







Ari



Colby



Steve







The Magic Connection

More than 20 years ago, in 1992, global Internet networks carried approximately 100 GB of traffic per day. Ten years later, in 2002, global Internet traffic amounted to 100 Gigabytes per second (GBps). In 2016, global Internet traffic reached more than 20,000 GBps.

Cisco Systems

The Magic

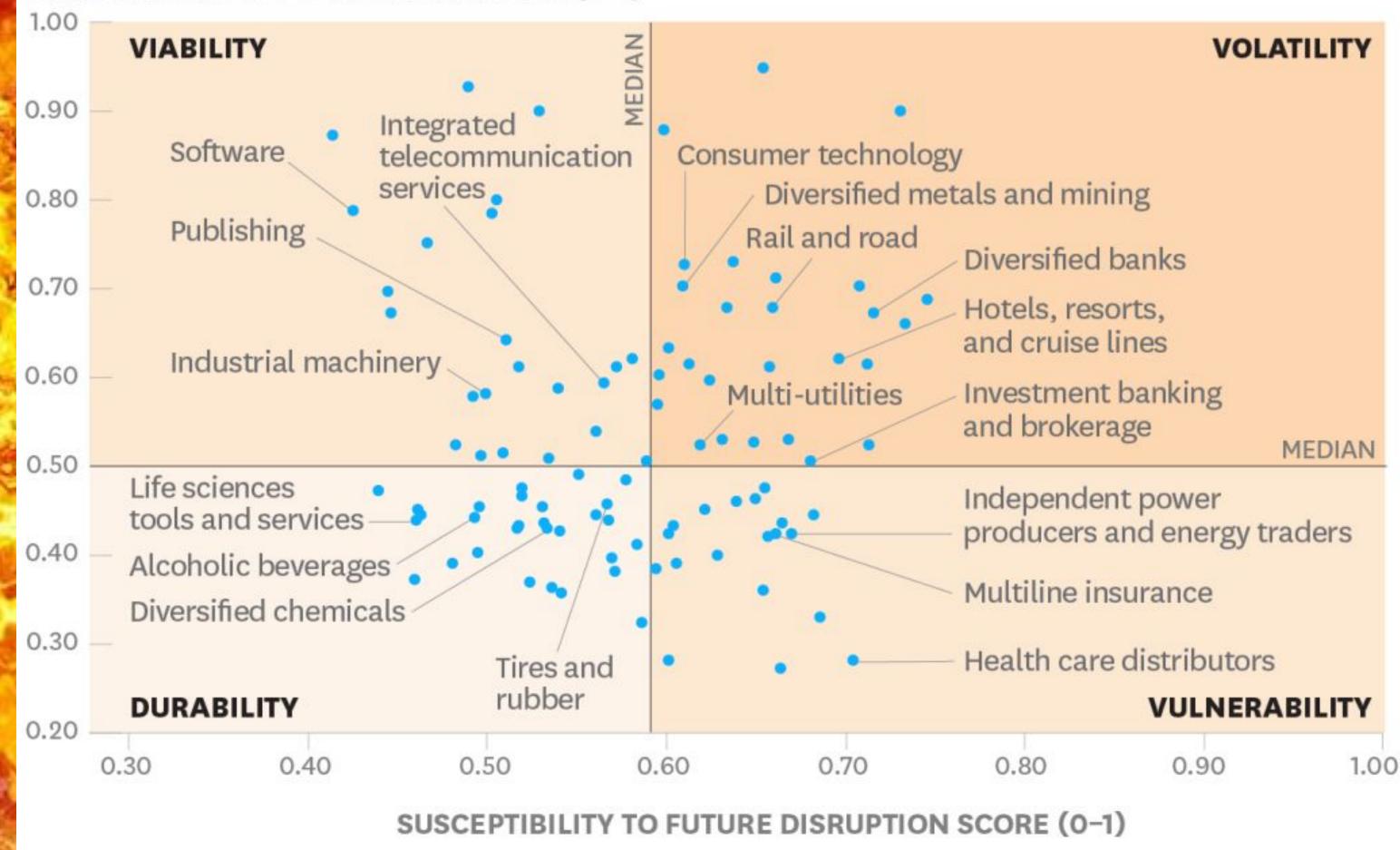




The Four States of Disruption

How susceptible is your industry?

CURRENT LEVEL OF DISRUPTION SCORE (0-1)



Let's Disrupt!

Homebuilders!

Impact on Housing?

SKANSKA















What would Google do?



What would Amazon do?



What IS IKEA doing?



What IS Katerra doing?



blokable

What IS Blokable doing?

Industrial Robots	\$500,000 → \$22,000	23x in 5 yrs
Drones	\$100,000 → \$700	142x in 6yrs
Solar Energy	\$30/kW → 0.15/kW	200 x in 30 yrs
LiDAR (sensors)	\$20,000 → \$79	250x in 5 yrs
DNA Sequencing	\$10MM → \$1,000	10,000x in 7 yrs
CNC Machine	\$1MM → \$10,000	1000x in 30 yrs
Housing	\$172,000 → \$272,000	1.5x in 17 yrs

Pre

Manual
Distributed
Circular

Low Workshop Setup Cost Hi Product Cost Many Products Customized

1st

Powered Centralized Linear

Hi Factory Setup Cost Med Product Cost One Products One Size Fits All

No Resilience to Demand Drops

2nd

Mechanized Centralized Linear

Hi Factory Setup Cost Low Product Cost One Products One Size Fits All

No Resilience to Demand Drops

3rd

Digital Centralized Linear

Med Factory Setup Cost Very Low Product Cost One Products One Size Fits All

No Resilience to Demand Drops

4th

Digital
Distributed
Smart
Circular

Low Factory Setup Cost Very Low Product Cost Many Products Mass Customized

Resilient, On-Demand, Circular

Craftsman

Early Factory

The "Ford" Factory

Modern Factory **Future Factory**

Trade Coordination

Design Details

Correct Materials

Logistically Challenging

Behind Schedule

Accurate Timing



Proper Lot

Terribly Inefficient

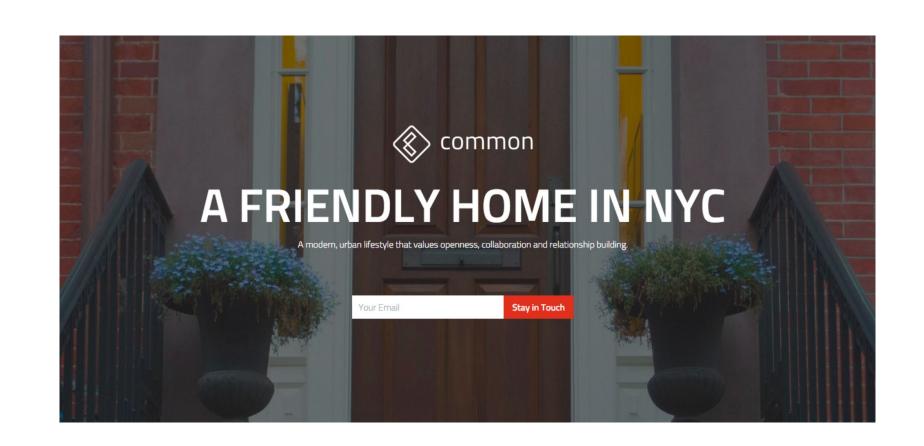
Regulation / Code

Necessary Tools
/ Training



Access versus ownership?





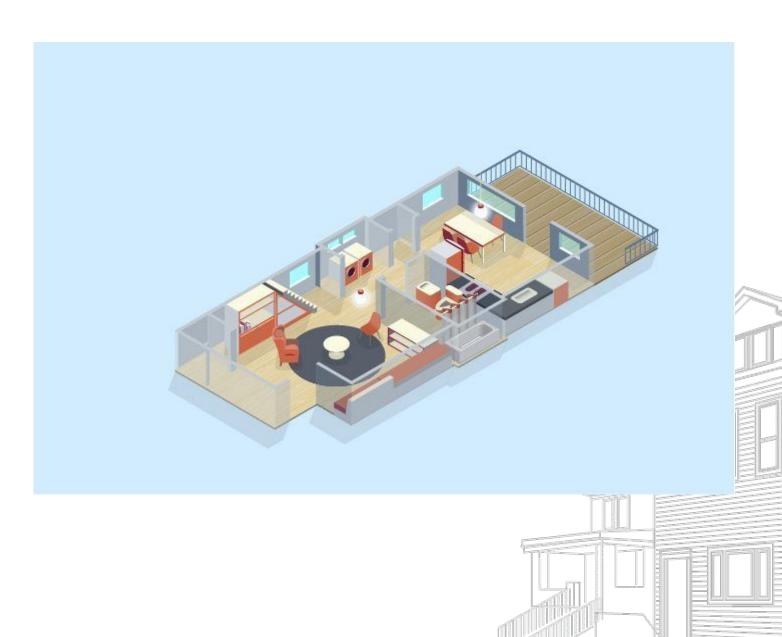


NORTH AMERICA SEKISUI HOUSE, LLC

welive



20-year warranties...customers for life?





MODULE











Marketing & **Community Relations** Bill & Melinda Gates Foundation



Supply Chain, etc. Hewlett-Packard

Manufacturing CEVA Logistics, Flextronics



Building Engineering

Engineering - Apple headquarters, Bejing Olympic Stadium

Finance

Amkor Technology, Price Waterhouse

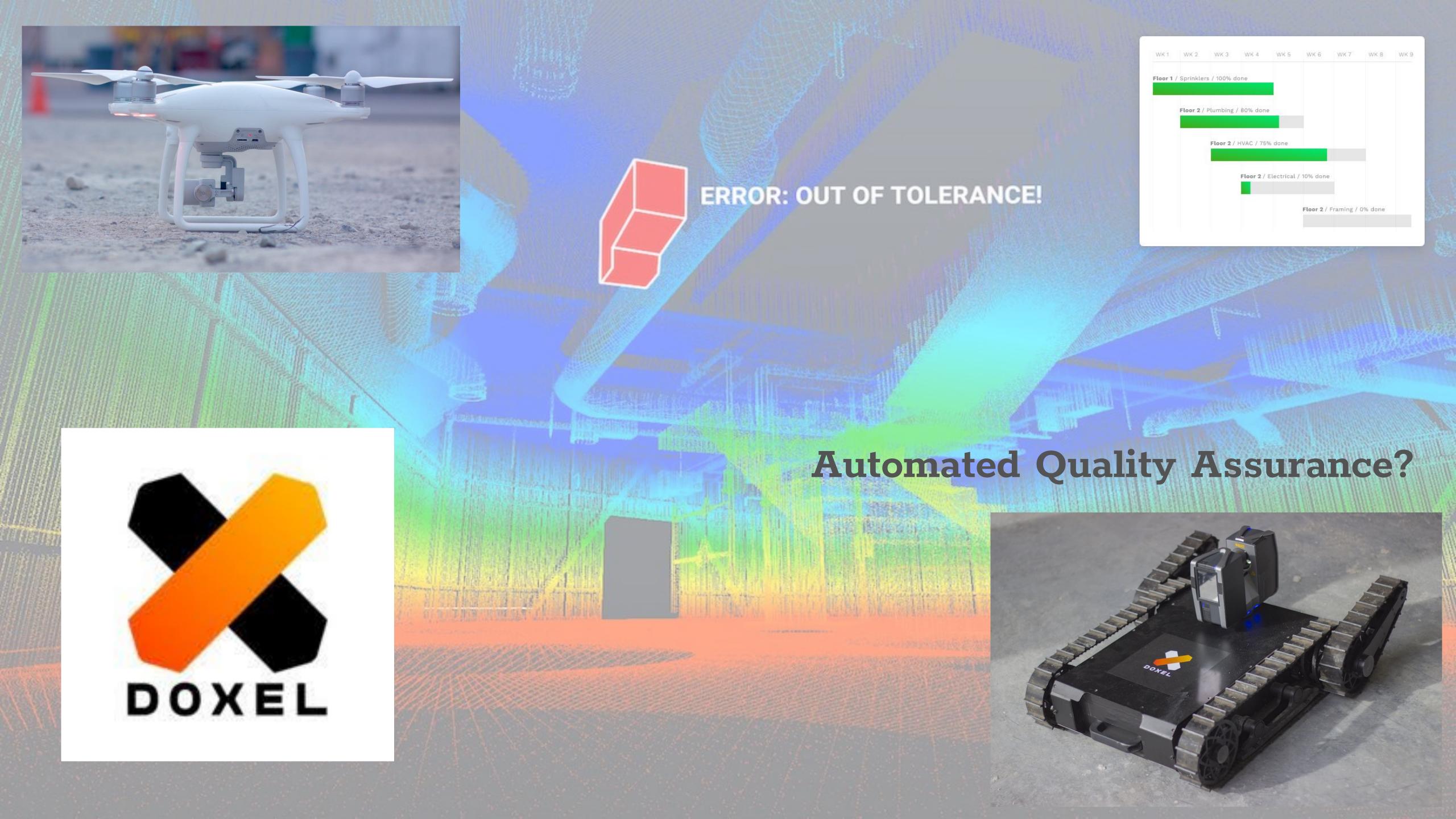
Construction

Kitchell Contractors, Bernards Brothers

SanDisk

Architecture, Interior Design

First commercial Living Building Challenge built in the World



The Future of Home Building



Role of the HERS
Rater?

WHY CHANGE? ...aren't things pretty good?

In a high quality building environment, what is the place for low-cost commodity rating work?

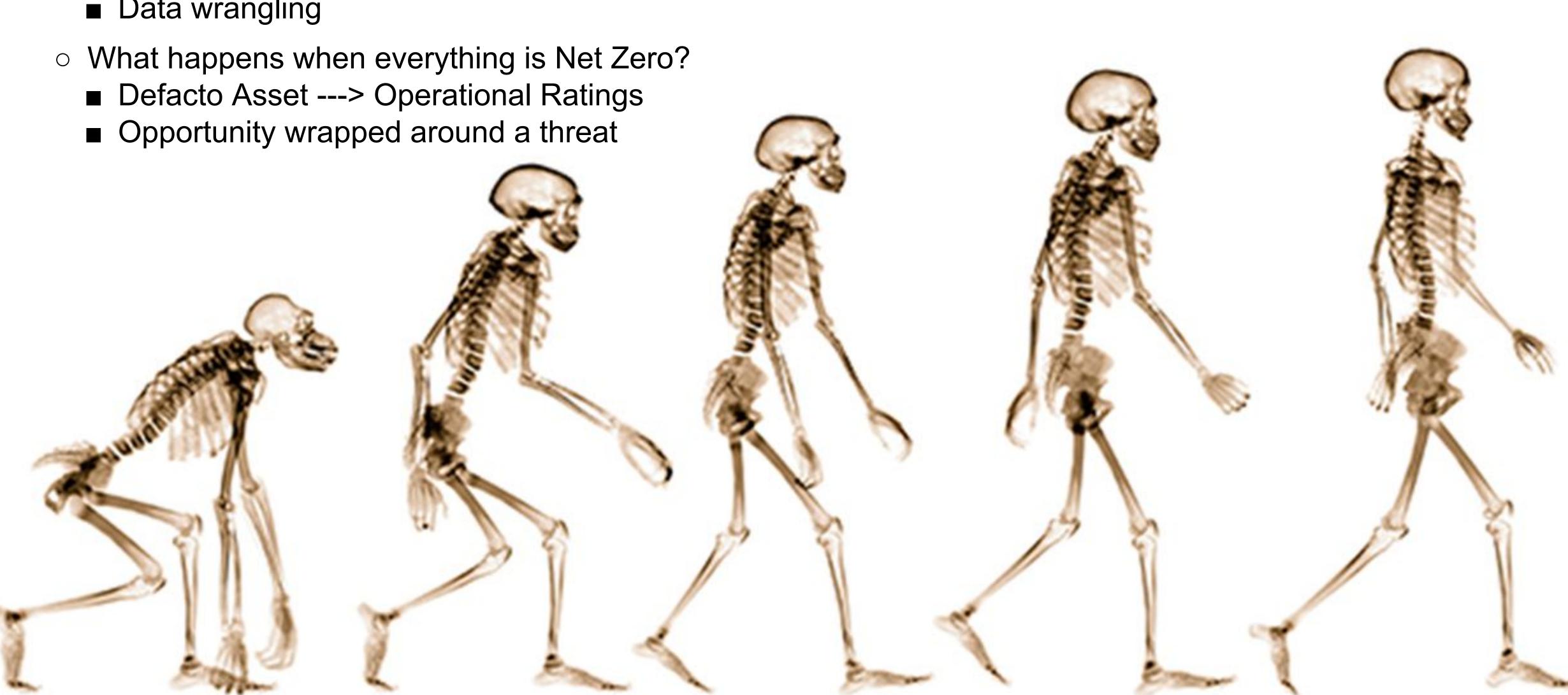
- Controlled environment = Far fewer mistakes
 - Data
 - Job-site construction time reduced by as much as 33 %
 - Key material utilization reduced by as much as 25%
 - Skilled labor needs on site reduced by approximately 40% to 60%
- Less need for "traditional" QA
 - Remaining "on-site" QA needs?
 - **■** 555

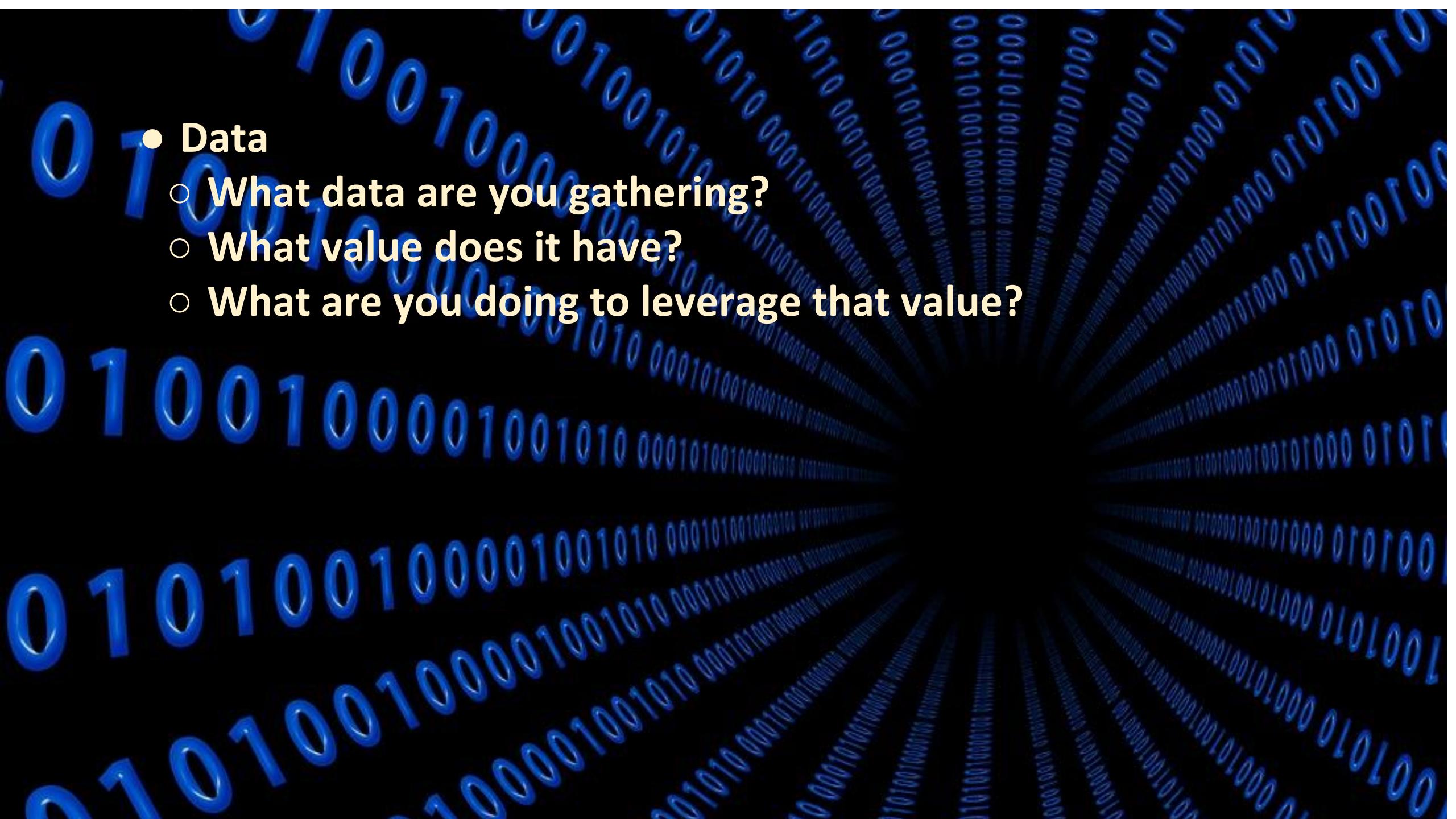


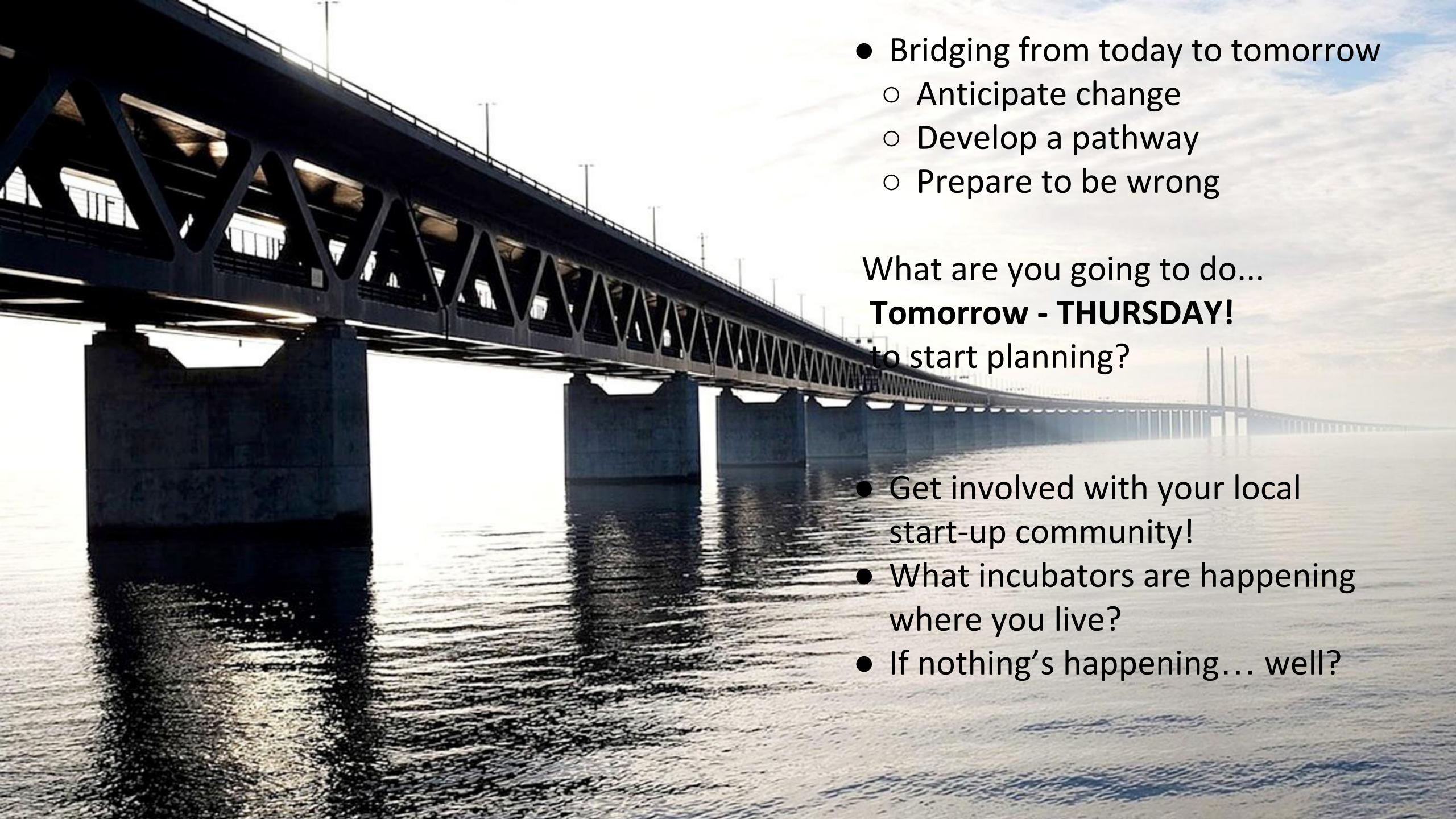


Adapt or die...

- Find a new niche
 - New QA role
 - Trade Education
 - Data wrangling

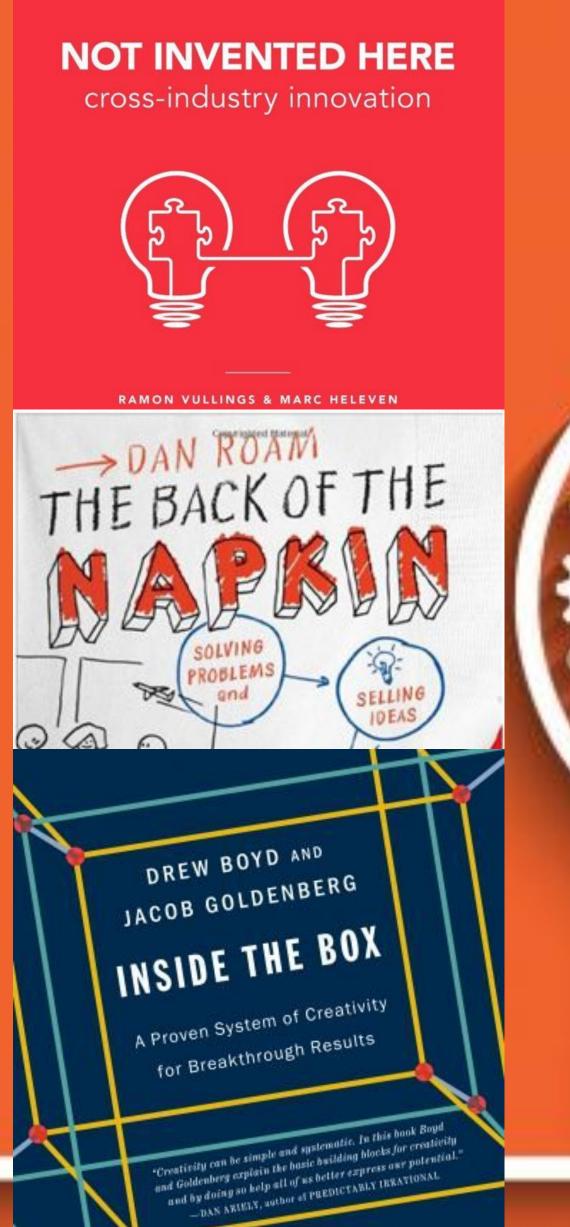






How to get started - Innovation 101

DIY = Disruption is You!





"Change is the law of life. And those who look only to the past or present are certain to miss the future."

- John F. Kennedy



Breakout Questions

- 1. When energy is free/nearly free, what are the implications to the builder, Rater, trades, homeowners?
- 2. When offsite becomes the norm, what are the implications to the builders, the Rater, trades, homeowners?
- 3. When robotics and AI are ubiquitous, what are the implications to the builder, Rater, trades, homeowners?

What are you doing now to deal w/ this?

When you leave here ...

- Attend local start-up community events
 - Lookup "meetups"
 - AutoDesk BUILD space Boston
 - ...
- Attend non-traditional conferences:
 - BuiltWorlds Machine/Robotics in Construction May 3 Chicago
 - CES Las Vegas
 - Singularity Summit Futurist conference Aug 20-22 San Fran.
 - World of Modular 2019
 - ICC code Conferences