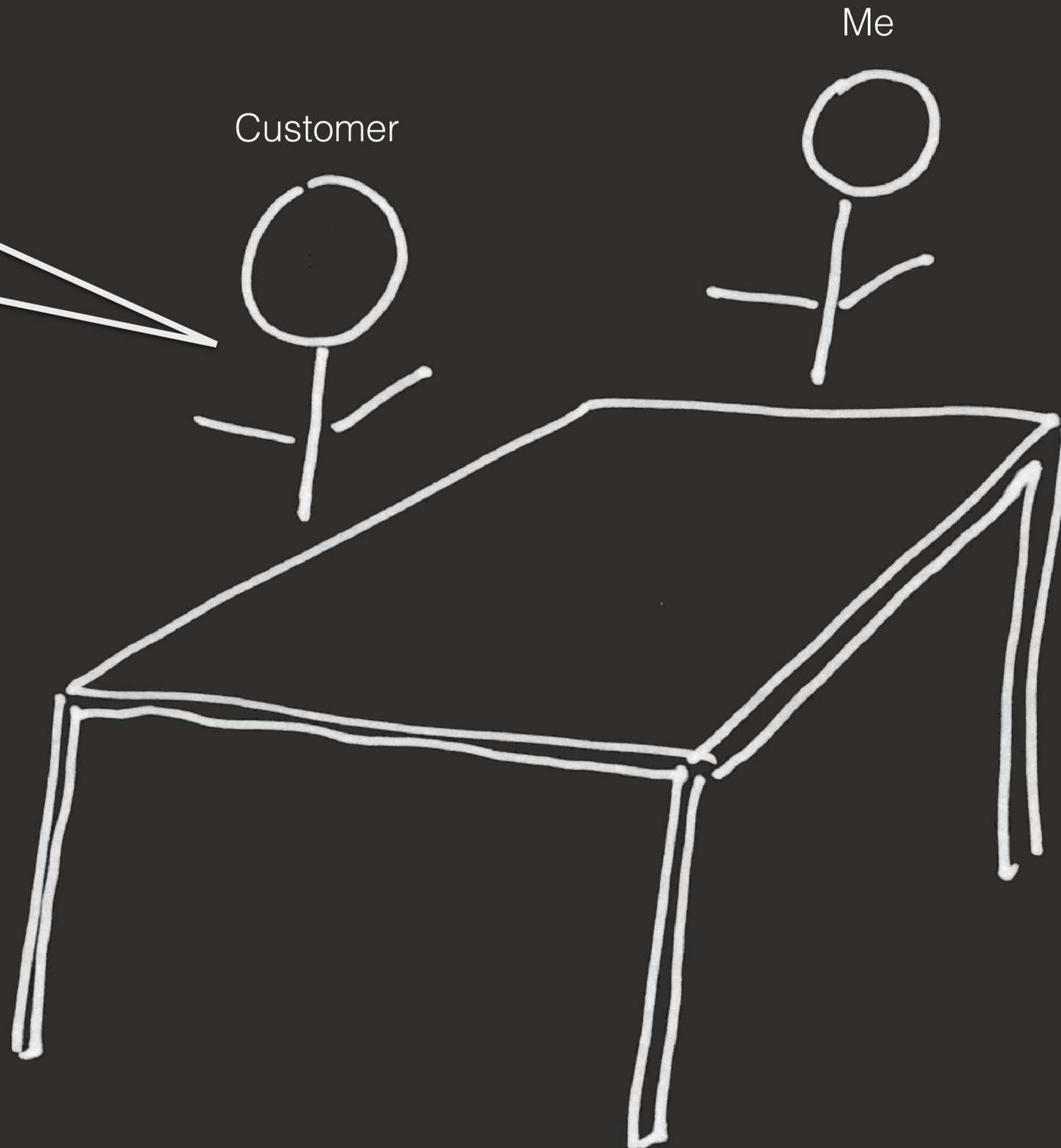
Tools

Learning

Data. Lots of It.



We want to be able to predict equipment failure, so we've wired up our factory for IoT.

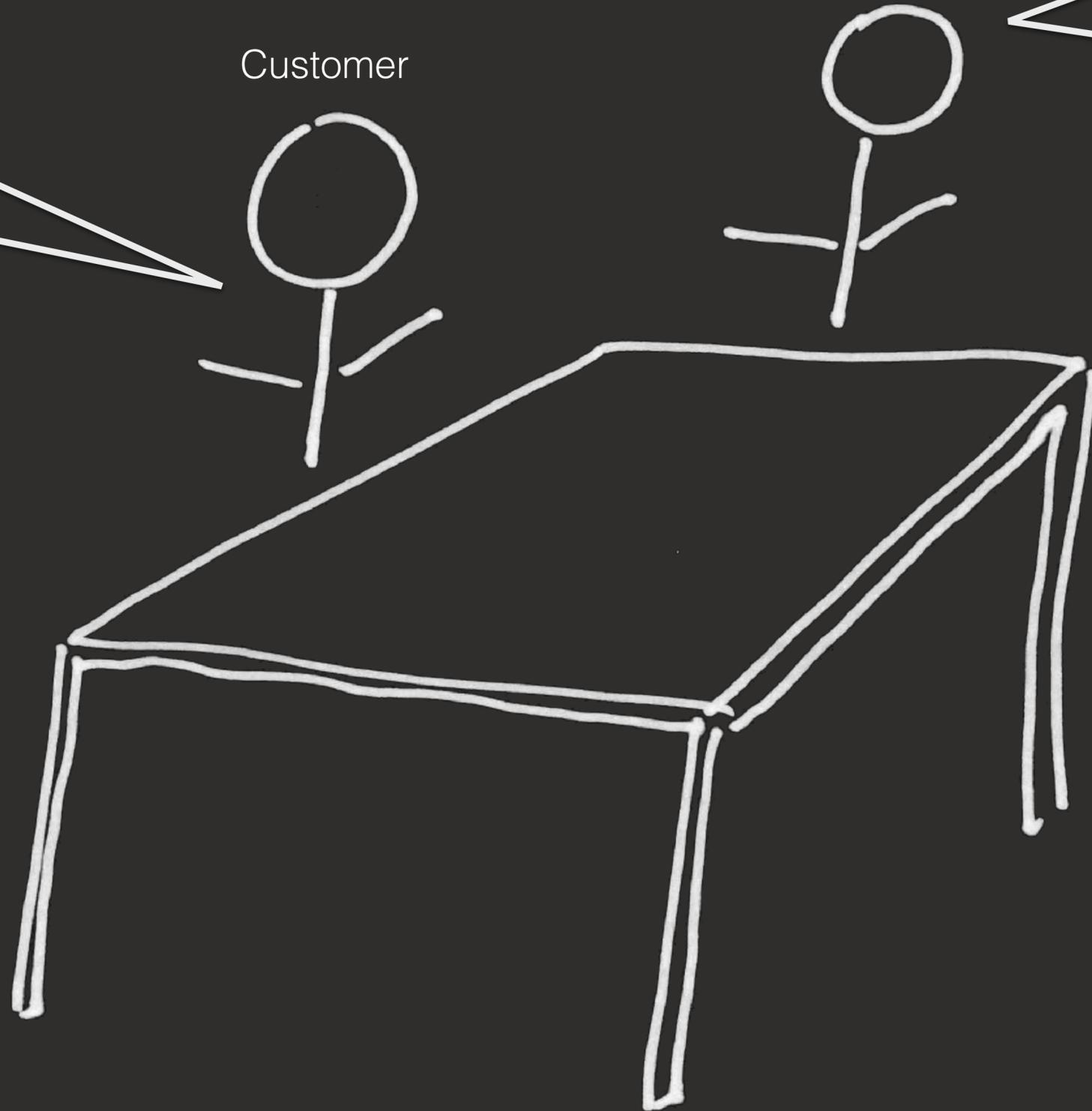


We want to be able to predict equipment failure, so we've wired up our factory for IoT.

Customer

Me

Good idea!



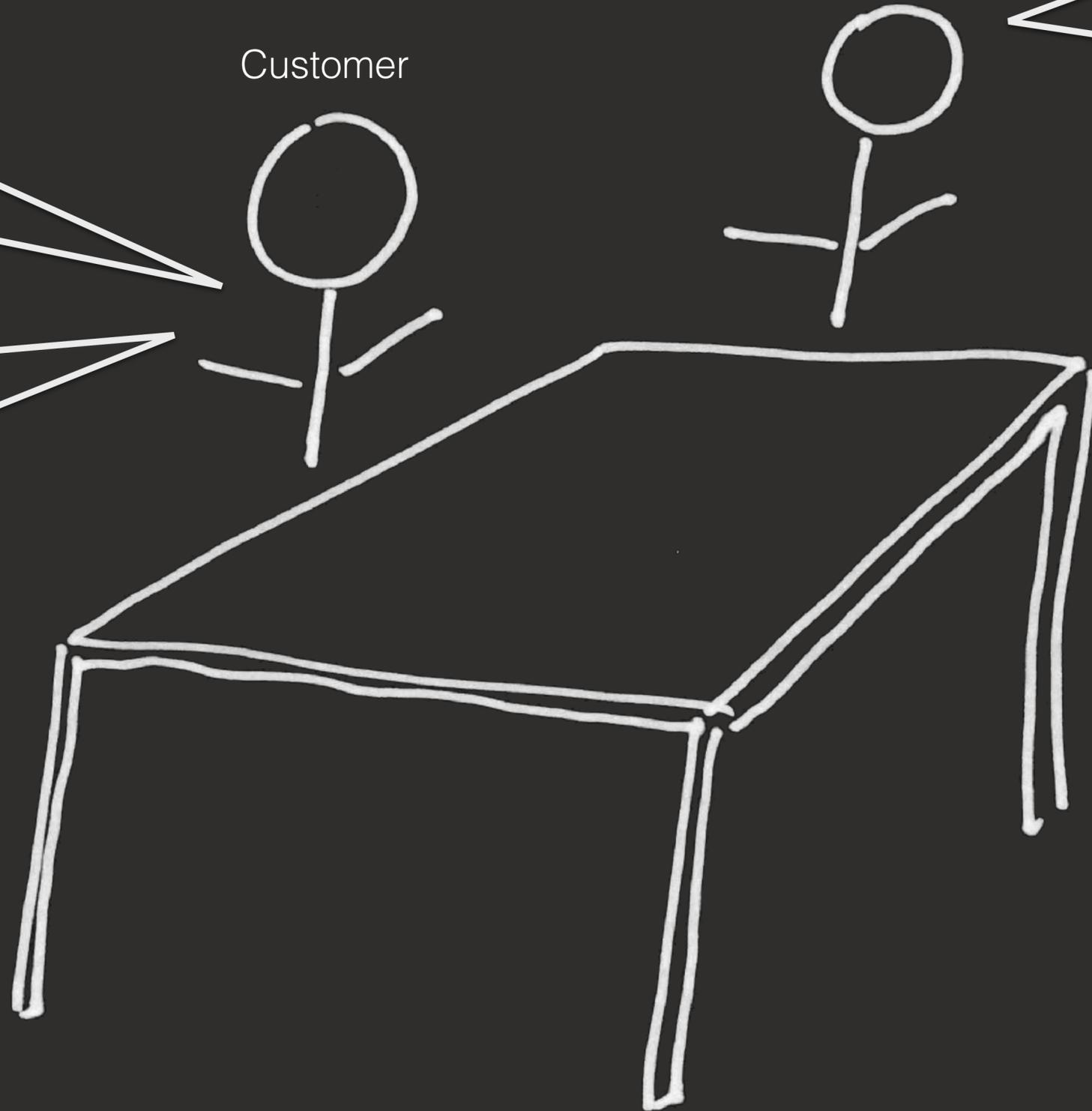
Me

Customer

Good idea!

We want to be able to predict equipment failure, so we've wired up our factories with IoT

That was a few years ago. We're not doing anything with the data...



We want to be able to predict equipment failure, so we've wired up our factories with IoT

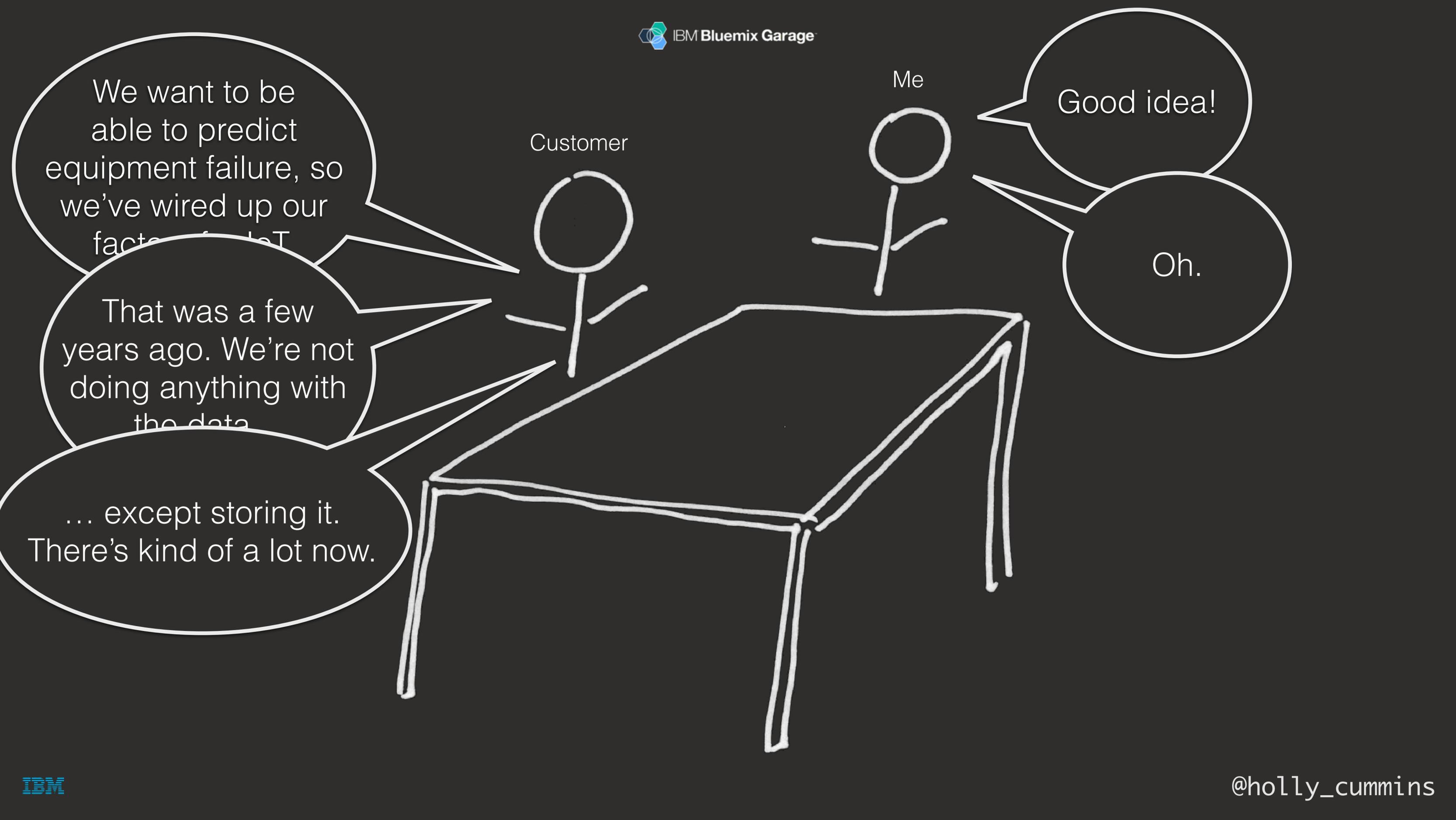
That was a few years ago. We're not doing anything with the data...

Customer

Me

Good idea!

Oh.





You're going to
need a data lake.



You're going to
need a data lake.

... and if you never use what's
in the data lake, that's a big
missed opportunity.



Handle a never-ending avalanche of data.

minimum requirement

Handle a never-ending avalanche of data.



minimum requirement

Handle a never-ending avalanche of data.

Combine structured and unstructured
data for new insights.

minimum requirement

Handle a never-ending avalanche of data.

Combine structured and unstructured
data for new insights.

“cognitive computing”



Team Visible

Backlog



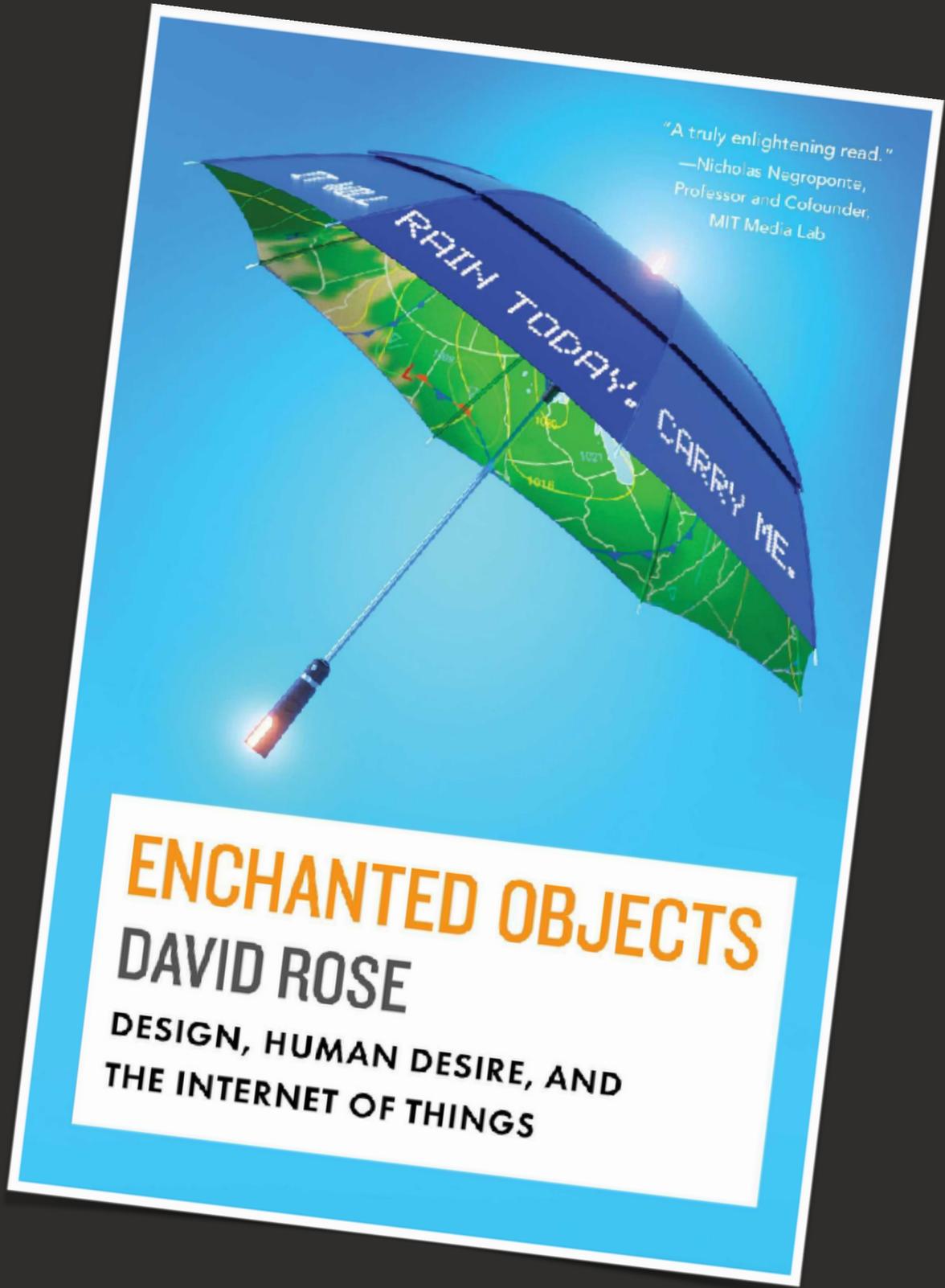
As Rufus, I can avoid having the WeWork building burned down around me by someone turning on an unsecured popcorn maker from the internet



1

Security

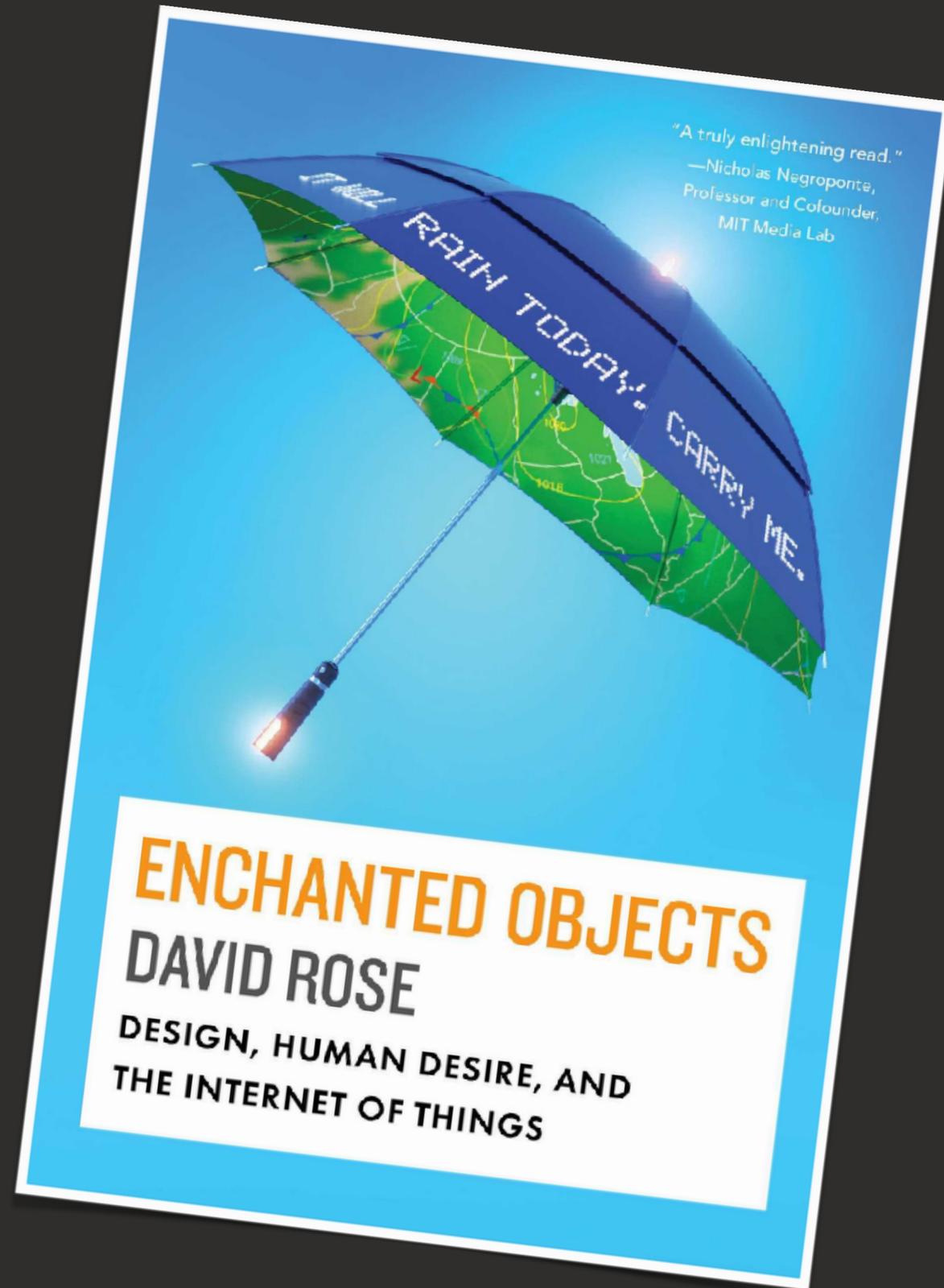


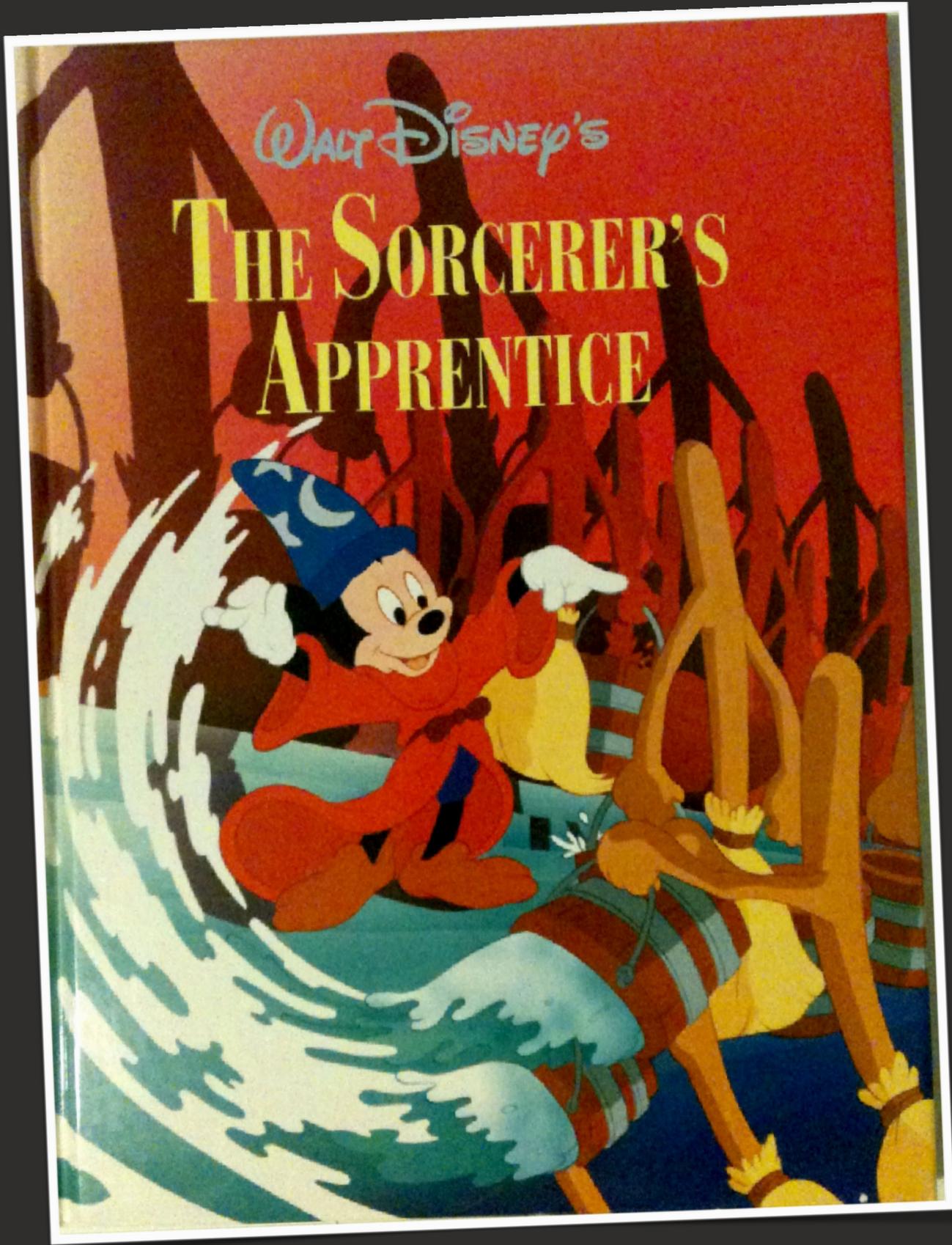


"A truly enlightening read."
—Nicholas Negroponte,
Professor and Co-founder,
MIT Media Lab

ENCHANTED OBJECTS
DAVID ROSE
DESIGN, HUMAN DESIRE, AND
THE INTERNET OF THINGS

What if our things
turn against us?



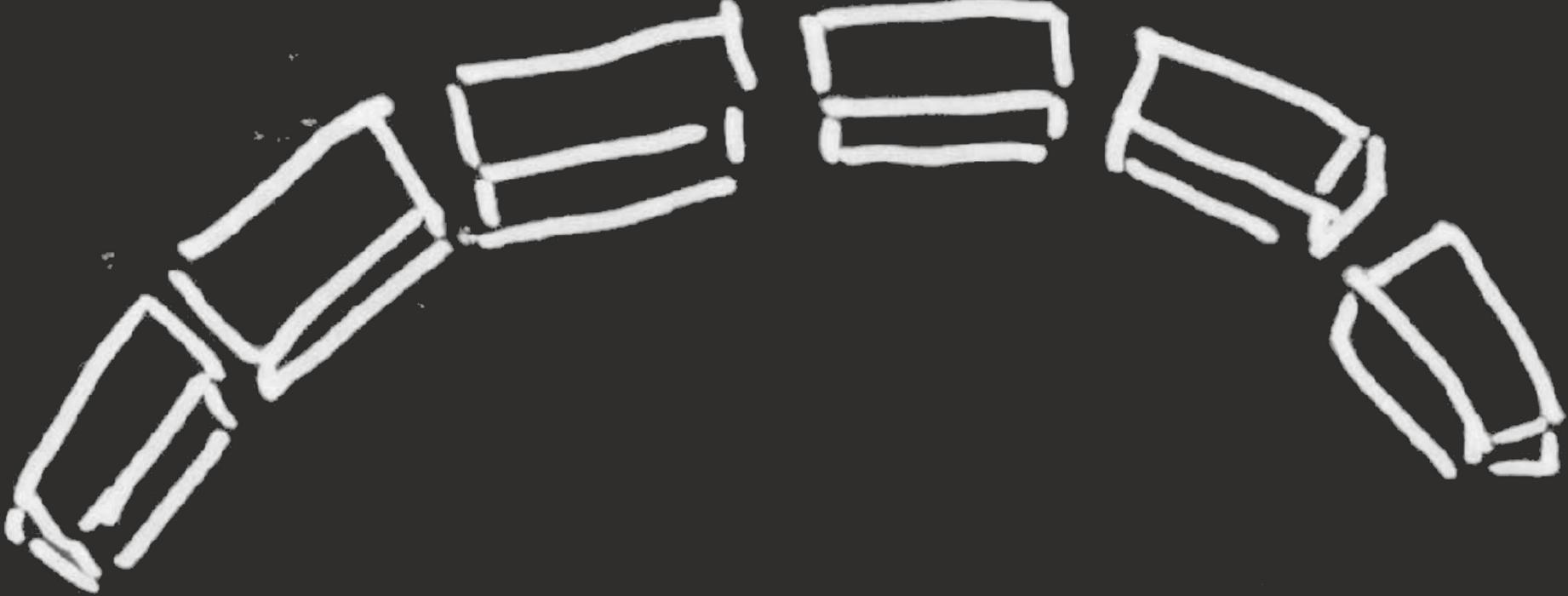


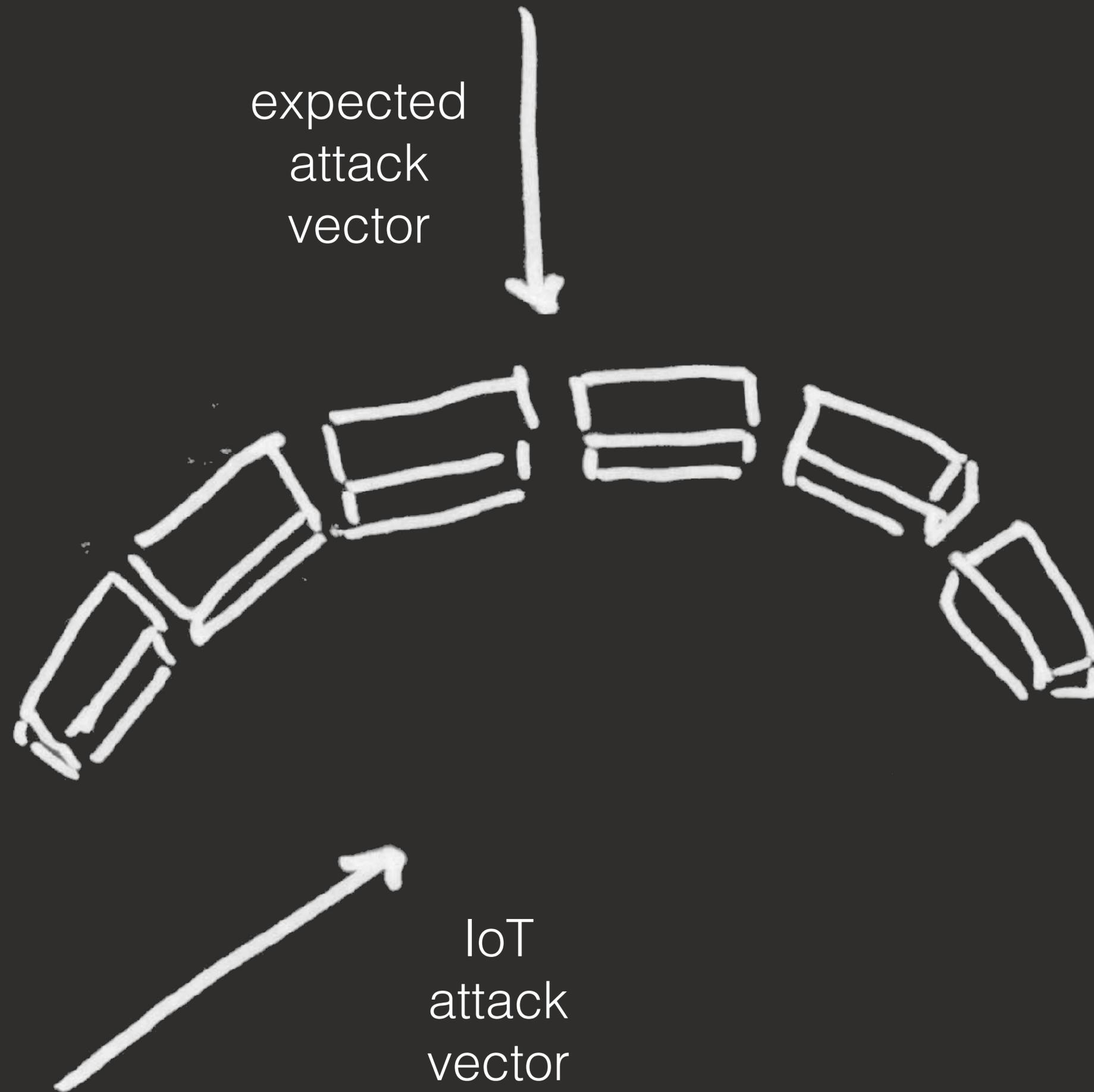


If IoT is scary in our homes, just imagine what it could do to our businesses?



expected
attack
vector





Software

Hacker jailed for revenge sewage attacks

Job rejection caused a bit of a stink

31 Oct 2001 at 15:55, [Tony Smith](#)



An Australian man was today sent to prison for two years after he was found guilty of hacking into the Maroochy Shire, Queensland computerised waste management system and caused millions of litres of raw sewage to spill out into local parks, rivers and even the grounds of a Hyatt Regency hotel.

"Marine life died, the creek water turned black and the stench was unbearable for residents," said Janelle Bryant of the Australian Environmental Protection Agency.



6 FEB 2014 **NEWS**

Target Hackers May Have Gotten In Through the Air Conditioner



Sources have said that credentials used in the Target breach were likely taken from Fazio Mechanical Services, a provider of refrigeration and HVAC systems for retailers and other businesses

The big-box giant saw 110 million in-store customers compromised by a widespread point-of-sale (PoS) hack during the busy holiday shopping season, with credit card info and other personal details lifted by the **BlackPOS malware** that was somehow uploaded from a central server. Target last week **confirmed** that the server itself was compromised by a third party using stolen credentials. Now, sources have said that those credentials were likely taken from Fazio Mechanical Services, a provider of refrigeration and HVAC systems for retailers and other businesses.

People familiar with the investigation told security researcher Brian Krebs, who continues to find Deep Throat-worthy sources to spill details on the breach, that the US Secret Service paid Fazio a visit and that the investigation overall is "very active." The perpetrators of the breach are suspected to be of eastern European and Russian origin, and they were

able to upload the malware (after a limited trial run) to "a majority" of Target's PoS devices, going on to collect information on about 40 million debit and credit card accounts between Nov. 27 and Dec. 15, 2013.

The information was then sent to several drop servers for housing and processing, including locations inside the US (Miami specifically), Brazil and other places.

info security
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Why Not Watch?



29 JAN 2015



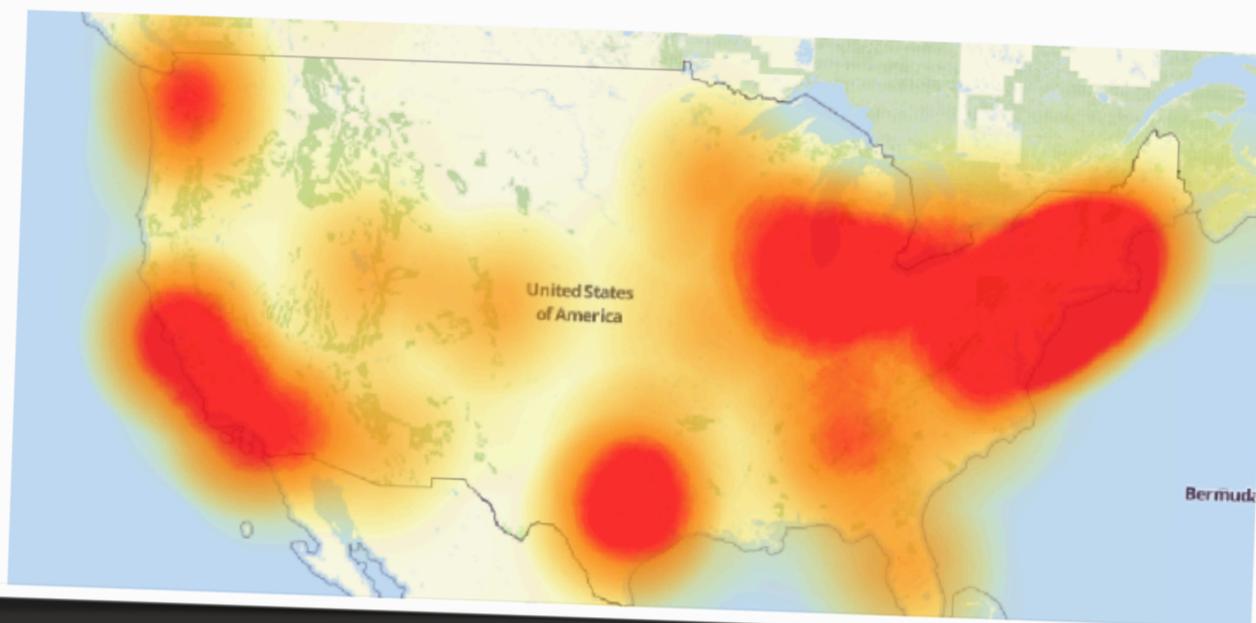
26 FEB 2015

21 Hacked Cameras, DVRs Powered Today's Massive Internet Outage

OCT 16

A massive and sustained Internet attack that has caused outages and network congestion today for a large number of Web sites was launched with the help of hacked "Internet of Things" (IoT) devices, such as CCTV video cameras and digital video recorders, new data suggests.

Earlier today cyber criminals began training their attack cannons on **Dyn**, an Internet infrastructure company that provides critical technology services to some of the Internet's top destinations. The attack began creating problems for Internet users reaching an array of sites, including Twitter, Amazon, Tumblr, Reddit, Spotify and Netflix.

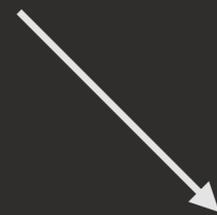


Hundreds of thousands of cameras and TV recorders working together brought down the Dyn DNS provider in a DDoS.

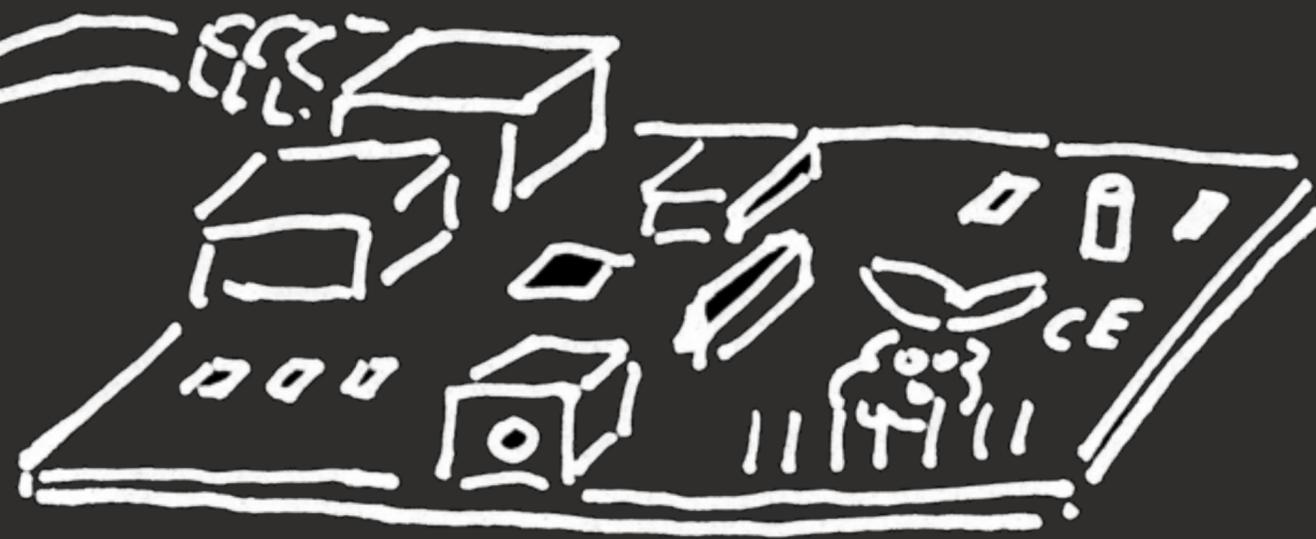


In the future, do we need to fear
our DVRs and air conditioners?

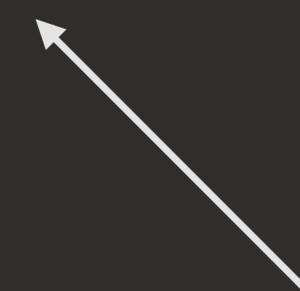
get data in and out



You can do IoT
if you can ...



read and write to pins

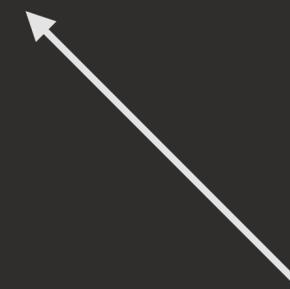


get data in and out



You can do IoT
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read and write to pins



This may be part
of the problem.



EUROPE EDITION
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EUROPE

Hackers Use New Tactic at Austrian Hotel: Locking the Doors

By DAN BILEFSKY JAN. 30, 2017



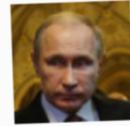
The ransom demand arrived one recent morning by email, after about a dozen guests were locked out of their rooms at the lakeside Alpine hotel in Austria.



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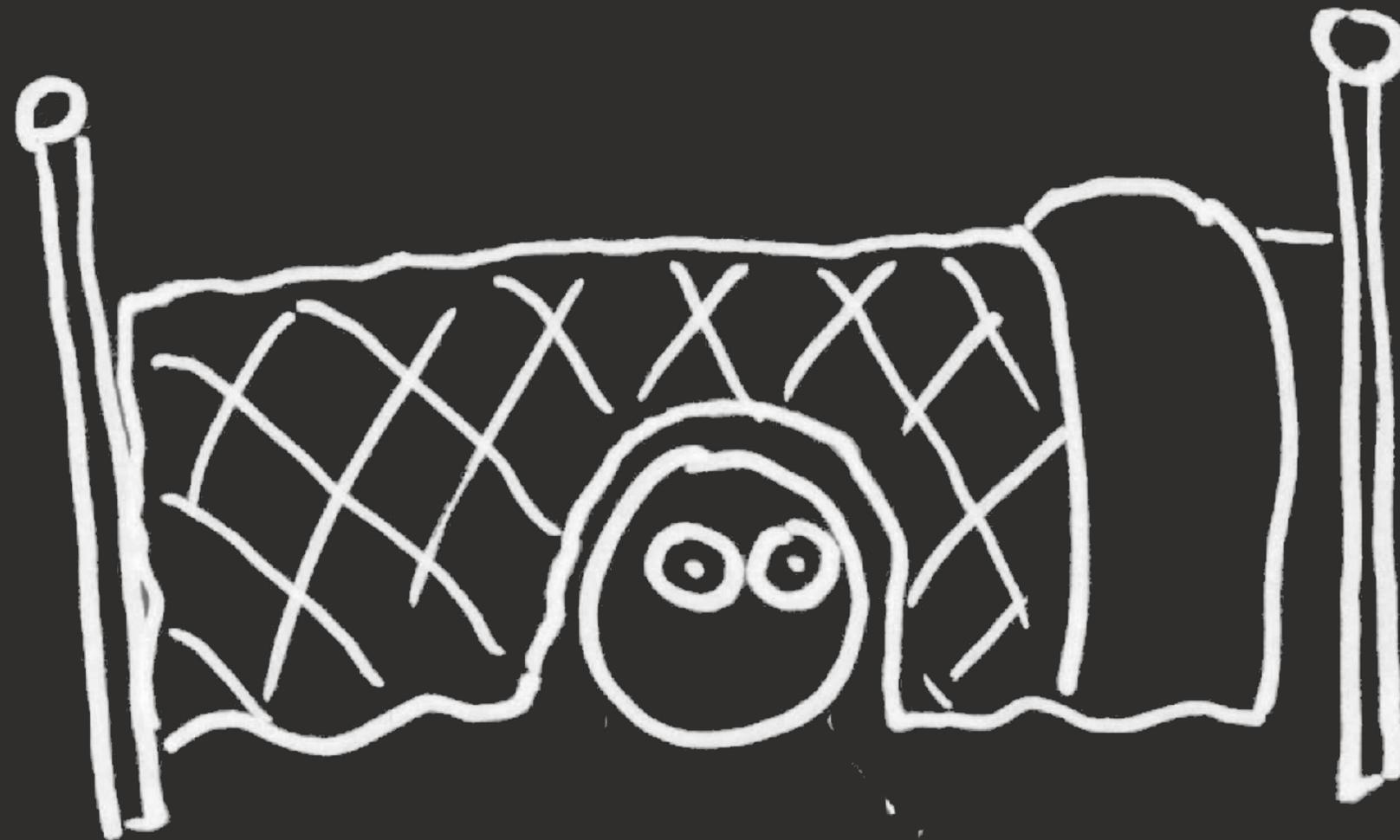
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The ransom demand arrived one recent morning by email, after about a dozen guests were locked out of their rooms at the lakeside Alpine hotel in Austria.

The hotel is now going to downgrade doors to old fashioned locks and real keys.

Is disconnection
the solution?



How about ... we educate
ourselves and make
better design decisions?



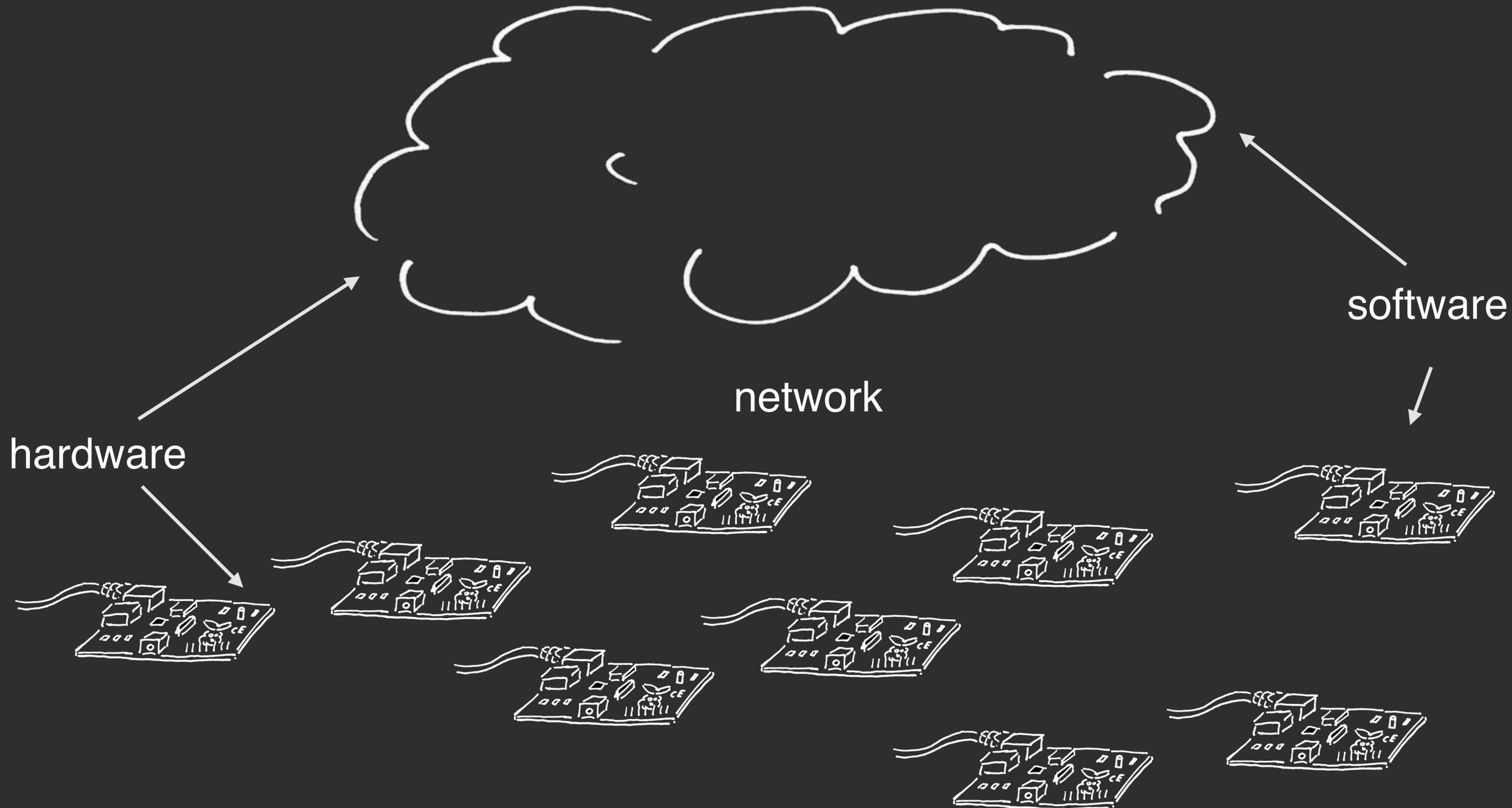
"Never attribute to malice that which is adequately explained by incompetence."

Reliability



“Holly, I saw a video of your throwable application server talk. I thought you handled the fact that the demo failed really well. Are there any videos where it actually works?”

- My mother



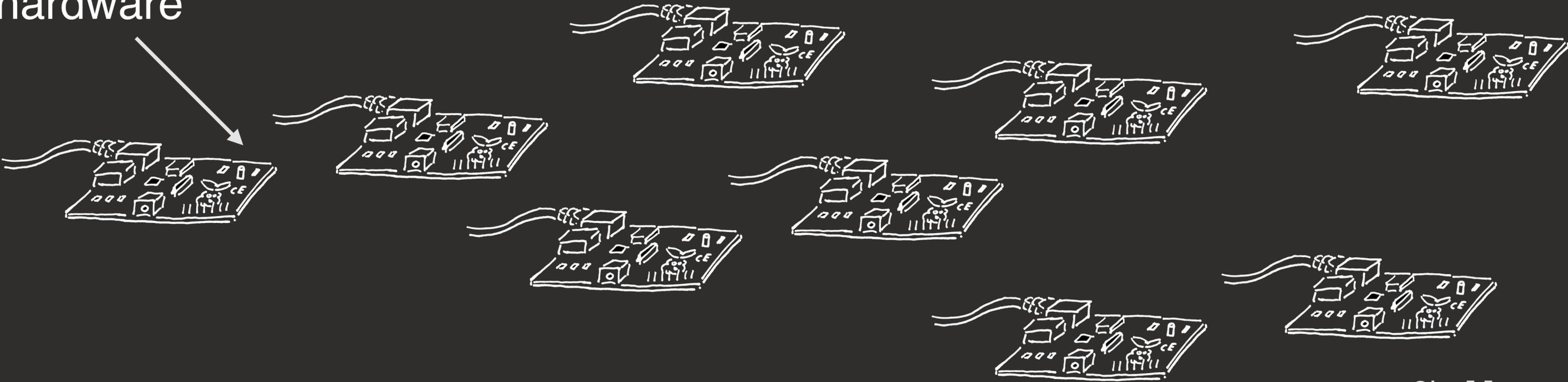
What could possibly go wrong?



software

network

hardware



The more moving parts, the
more opportunity for failure.



But ...what does
it all *mean*?



What can you imagine
for *your* domain?



Questions?