

# Microservices

*How to safely speed up your  
digital innovation*

Mike Amundsen

API Academy/CA Technologies

@mamund

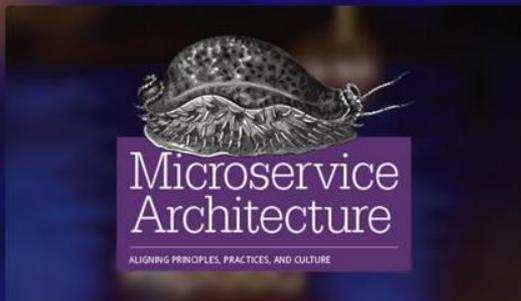




Mike Amundsen  
@mamund



EBOOK



## MICROSERVICE ARCHITECTURE: ALIGNING PRINCIPLES, PRACTICES & CULTURE

DESIGN AND APPLY MICROSERVICES TO EMBRACE CONTINUAL  
CHANGE IN THE DIGITAL ECONOMY

READ MORE

# <http://g.mamund.com/msabook>

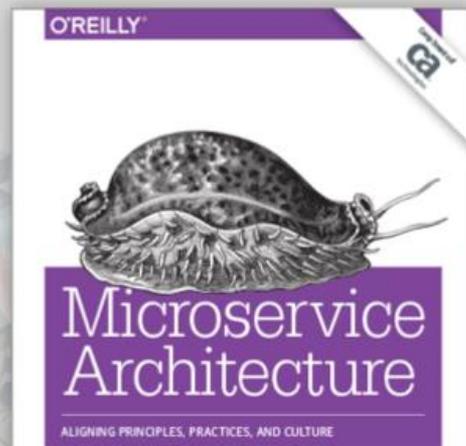


## Microservice Architecture: Aligning Principles, Practices, and Culture

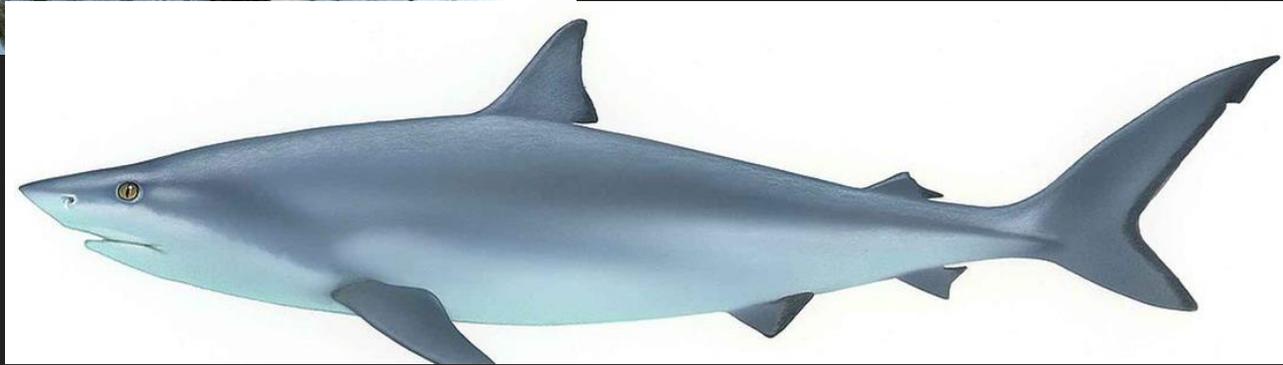
Microservices is the next evolution in software architecture designed to help organizations embrace continual change in the digital economy. But how do you design and apply an effective microservice architecture?

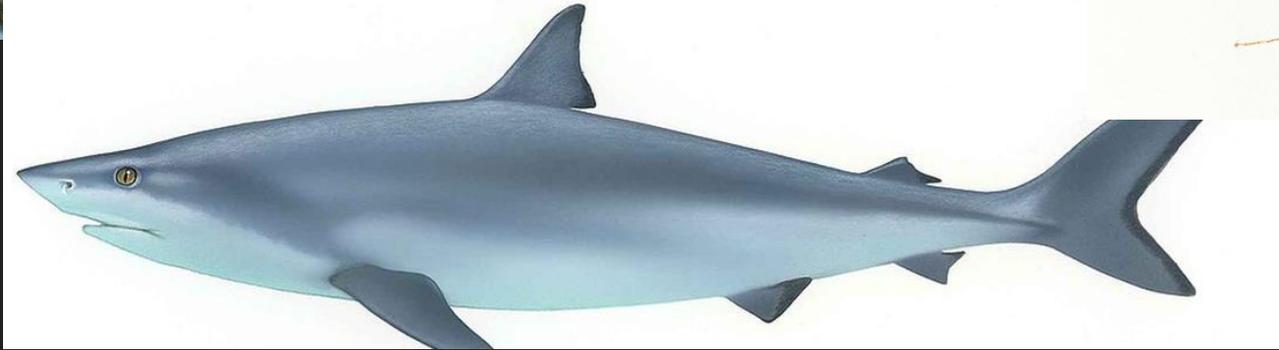
This new book from O'Reilly provides comprehensive guidance through seven valuable chapters that give you a deep-dive into:

- The benefits and principles of microservices
- A design-based approach to microservice architecture
- Lessons for applying microservices in practice











# Microservices

# Tool-making

Known for using plant material to create stick and leaf tools to capture prey.



# Tool-making

Make each program do one thing well

Expect the output of every program to be the input of another

Design and build software to be tried early

Use tools to lighten the programming task



# Unix Operating Principles (1978)

Make each program do one thing well

Expect the output of every program to be the input of another

Design and build software to be tried early

Use tools to lighten the programming task

The UNIX logo is displayed in a white rectangular box. The word "UNIX" is written in a bold, black, sans-serif font. A diagonal slash is positioned to the right of the letters "N" and "I", extending from the top right of the "I" down to the bottom right of the "N".

UNIX

# Tool-making

Make each program do one thing well

Expect the output of every program to be the input of another

Design and build software to be tried early

Use tools to lighten the programming task

The Netflix logo, consisting of the word "NETFLIX" in a bold, white, sans-serif font with a slight 3D effect, set against a solid red rectangular background.The Unix logo, featuring the word "UNIX" in a black, sans-serif font, with a diagonal slash through the letter "X", set against a white rectangular background.

# Tool-making

Make each program do one thing well

Expect the output of every program to be the input of another

Design and build software to be tried early

Use tools to lighten the programming task

The Netflix logo, featuring the word "NETFLIX" in a bold, white, sans-serif font with a black outline, set against a solid red background.The Amazon logo, featuring the word "amazon" in a bold, black, lowercase sans-serif font, with a yellow curved arrow underneath that points from the letter 'a' to the letter 'z'.The Unix logo, featuring the word "UNIX" in a bold, black, uppercase sans-serif font, with a diagonal slash through the letter 'X', set against a white background.

# Tool-making

Make each program do one thing well

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*Microservices is all about tool-making*



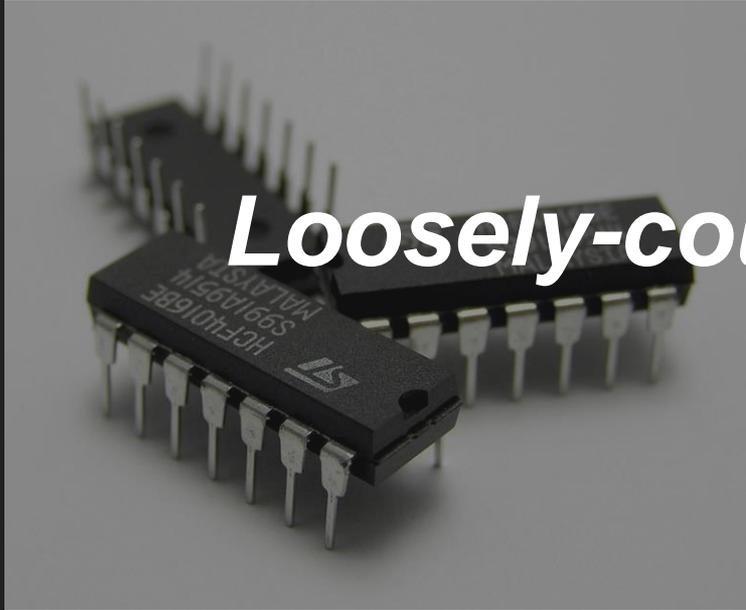
# A useful definition of Microservices

***Loosely-coupled components***

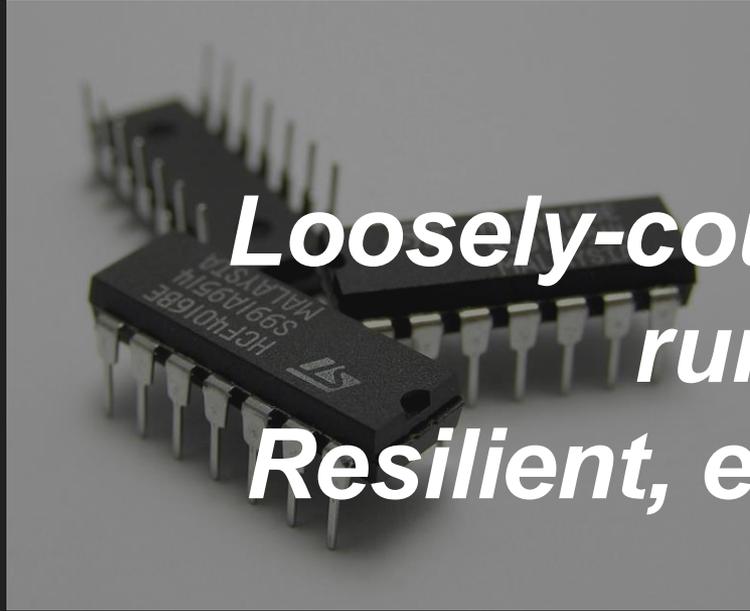


# A useful definition of Microservices

*Loosely-coupled components*



# A useful definition of Microservices

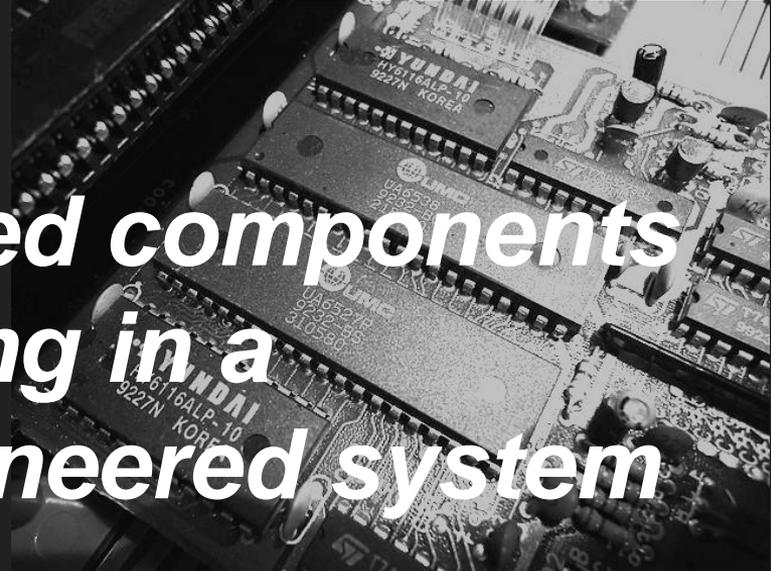
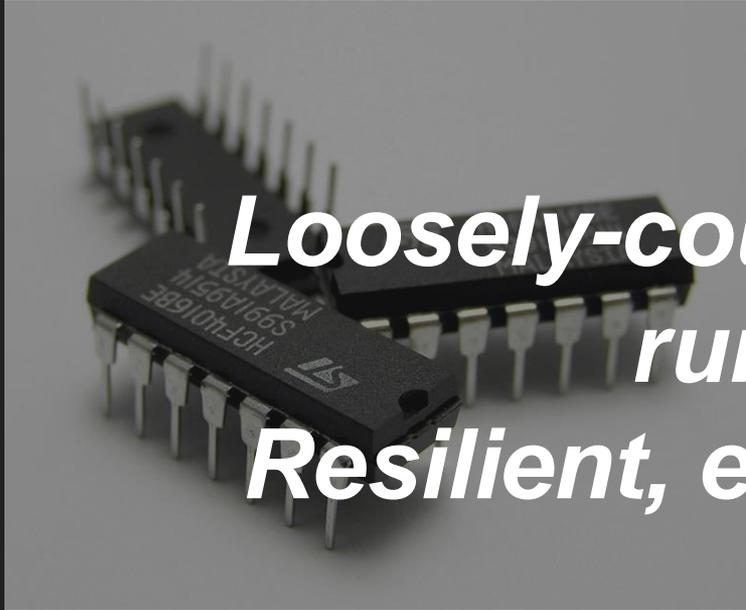


***Loosely-coupled components  
running in a  
Resilient, engineered system***



# A useful definition of Microservices

*Loosely-coupled components  
running in a  
Resilient, engineered system*



# *Harmonizing Speed and Safety at Scale*





*Harmonizing Speed and Safety at Scale*





*Harmonizing Speed and Safety at Scale*



# Three things you can do now...

Build Pipelines

Engineered Deployment

Reduce Work in Progress

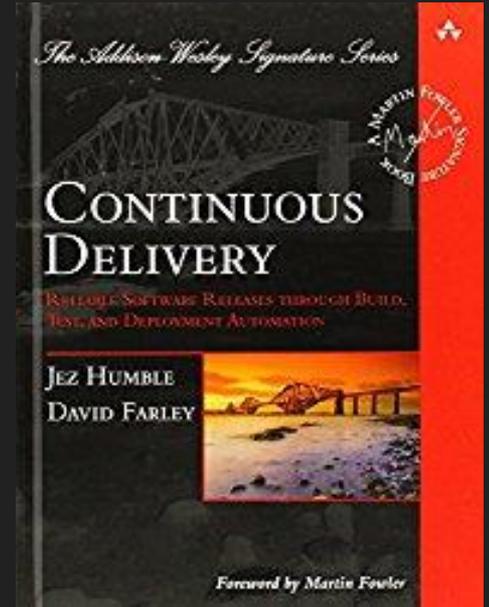


# Three things you can do now...

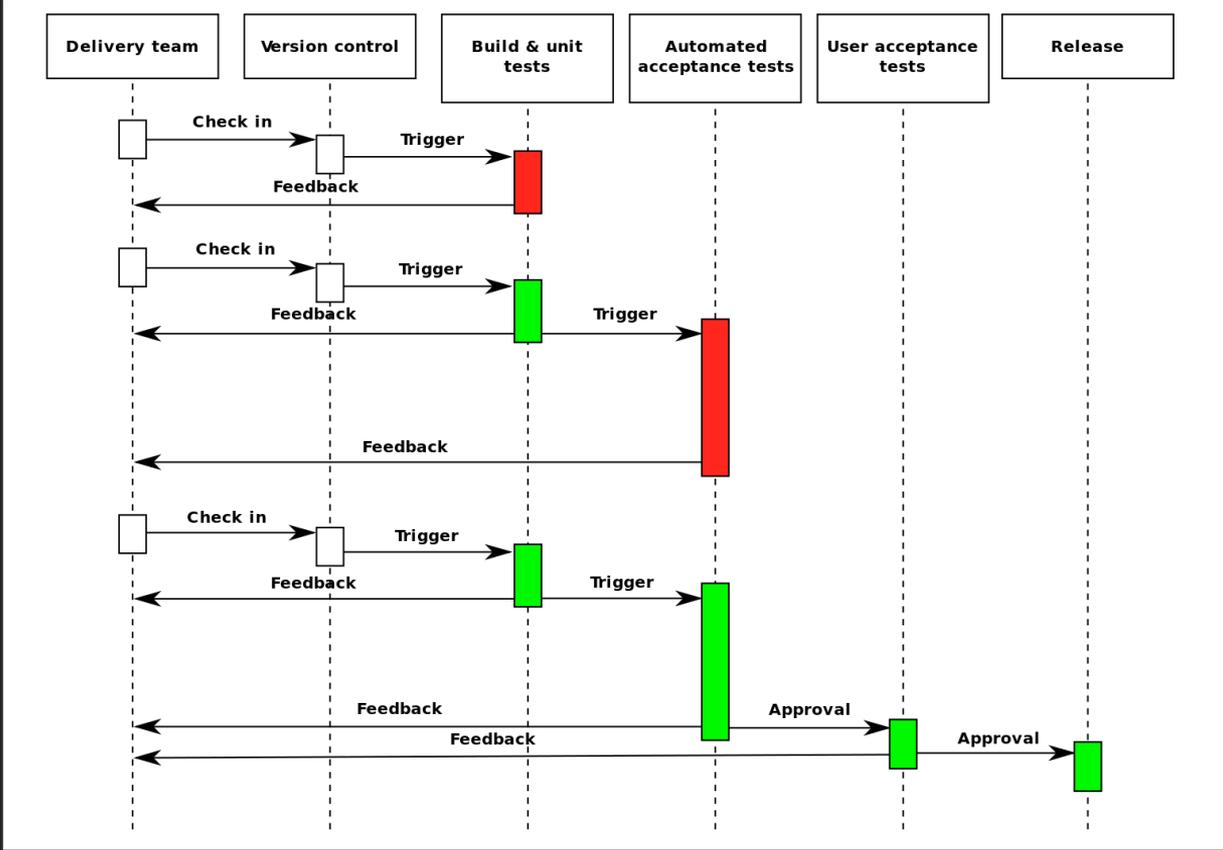
Build Pipelines

Engineered Deployment

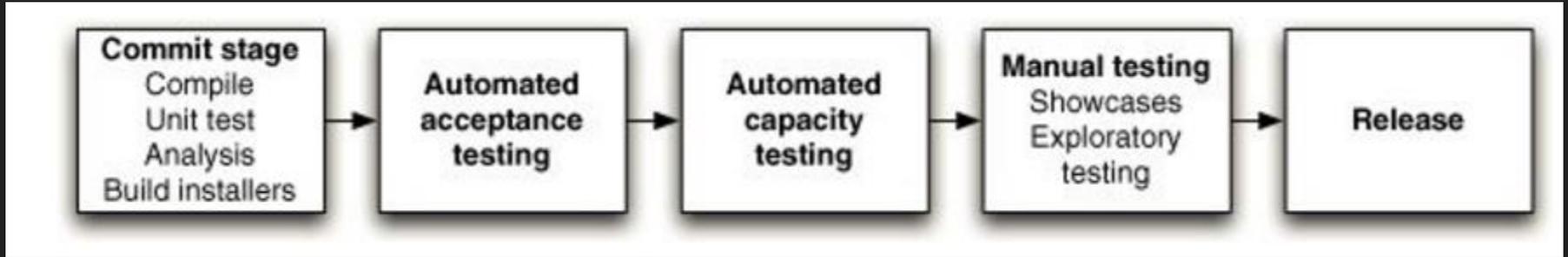
Reduce Work in Progress



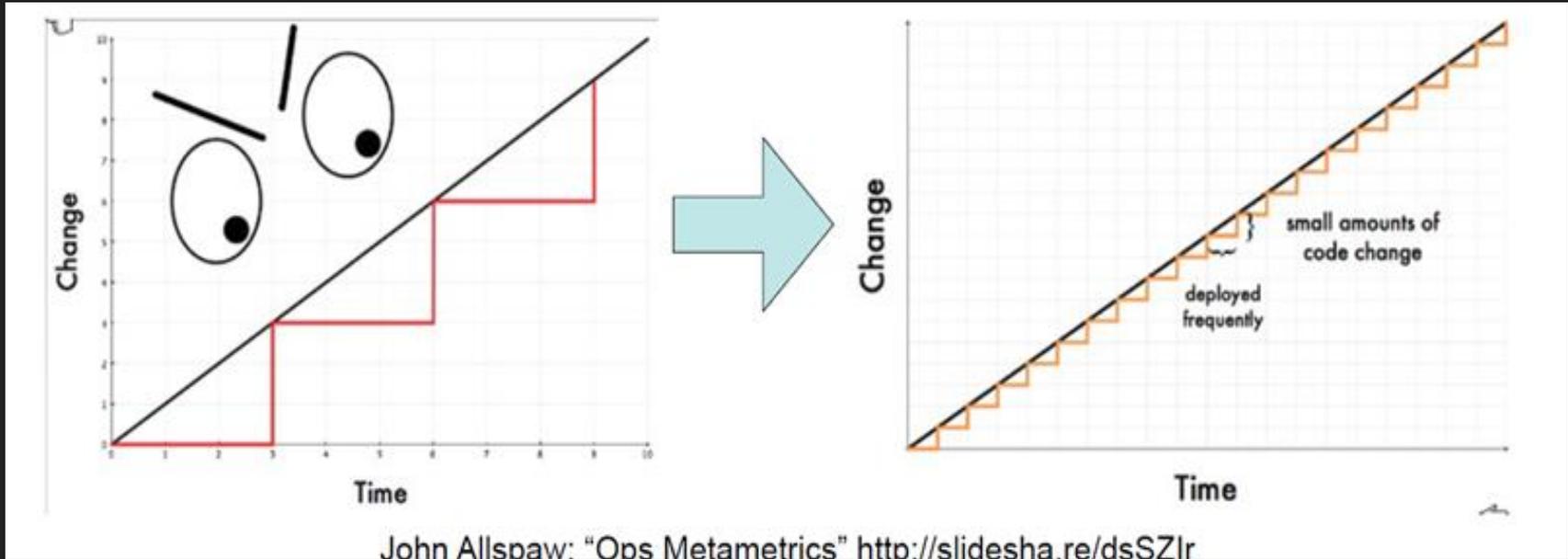
# Build Pipelines



# Engineered Deployment

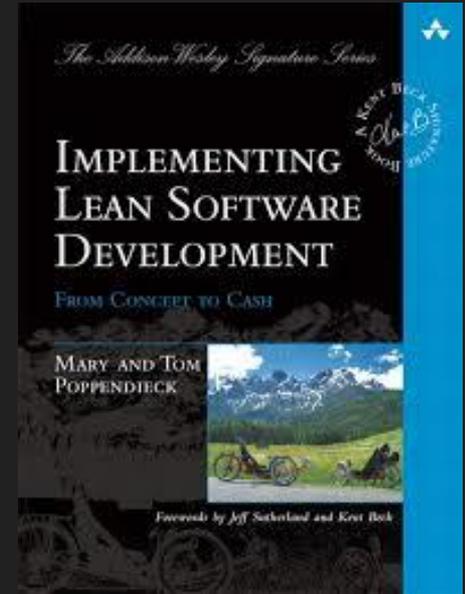


# Reduce Work in Progress



# Ask yourself...

“How long would it take your organization to deploy a change that involved just one single line of code? Do you do this on a repeatable, reliable basis?”

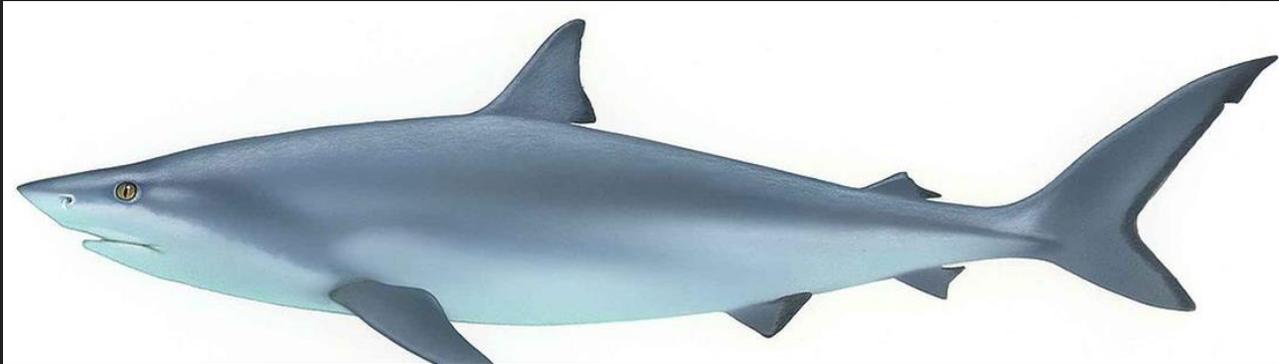


Mary and Tom Poppendieck, *Implementing Lean Software Development*,

*Harmonizing Speed and Safety at Scale  
is the  
The Microservice Way*



# APIs



# Bull Shark

Bull sharks can thrive in both saltwater and freshwater.



# Dual mode APIs

APIs can thrive  
within an organization...



# Dual mode APIs

APIs can thrive  
within an organization  
and  
between organizations.



# Dual mode APIs

APIs can be used to support machine-to-machine interactions



# Dual mode APIs

APIs can be used to support  
machine-to-machine  
interactions  
and  
machine-to-human  
interactions





GET /weather

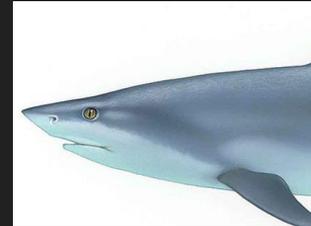
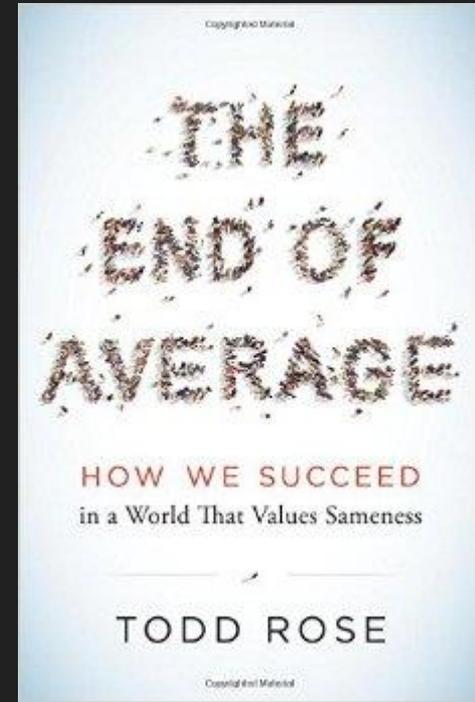


```
{  
  "city": "London",  
  "temp": 22  
}
```

# The End of Average

*"Our modern conception of 'average' is not a mathematical truth but a human invention, created a century and a half ago."*

*-- Todd Rose*



# The End of Average APIs

There is no "canonical" API

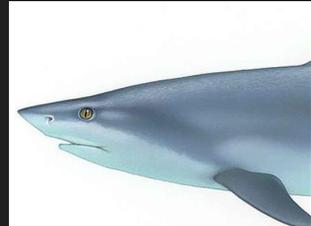
Interfaces should be designed w/ the consumer in mind

You need to make API design, implementation, release

Safe

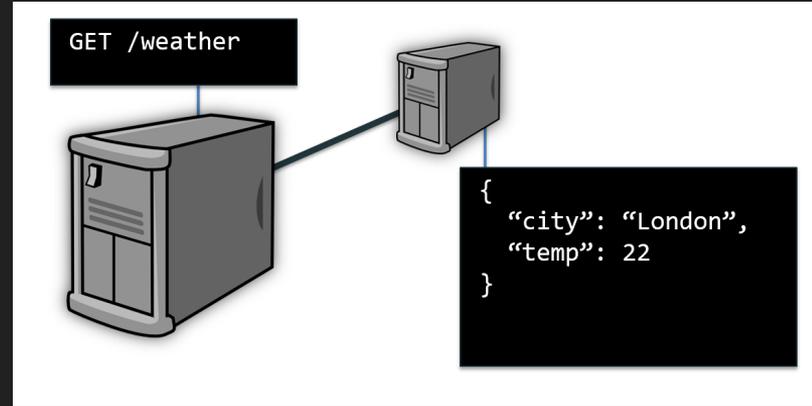
Cheap

Easy

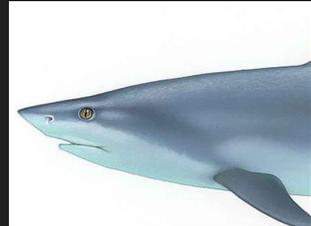


# Ask yourself...

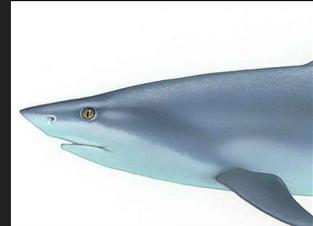
“How long would it take your organization to deploy a **new API**? Do you do this on a repeatable, reliable basis?”



Apologies to Mary and Tom Poppendieck



*Govern for Interop, not Integration*

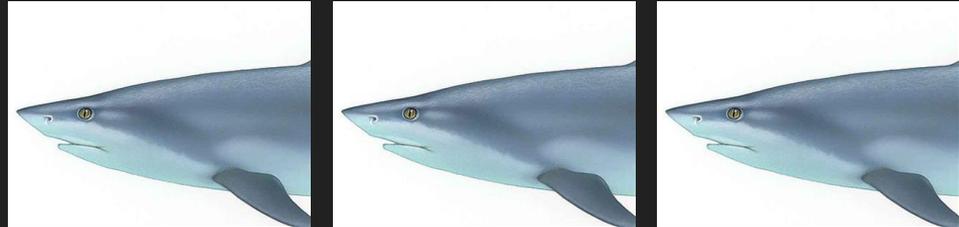


# Three Things you can do now...

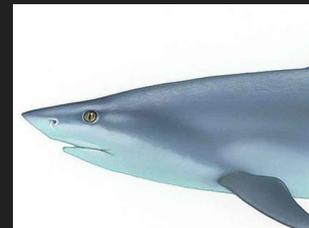
Adopt Protocols

Support Message Formats

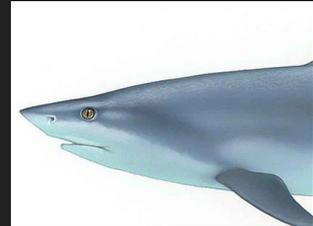
Establish Domain Vocabularies



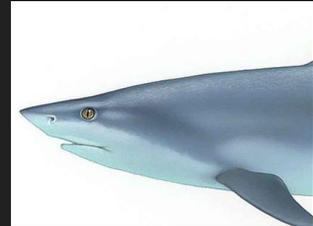
Protocol



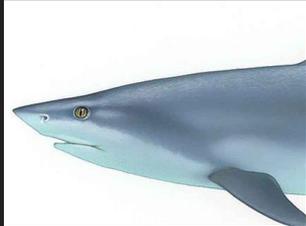
# Protocol



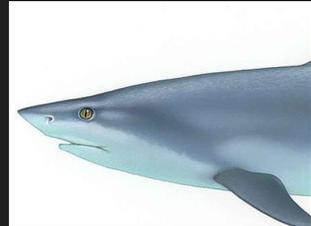
# Protocol



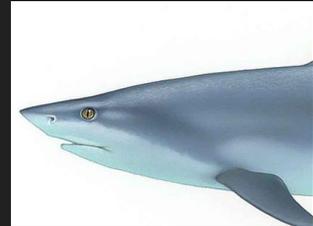
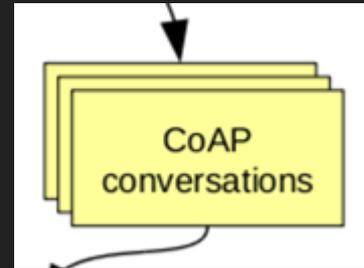
# Protocol



# Protocol



# Protocol



# Protocols

Move beyond "average" HTTP format

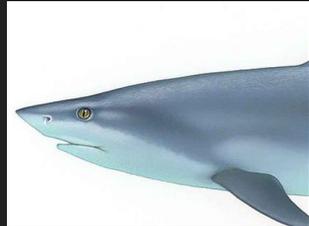
Use targeted protocols as needed

WebSocket

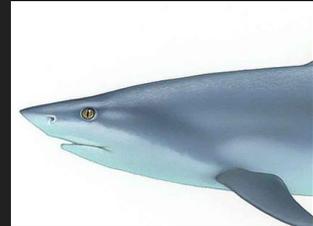
MQTT

CoAP

Plan to support multiple protocols



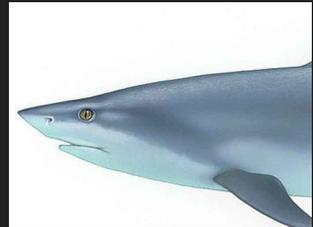
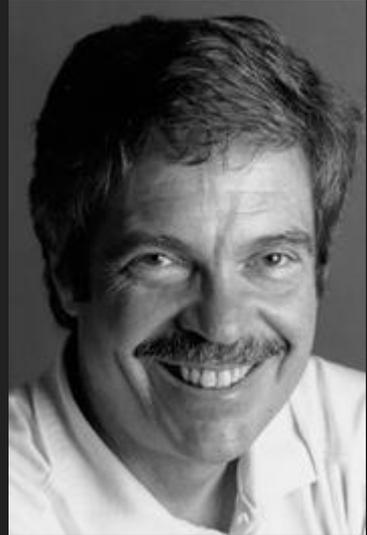
# Message Formats



# Message Formats

"I'm sorry that coined the term 'objects' for this topic. The big idea is 'messaging'."

-- Alan Kay, 1998



# Message Formats

Move beyond "average" JSON format

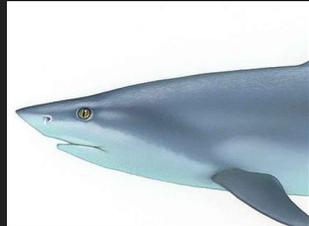
Use structured formats like

HAL

Siren

Collection+JSON

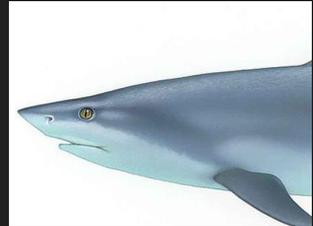
Plan to support multiple formats



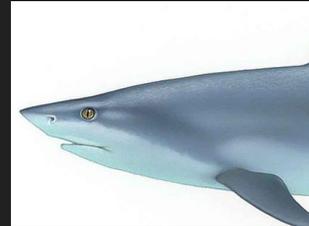
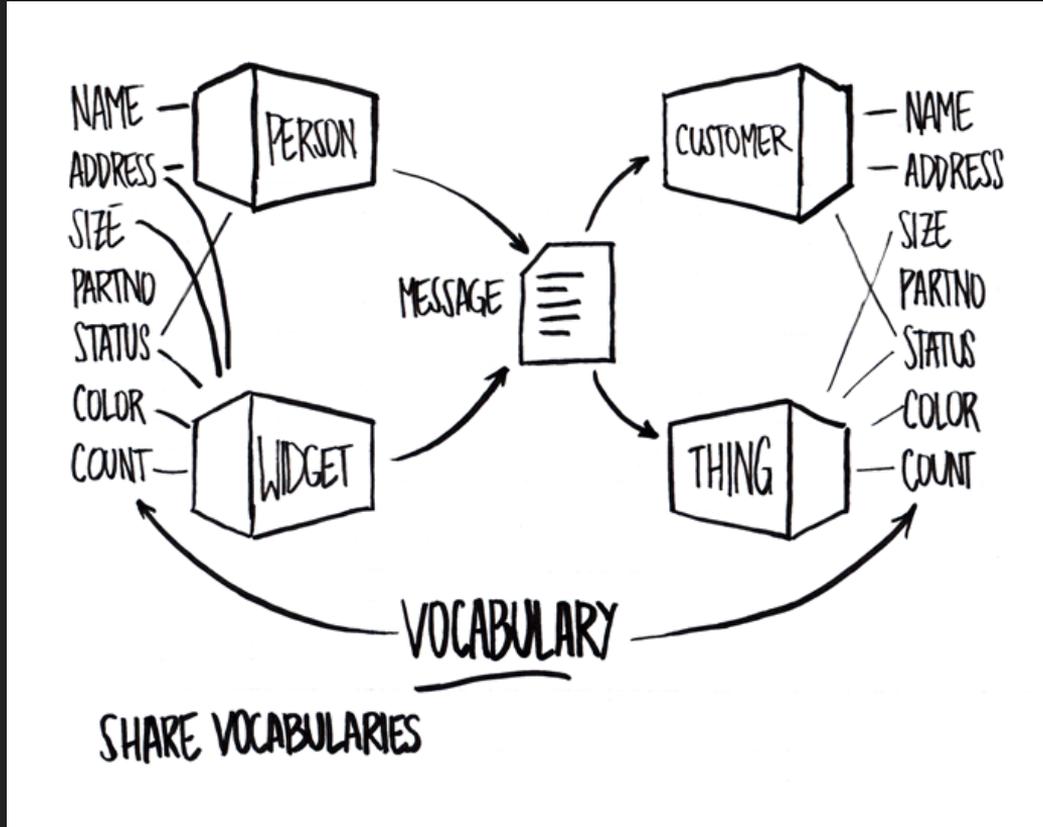
# Domain Vocabulary

"It is easier to standardize representation than objects and object-specific interfaces."

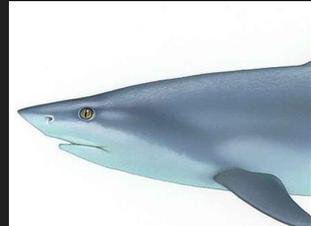
-- Roy Fielding



# Domain Vocabulary



*Standardizing the way we communicate  
allows us to  
Go Beyond Average*

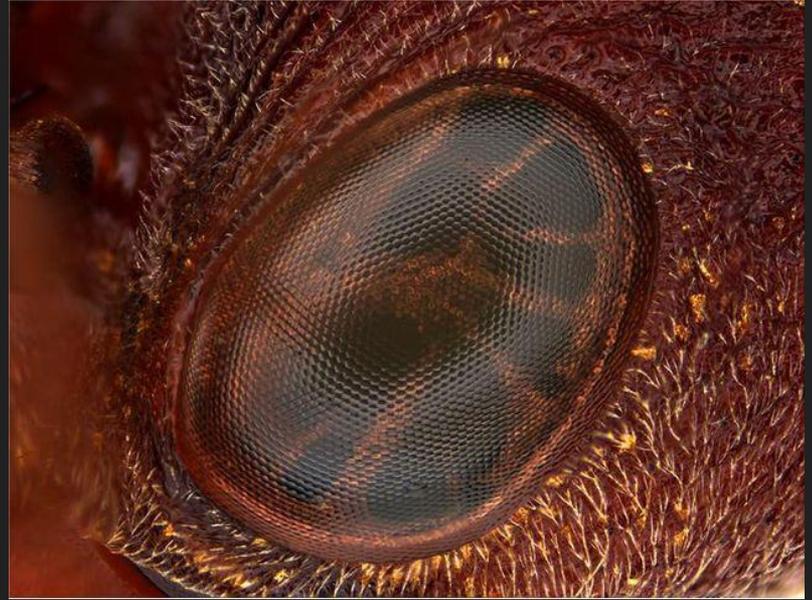




# Innovation Culture

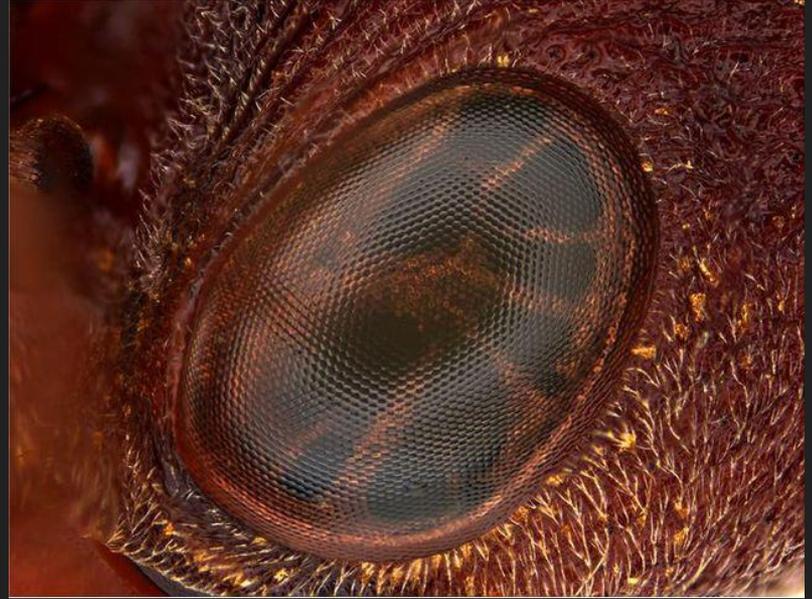
# Myrmecia -- the Ant

While most ants have poor eyesight, Myrmecia ants have excellent vision.

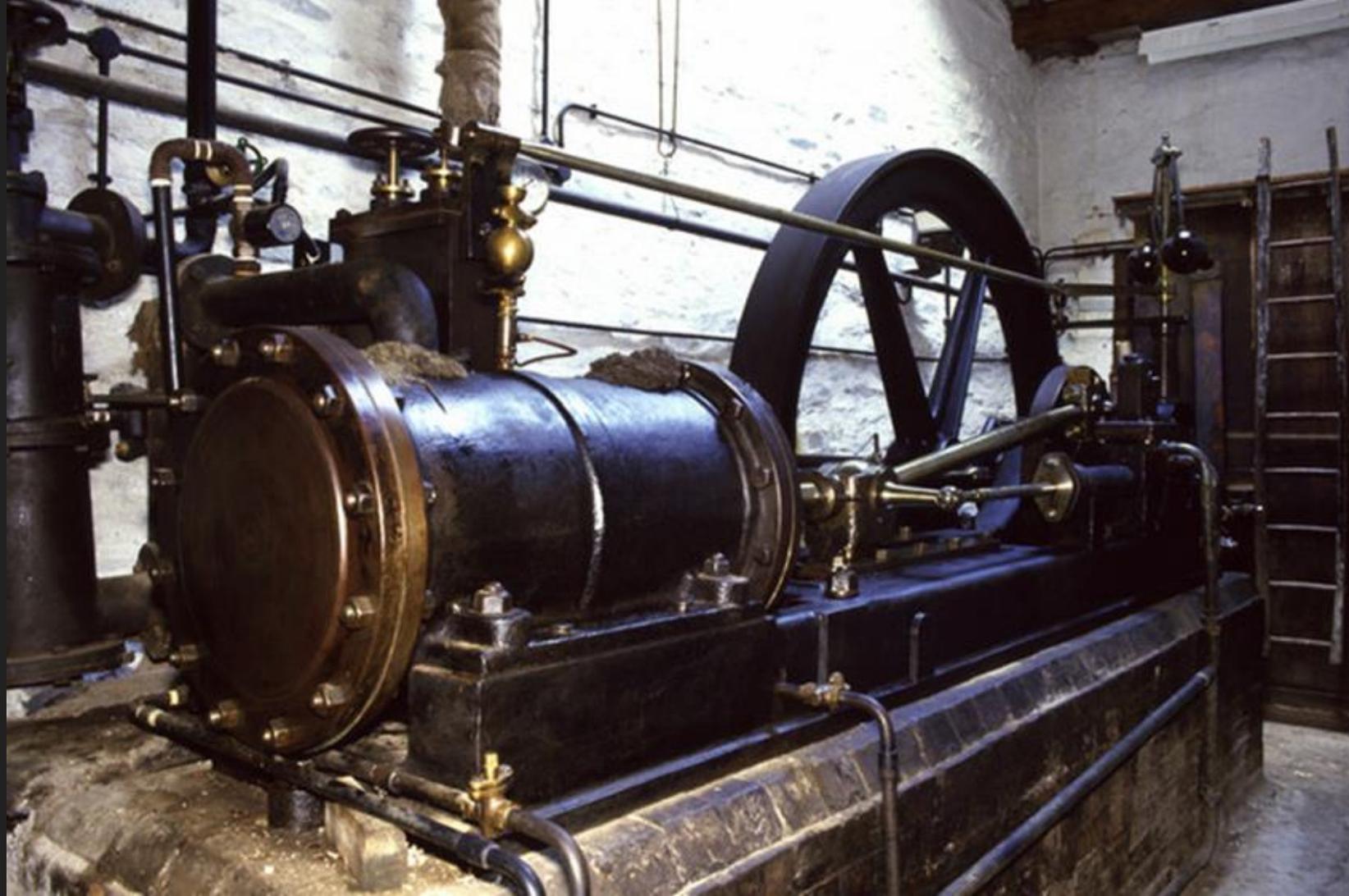


# Innovative Vision

Release the untapped vision and skill within your own organization.



*What does innovation look like?*







# Your Innovation Team Shouldn't Run Like a Well-Oiled Machine

by Ron Ashkenas and Markus Spiegel

OCTOBER 28, 2015



SAVE



SHARE



COMMENT

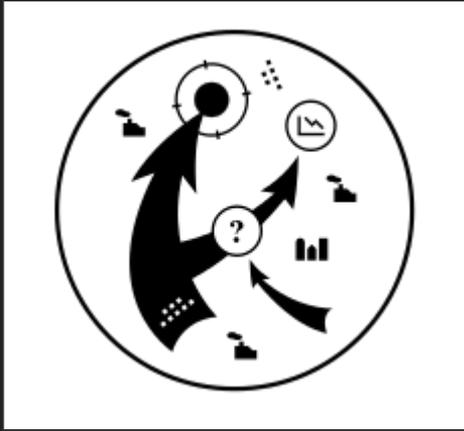


TEXT SIZE



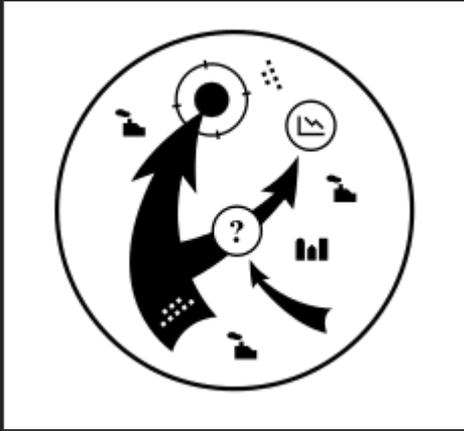
PRINT





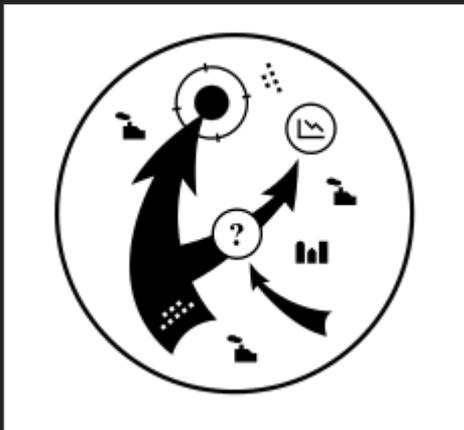
*Culture beats strategy*





*Culture beats engineering*



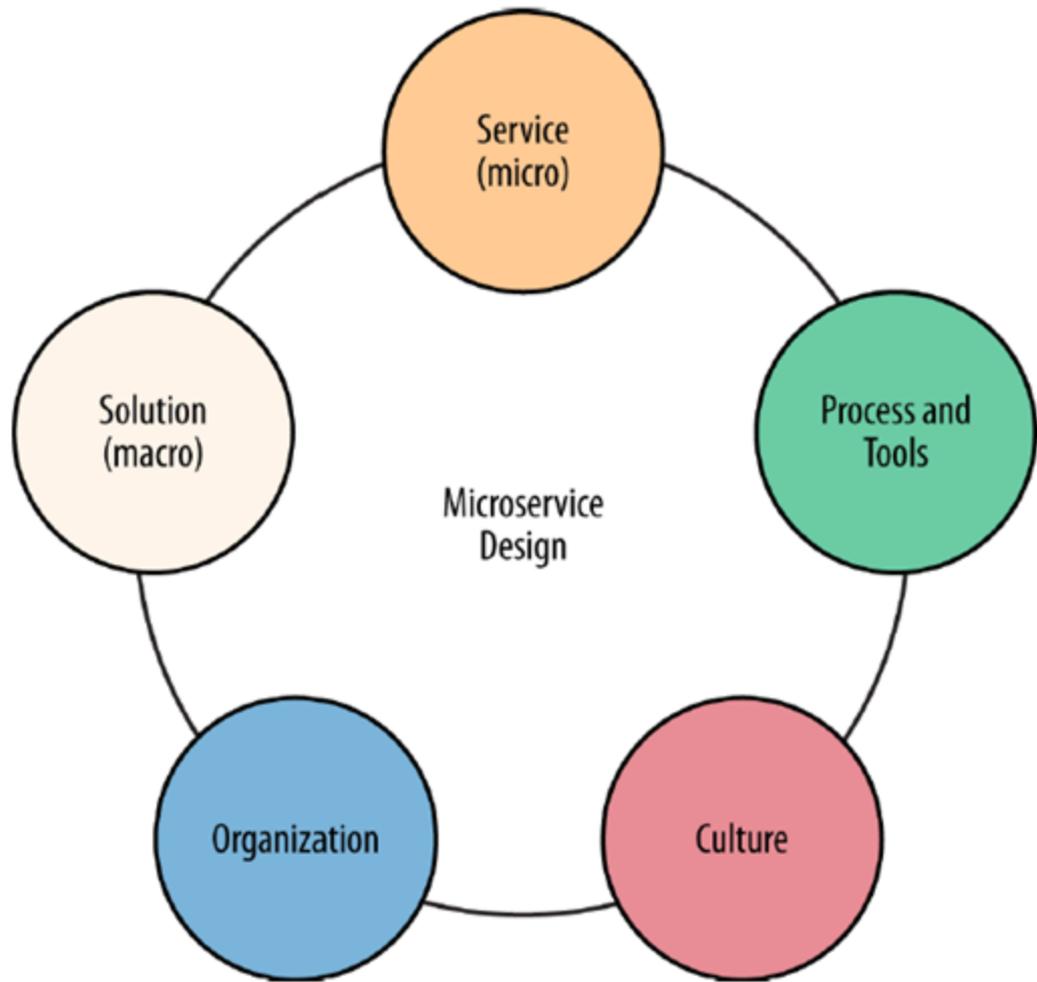


```
/**
 * Simple HelloButton() method.
 * @version 1.0
 * @author john doe <doe.j@example.com>
 */
HelloButton()
{
    JButton hello = new JButton( "Hello, wor
    hello.addActionListener( new HelloBtnList

    // use the JFrame type until support for t
    // new component is finished
    JFrame frame = new JFrame( "Hello Button"
    Container pane = frame.getContentPane();
    pane.add( hello );
    frame.pack();
    frame.show();                               // display the fra
}
```

*Culture beats code*





# Three Things you can do now...

Right-size your Teams

Recognize Conway's Law

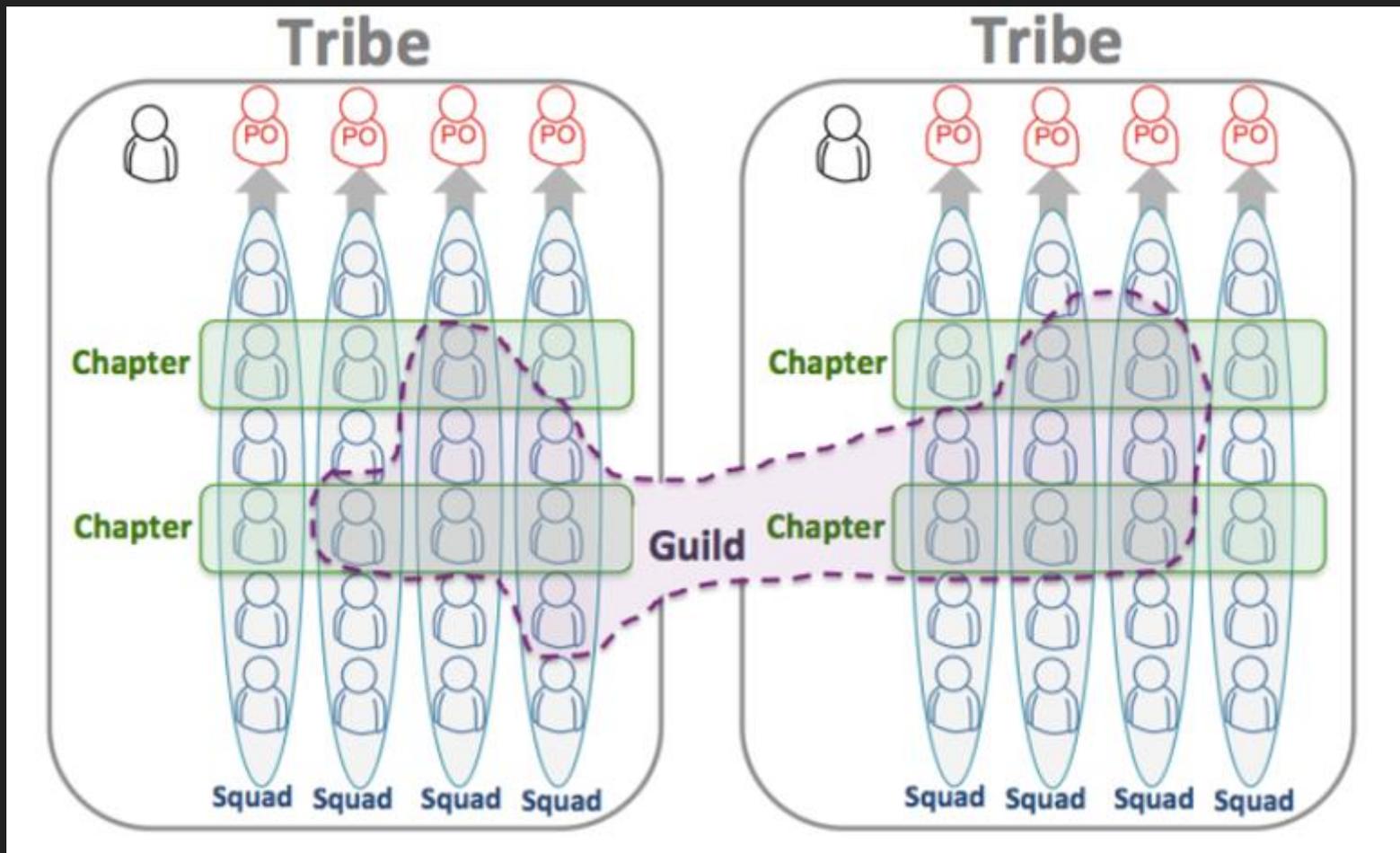
Enable Unplanned Innovation





## Dunbar's Number

*the max number of relationships a person can maintain*



Scaling Spotify”, Kniberg & Ivarsson (2012)

<https://dl.dropboxusercontent.com/u/1018963/Articles/SpotifyScaling.pdf>

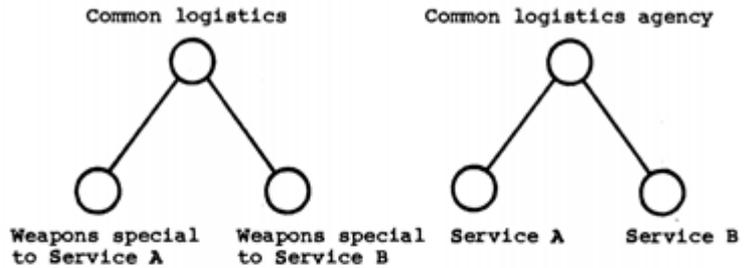
Aim for TEAM SIZE of  
“Dunbar level 1” (5),  
possibly “Dunbar level 2” (15).



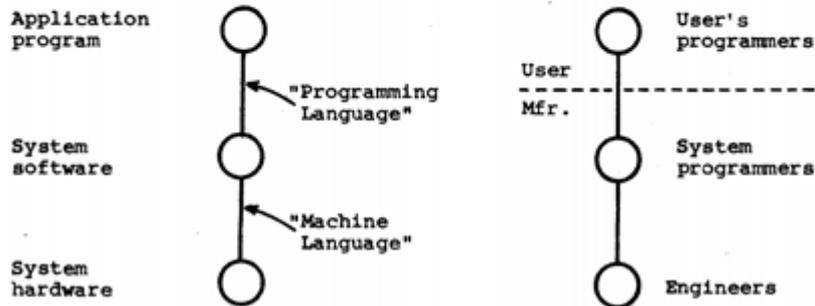


SYSTEM

DESIGN ORGANIZATION



3a. A Weapon System



3b. A Computer System

Figure 3 Two examples of identity of structure between a system and its design organization.

**“How Do Committees Invent?”, Conway (1967)**

<http://www.melconway.com/research/committees.html>

# Independent Teams

*"You built it, you run it."*

-- Werner Vogels, Amazon CTO



# Independent Teams

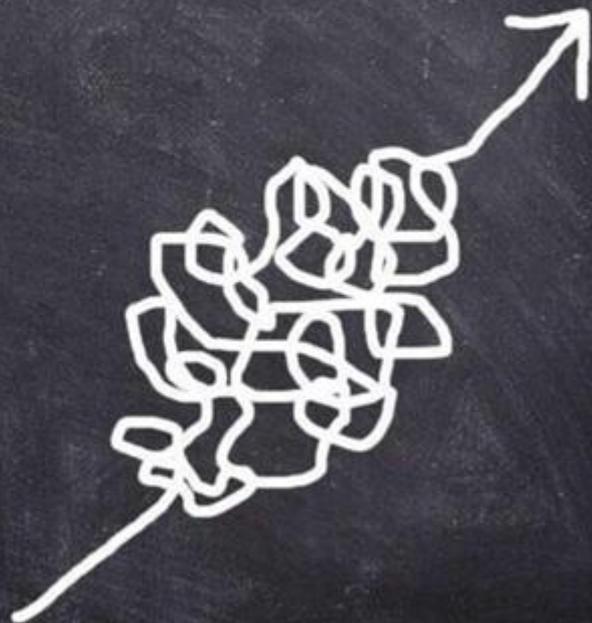
If you have to hold a release until another team is ready, you are not an independent team.



What People Think  
Success Looks Like:



What Success Really  
Looks Like:



*“If everything we do succeeds,  
then we are failing, because it  
means we are not taking enough  
risks.”*

*Deborah Bull  
Director of Partners  
King’s College, London*



IF YOU WANT TO ACHIEVE GREATNESS  
STOP ASKING FOR  
PERMISSION

# Ask yourself...

“How long would it take your organization to deploy a **new product**? Do you do this on a repeatable, reliable basis?”

Apologies to Mary and Tom Poppendieck



*One more thing...*

ANTOINE DE SAINT-EXUPÉRY

# The Little Prince



A NEW  
TRANSLATION  
OF THE BELOVED  
CLASSIC WITH  
RESTORED  
ORIGINAL ART

*“If you want to build a ship, don't drum up people together to collect wood and don't assign them tasks and work, but rather teach them to long for the endless immensity of the sea.”*

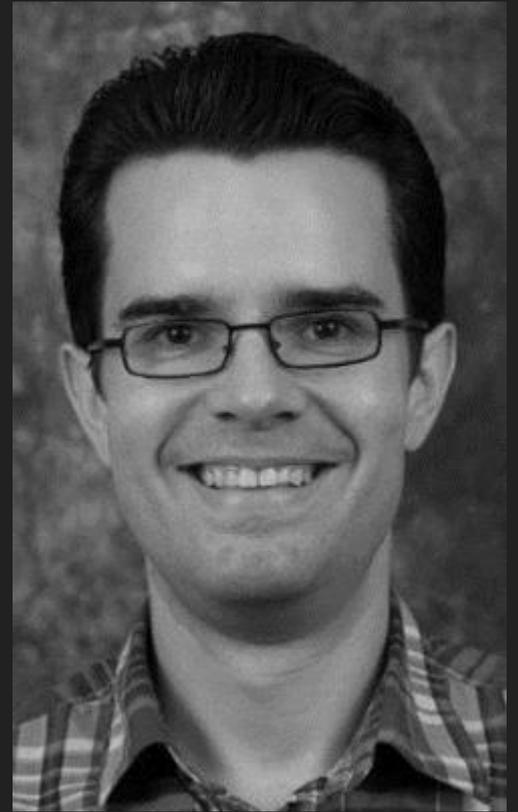
*Antoine de Saint-Exupéry*  
*1900-1944*



*“I have neither the place, the time,  
nor the desire, to micromanage or  
make technical decisions for [my  
team].”*

*Steve Urban,  
Engineering Mgr. Netflix  
August 2015*

**NETFLIX**



***Harmonizing Speed and Safety at Scale***



***Harmonizing Speed and Safety at Scale***

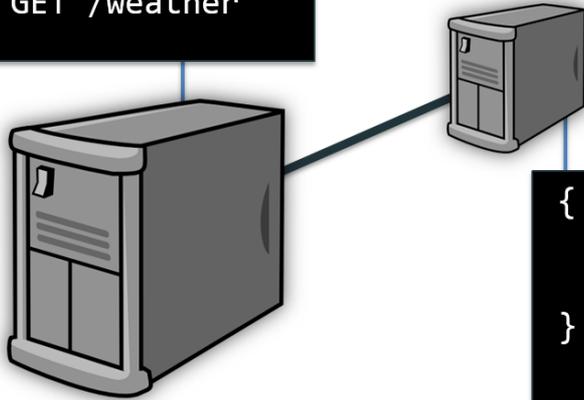


# *Harmonizing Speed and Safety at Scale*



# API Platforms

GET /weather

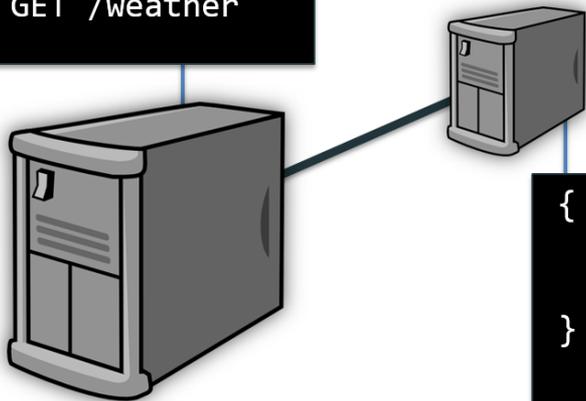


```
{  
  "city": "London",  
  "temp": 22  
}
```

# API Platforms



GET /weather



```
{  
  "city": "London",  
  "temp": 22  
}
```

Ask yourself...



Ask yourself...  
How long would it take?



# Microservices

*How to safely speed up your  
digital innovation*

Mike Amundsen  
API Academy/CA Technologies  
@mamund

