

Microservices

*How to safely speed up your
digital innovation*

Mike Amundsen

API Academy/CA Technologies

@mamund

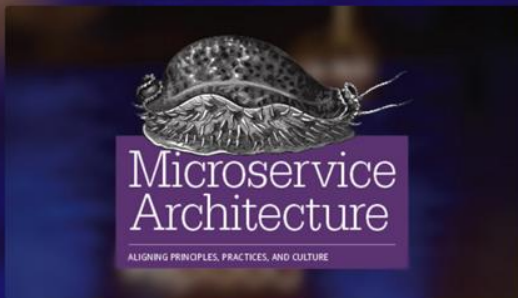




Mike Amundsen
@mamund



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

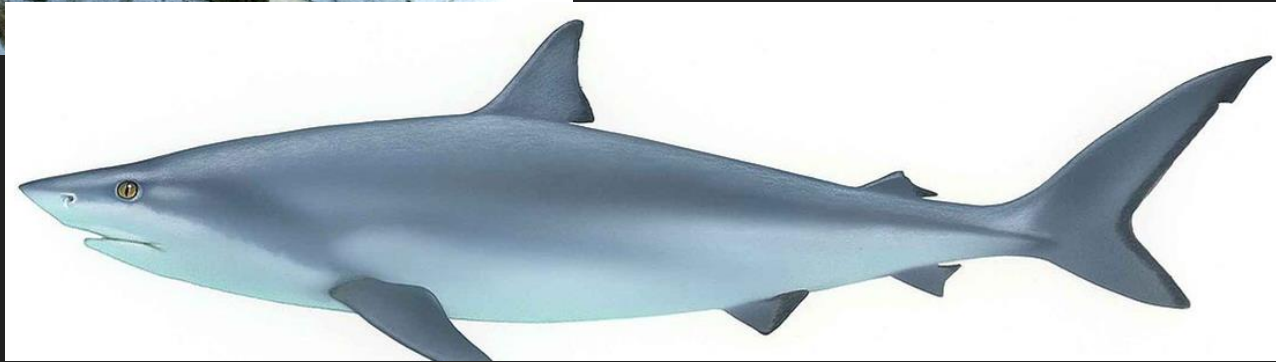
Microservices is the next evolution in software architecture designed to help organizations embrace continual change in the digital economy. But how do you design and apply an effective microservice architecture?

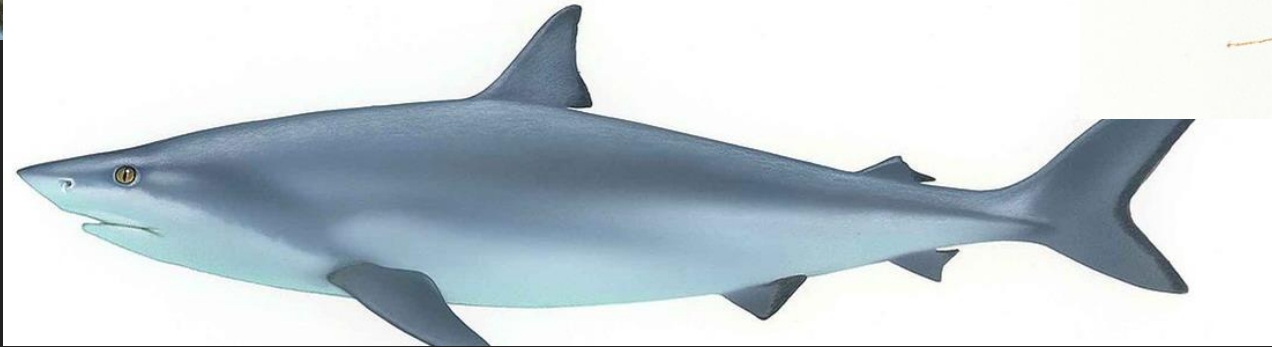
This new book from O'Reilly provides comprehensive guidance through seven valuable chapters that give you a deep-dive into:

- 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, featuring the word "NETFLIX" in a bold, white, sans-serif font with a black outline, 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

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Tool-making

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Microservices is all about tool-making



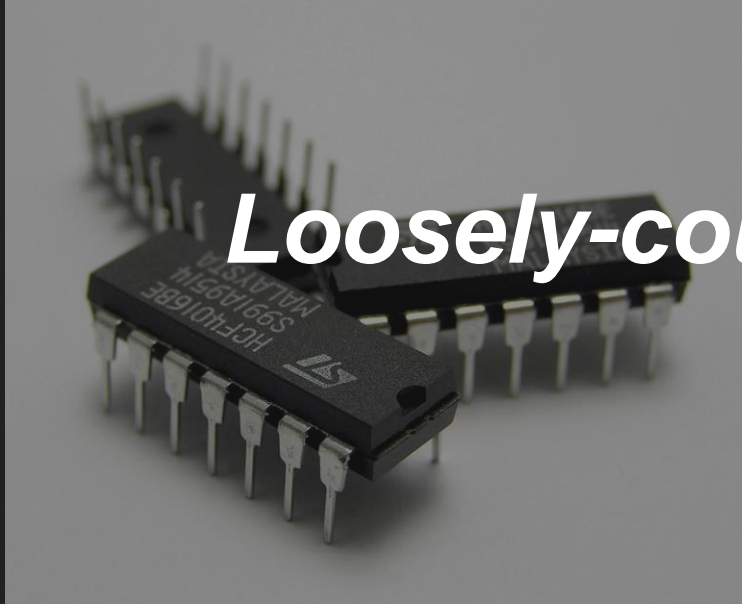
A useful definition of Microservices

Loosely-coupled components

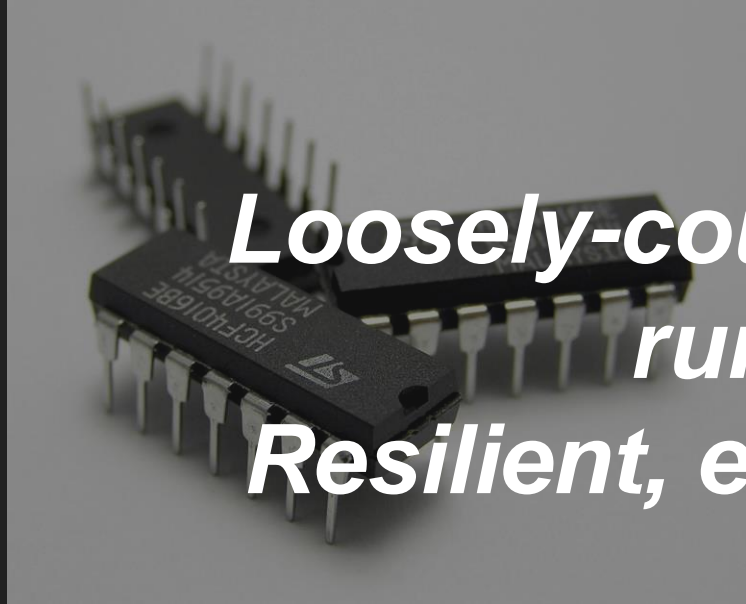


A useful definition of Microservices

Loosely-coupled components



A useful definition of Microservices

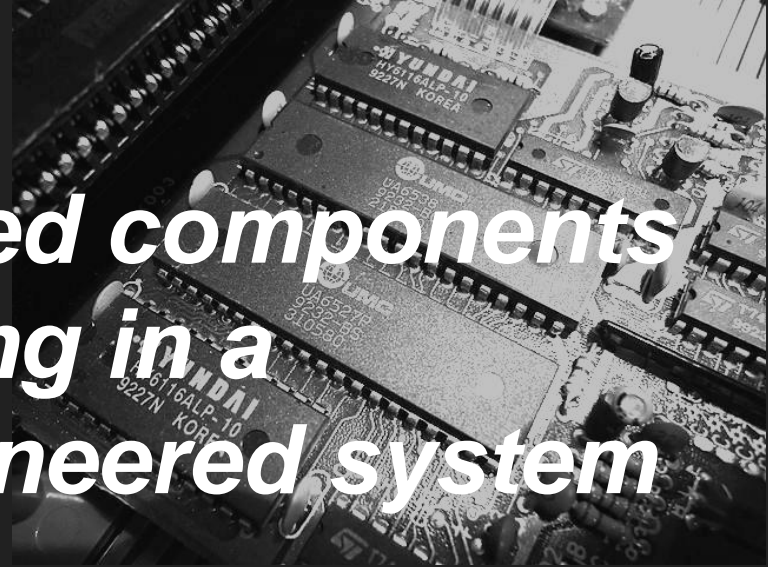
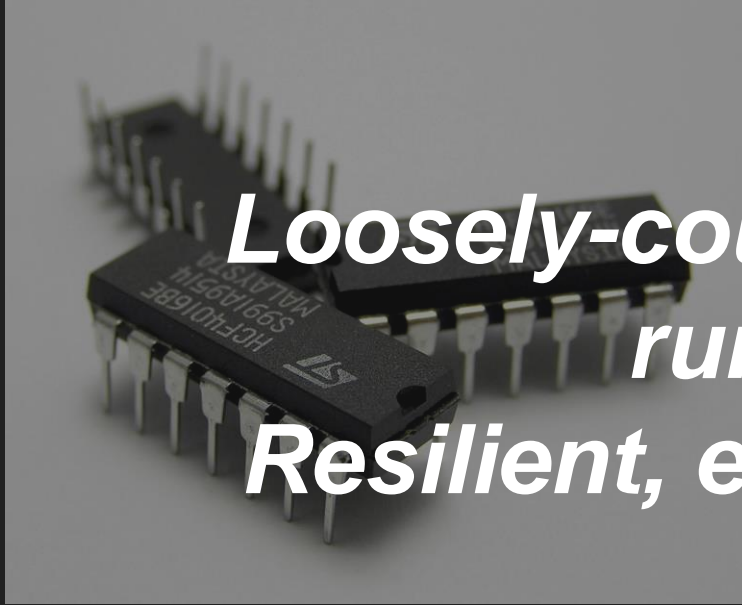


***Loosely-coupled components
running in a
Resilient, engineered system***



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

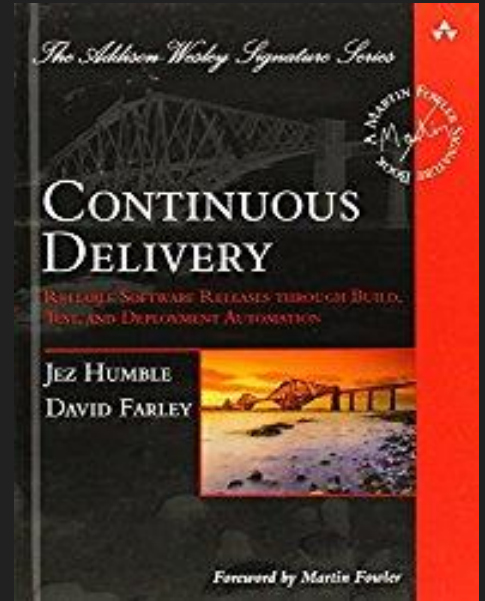


Three things you can do now...

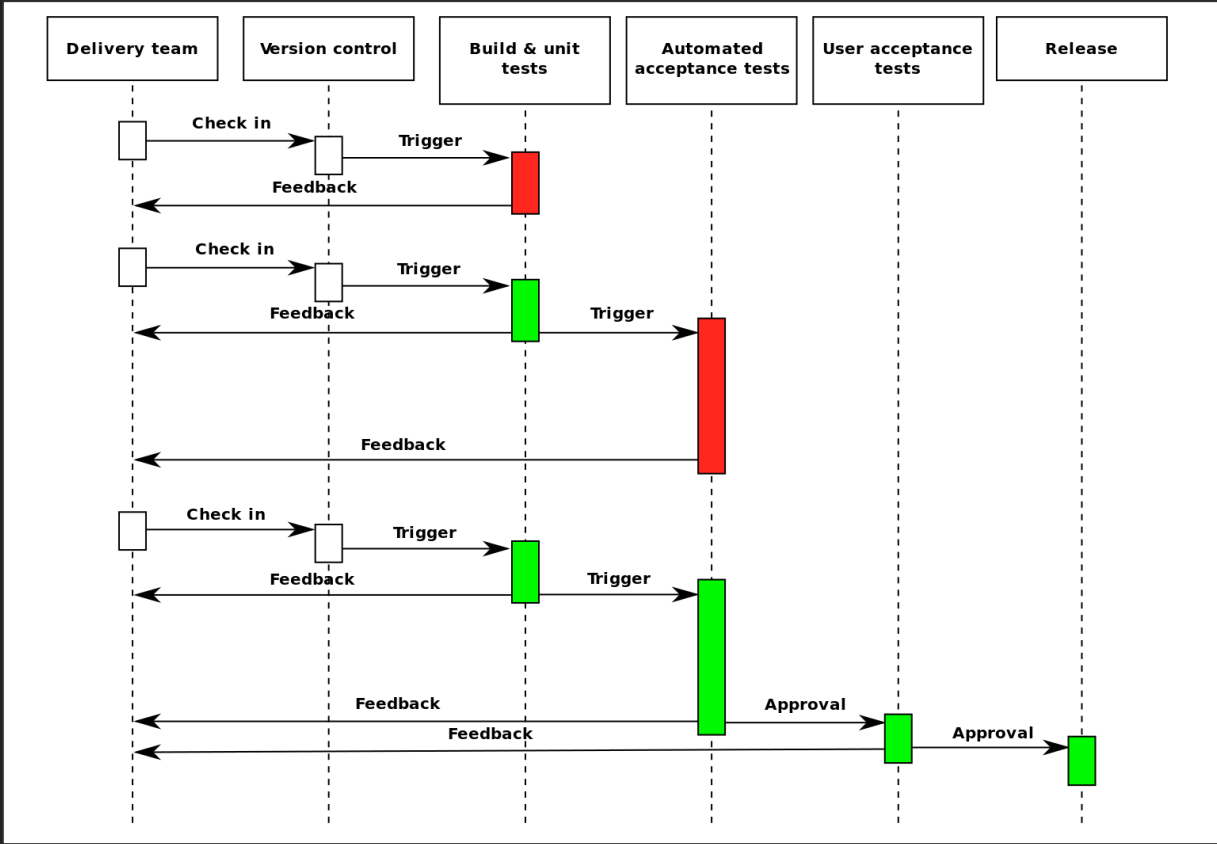
Build Pipelines

Engineered Deployment

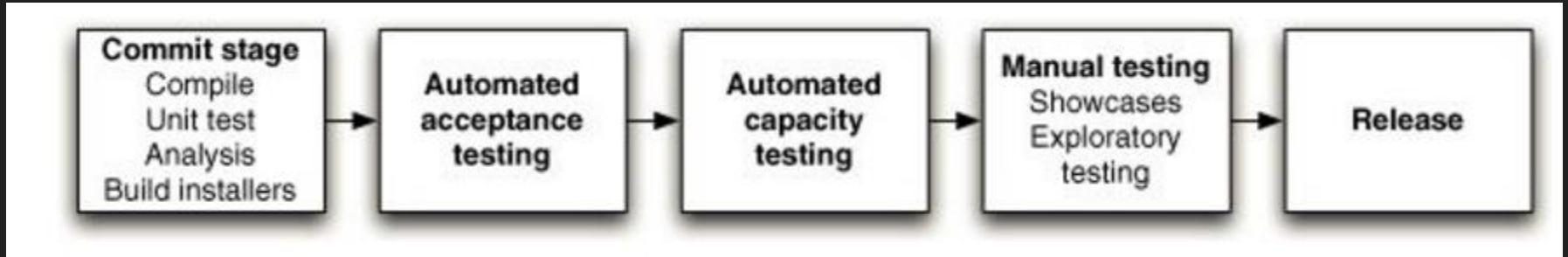
Reduce Work in Progress



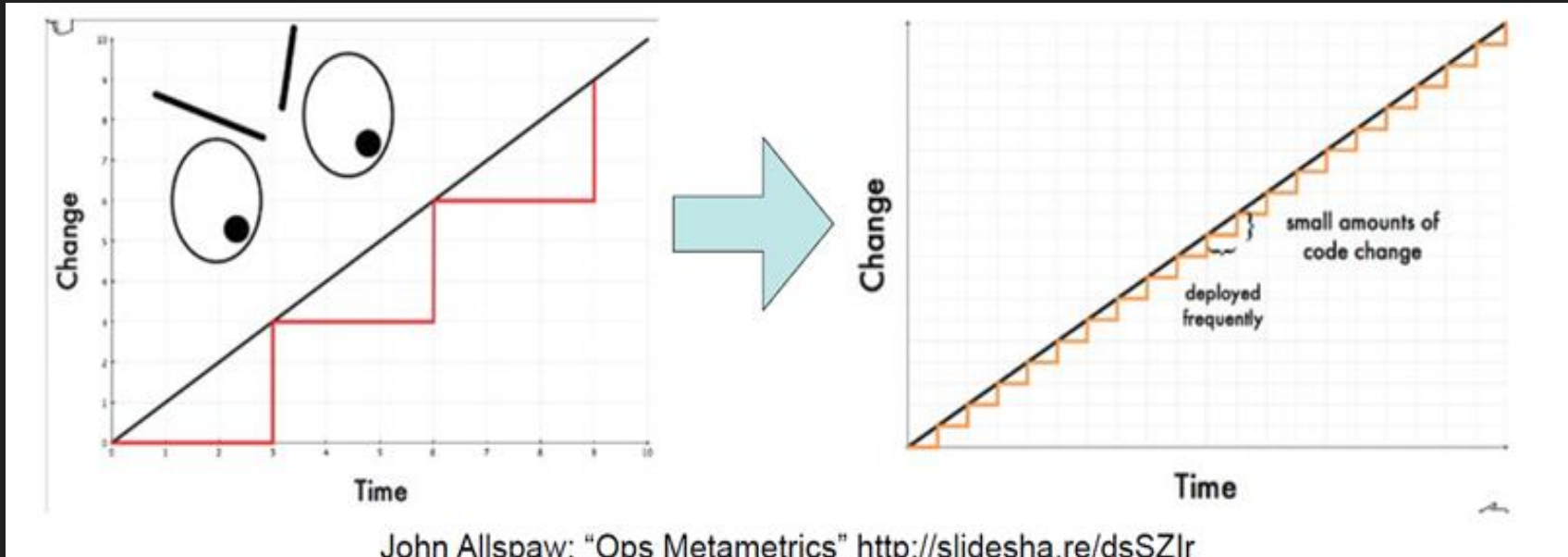
Build Pipelines



Engineered Deployment

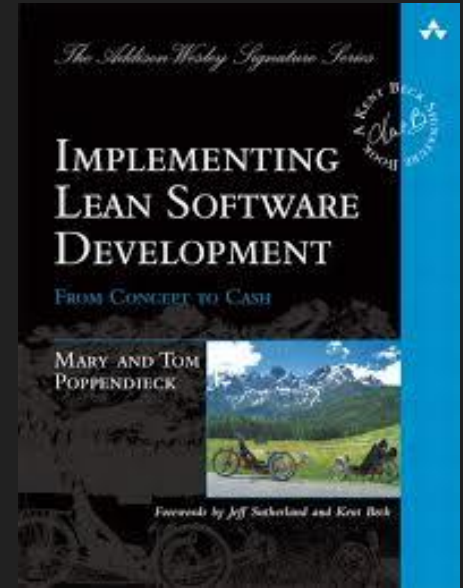


Reduce Work in Progress



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?”

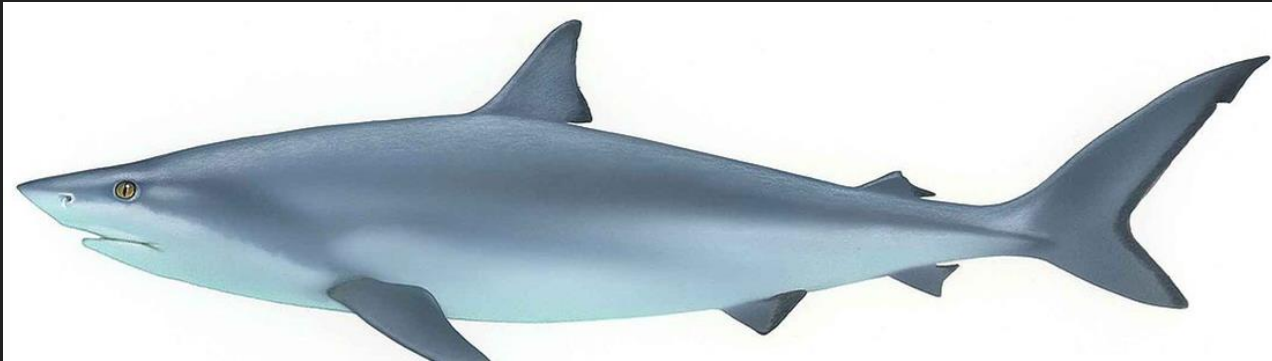


Mary and Tom Poppendieck, *Implementing Lean Software Development*,

*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

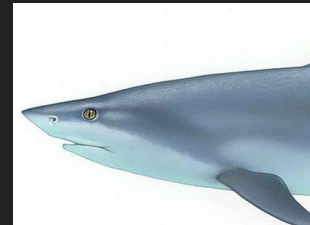
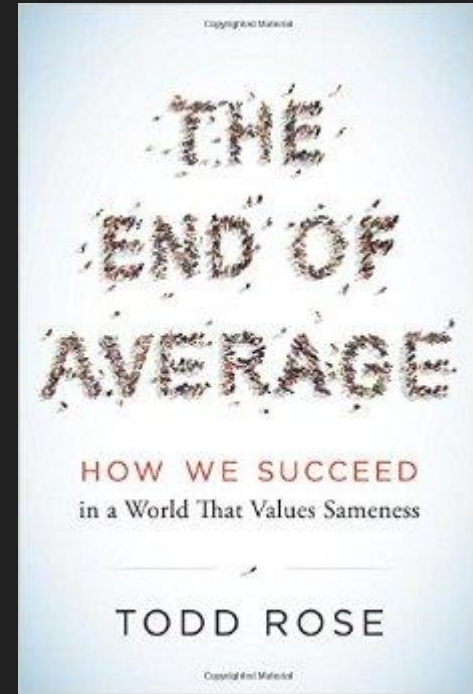


```
{  
  "city": "London",  
  "temp": 22  
}
```

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

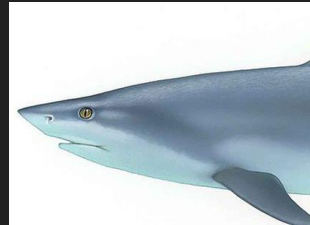
Interfaces should be designed w/ the consumer in mind

You need to make API design, implementation, release

Safe

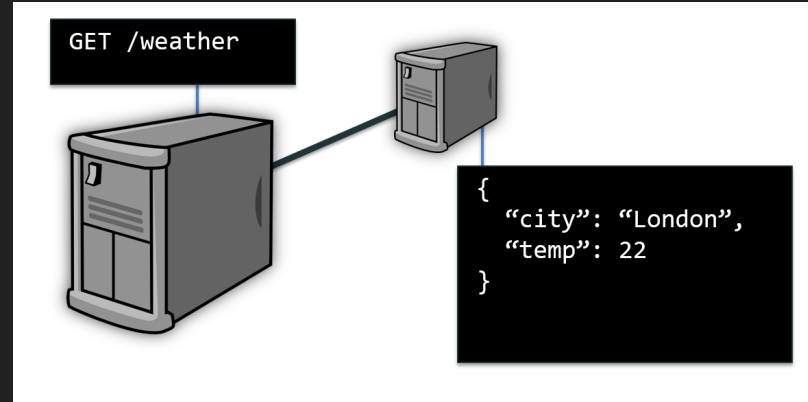
Cheap

Easy

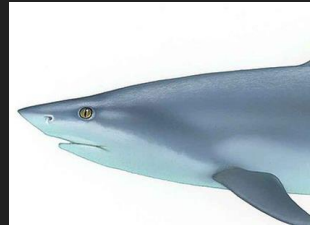


Ask yourself...

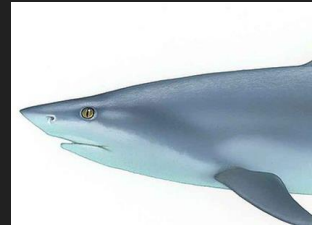
“How long would it take your organization to deploy a **new API**? Do you do this on a repeatable, reliable basis?”



Apologies to Mary and Tom Poppendieck



Govern for Interop, not Integration



Three Things you can do now...

Adopt Protocols

Support Message Formats

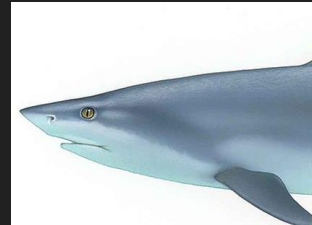
Establish Domain Vocabularies



Protocol



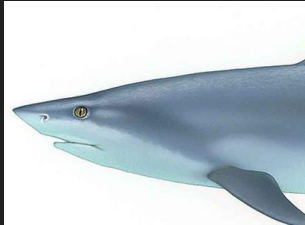
Protocol



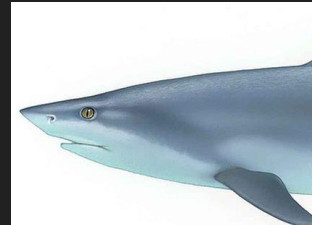
Protocol



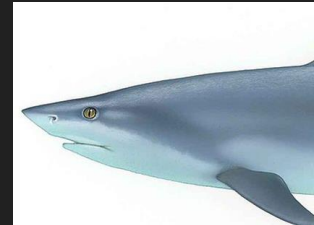
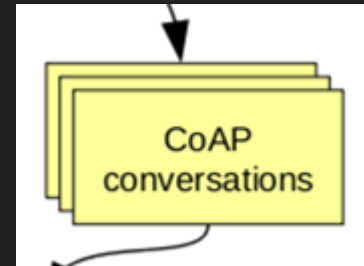
Protocol



Protocol



Protocol



Protocols

Move beyond "average" HTTP format

Use targeted protocols as needed

WebSocket

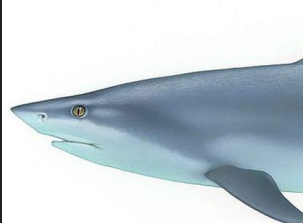
MQTT

CoAP

Plan to support multiple protocols



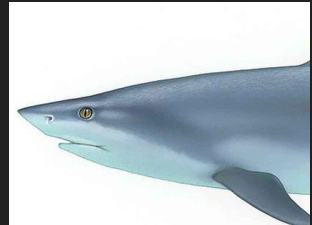
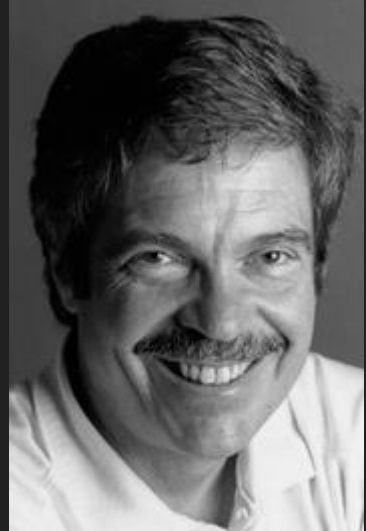
Message Formats



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

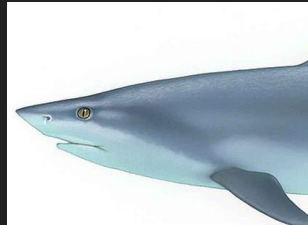
Use structured formats like

HAL

Siren

Collection+JSON

Plan to support multiple formats



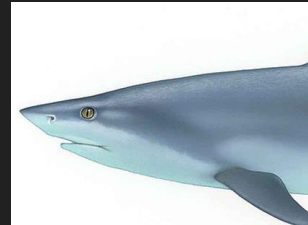
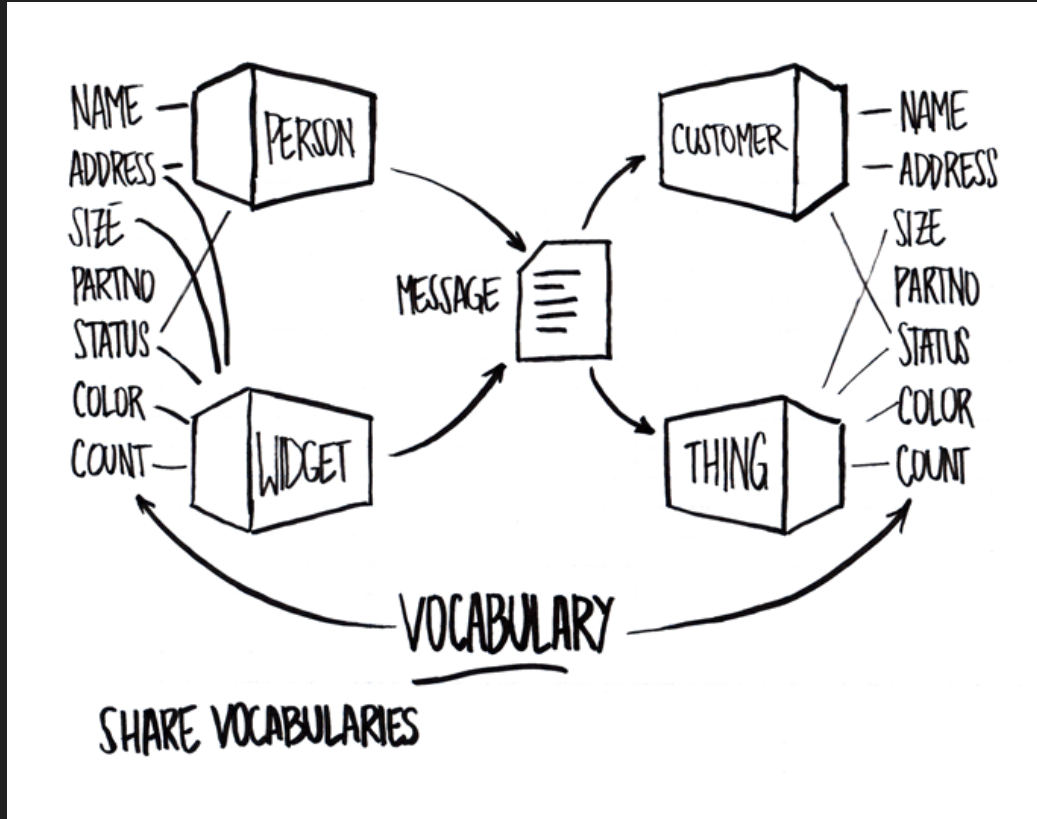
Domain Vocabulary

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

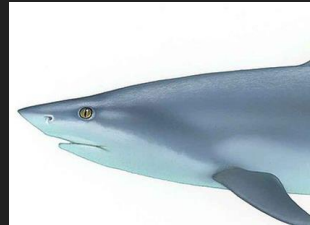
-- Roy Fielding



Domain Vocabulary



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

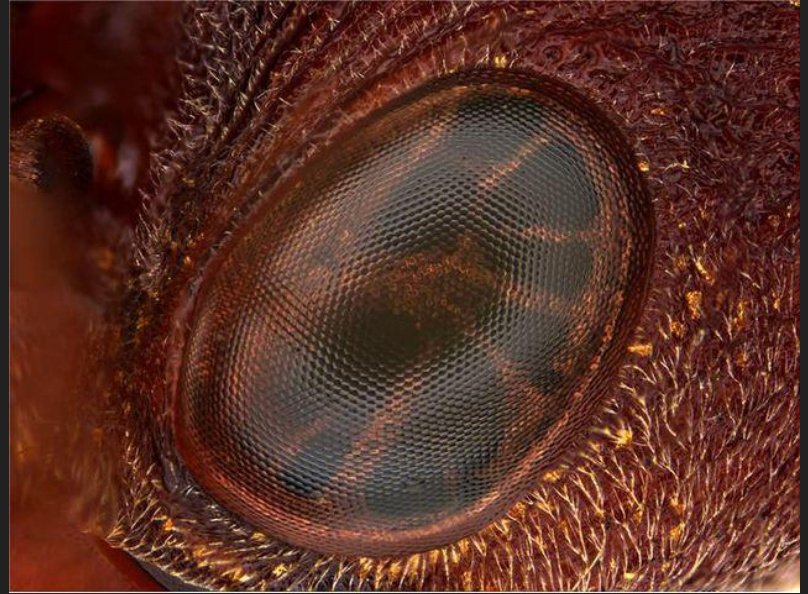




Innovation Culture

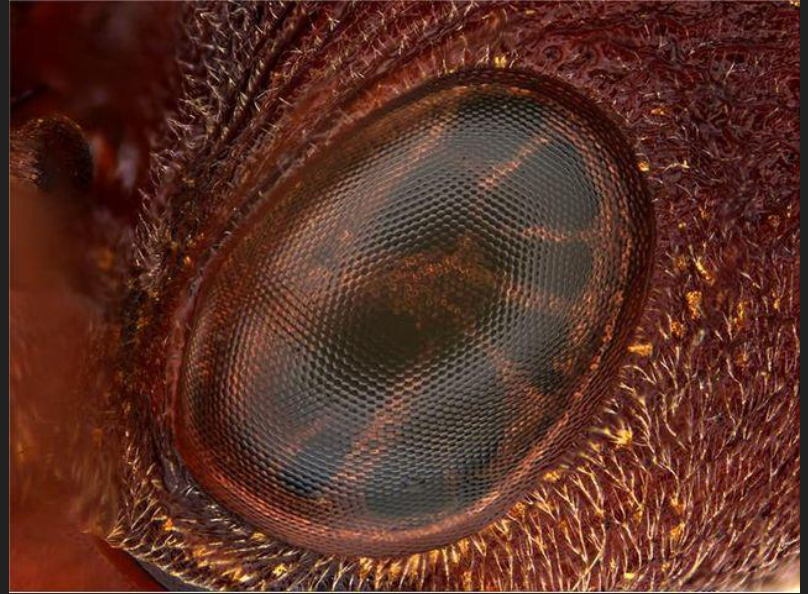
Myrmecia -- the Ant

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

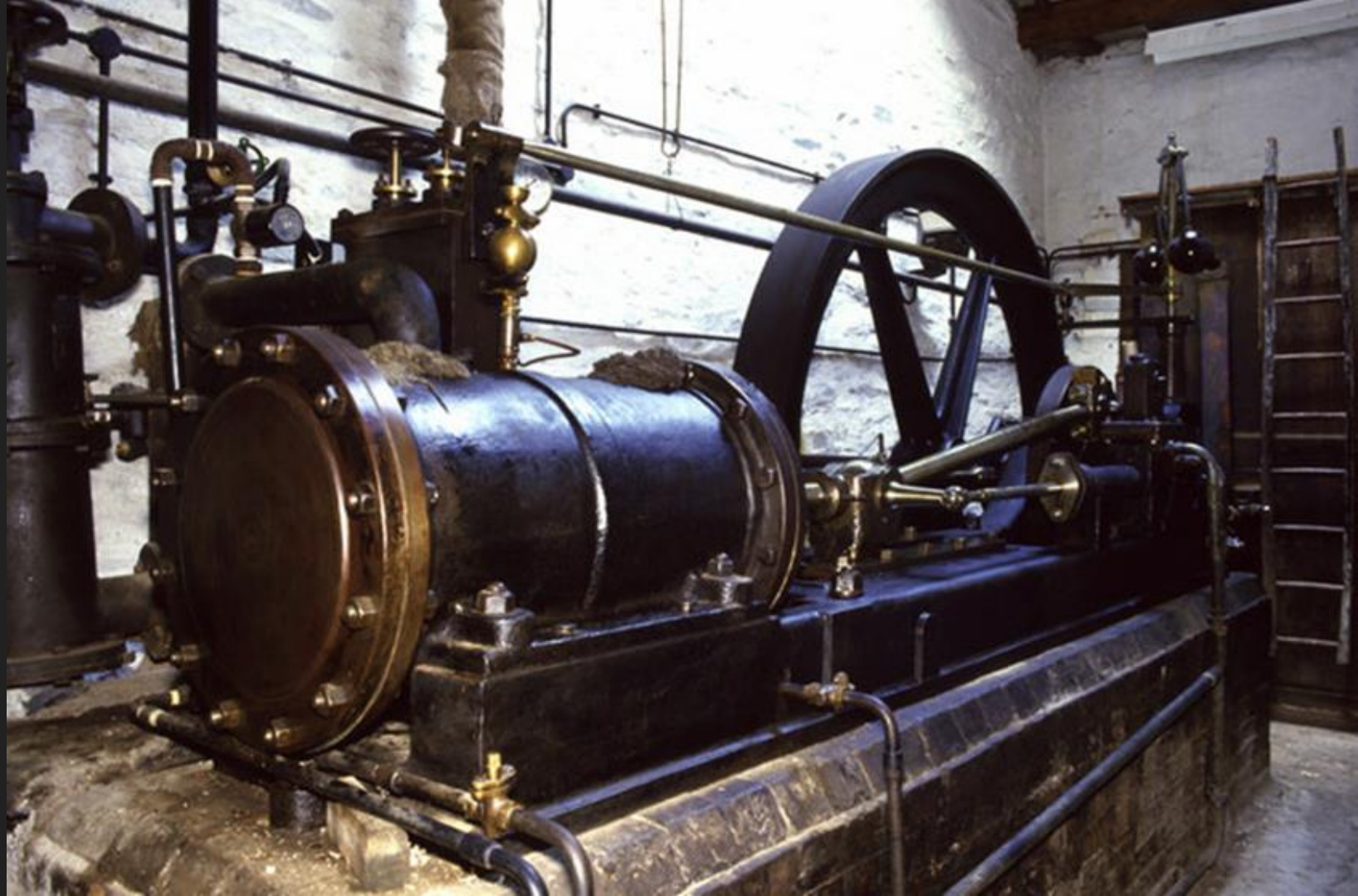


Innovative Vision

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

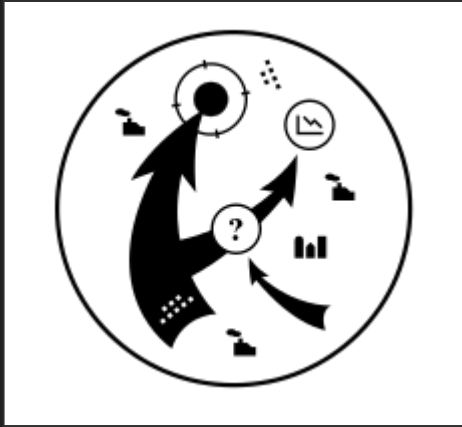


TEXT SIZE



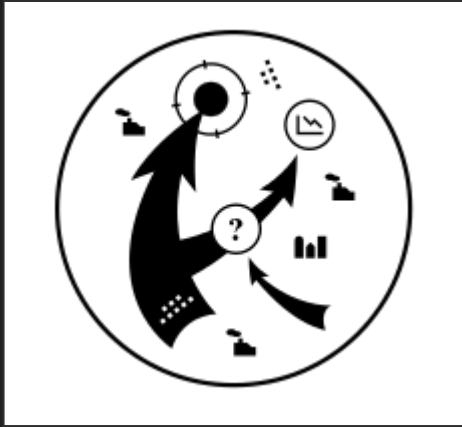
PRINT





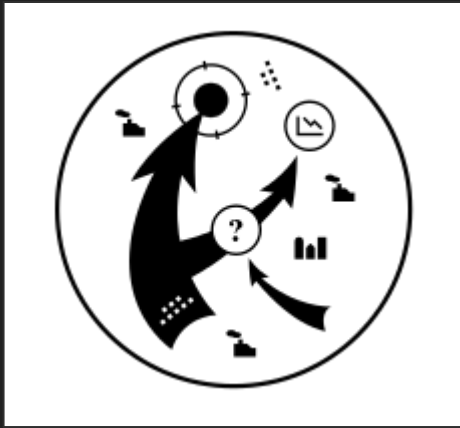
Culture beats strategy





Culture beats engineering



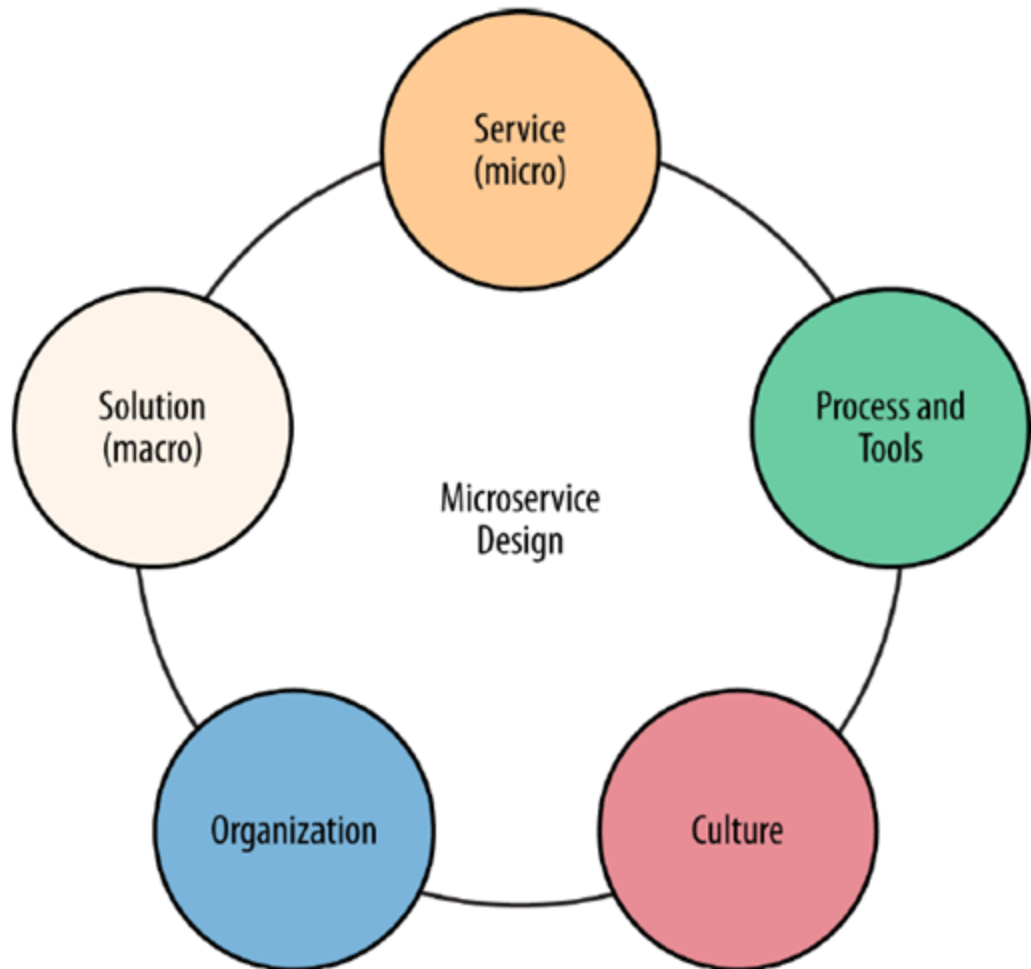


```
/**
 * Simple HelloButton() method.
 * @version 1.0
 * @author john doe <doe.j@example.com>
 */
HelloButton()
{
    JButton hello = new JButton( "Hello, wor
hello.addActionListener( new HelloBtnList

// 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





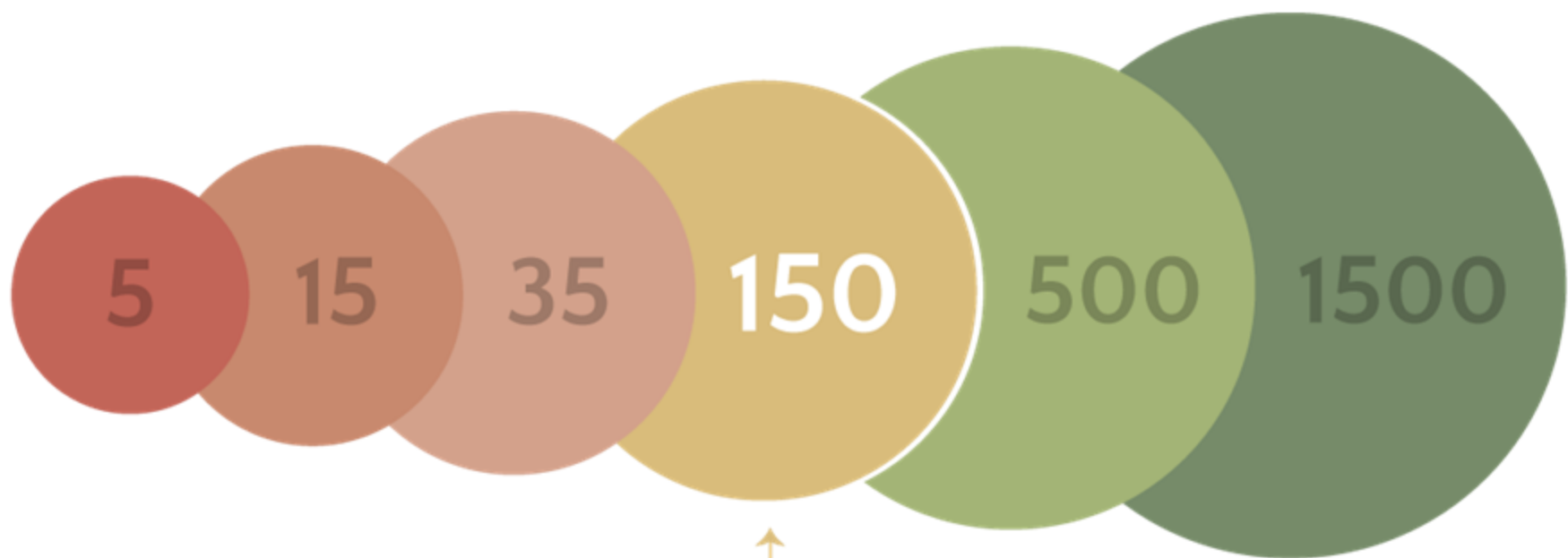
Three Things you can do now...

Right-size your Teams

Recognize Conway's Law

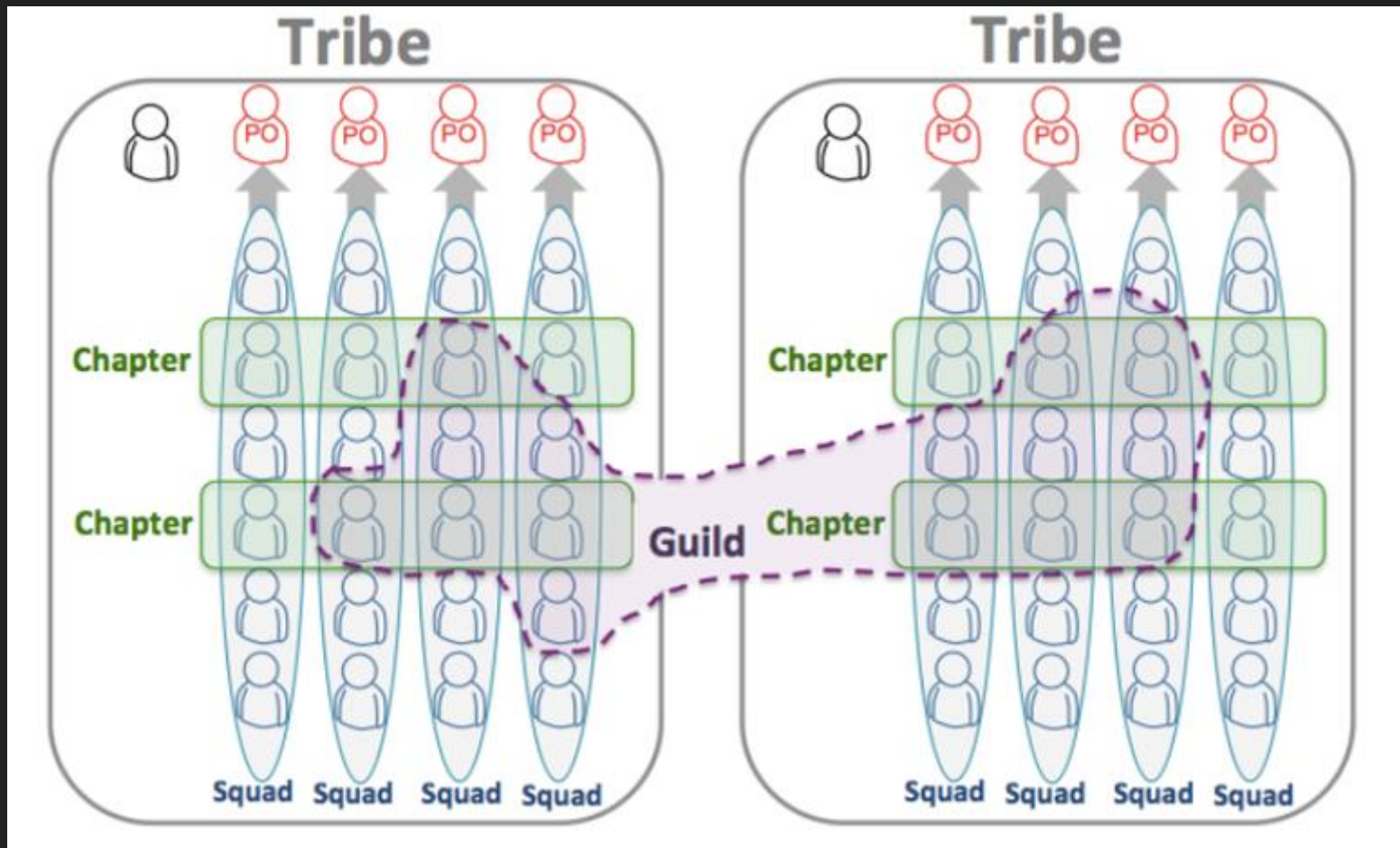
Enable Unplanned Innovation





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).



Conway's Law

A system's design is a copy of the organization's communication structure.

-- Mel Conway, 1967

HOW DO COMMITTEES INVENT?

design organization criteria

by MELVIN E. CONWAY

That kind of interrelated activity which creates a product whole from its diverse parts may be called the design of a system. Whether the particular activity is the creation of specifications for a major weapon system, the formation of a communication to meet a social dilemma, or the programming of a computer, the general activity is largely the same.

Typically, the objective of a design organization is the creation and assembly of a document containing a coherent, by-mentioned body of information. We may assume this information on the system design. It is especially produced for a sponsor who usually desires to carry out other activity guided by the system design. For example, a public official may wish to prepare legislation to carry a measure of a social character, or to appoint a team to explain the consequences of a manufacturing method to carry out other activity a product planning activity to specify what should be produced.

The design organization may or may not be involved in the construction of the system or design. Frequently, as public affairs there are activities which develop a group's action upon its own environment, whether in private industry, quite the opposite relationship often prevails. It seems reasonable to suppose that the knowledge that one will need to carry out the design organization as that this task will call to others, indirectly, other, some design changes which the individual designer or which team to make. Most design activity requires constant talking changes. Many of these changes may be seen that design decisions. They may also be ground decisions for change maker about the very thing. As we shall see later, the innovation which exist in a conventional management environment can facilitate changes which reduce the scope of the process?

stages of design

The usual stages of a design effort are concerned more with structuring of the design activity than with the system itself. The preliminary design activity cannot proceed until certain preliminary information is gained. These include:

1. Understanding of the problem, both the design activity and the system to be designed, defined by the sponsor and by the working body.
2. Identification of preliminary criteria of the system's organization so that design task groups can be means highly organized.

We shall see in detail later that the very art of cooperation is vital, but such more comprehensive because of the history of communication organization in many areas. Some of the history of the New Yorker of New York, August 1970, has recently Charles W. "The Interconnection".

For a discussion of the activities which are now active in design which may be used as a general and comprehensive, in C. E. Rouse, "Management and Organization," McGraw-Hill, New York, 1967, p. 75.

ing a design team means that certain design decisions have already been made, explicitly or otherwise. Given any design team organization, there is a class of design alternatives which cannot be effectively generated by such an organization because the necessary communication paths do not exist. Therefore, there is an implicit or a design group which is both required and related.

Once the organization of the design team is chosen, it is possible to design activities in the organization of the organization. Every time a decision is made and somebody's scope of activity is narrowed, the class of design alternatives which can be effectively generated is also narrowed.

These stages of activity are defined, a conventional problem is created. Conventional means task groups, although it appears to lower the probability of the individual in the total group operating the unit possibility that the separate task groups will be able to coordinate their efforts into a unified system design.

Thus the life cycle of a system design effort proceeds through the following general stages:

1. Structure of the problem according to the present state.
2. Choice of a preliminary design activity.
3. Identification of the design activity and delineation of the boundaries of the design.
4. Coordination among design tasks.
5. Identification of subdesign into a single design.

It is possible that a given design activity will not proceed until enough time has been made available to the sponsor. Design concepts for such an organization of uncertainty in software, and the very art of voluntarily obtaining a contract to publish and register. Of course, there are

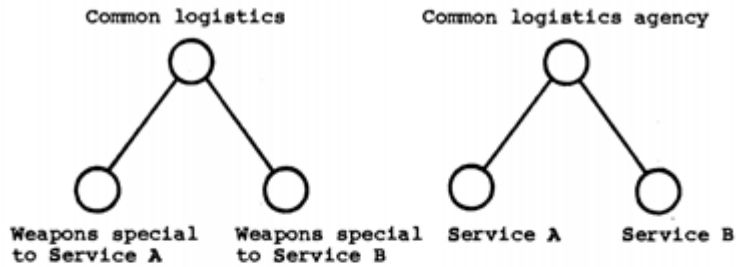


Dr. Conway is manager, peripheral systems research of Honeywell's Systems Division, where he is working on a range of activities which search the line between basic research and development in computer systems. He has an M.S. in physics from Stanford and a Ph.D. in math from Case.

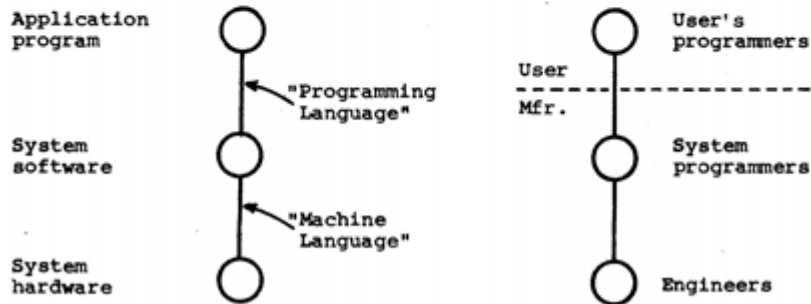


SYSTEM

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

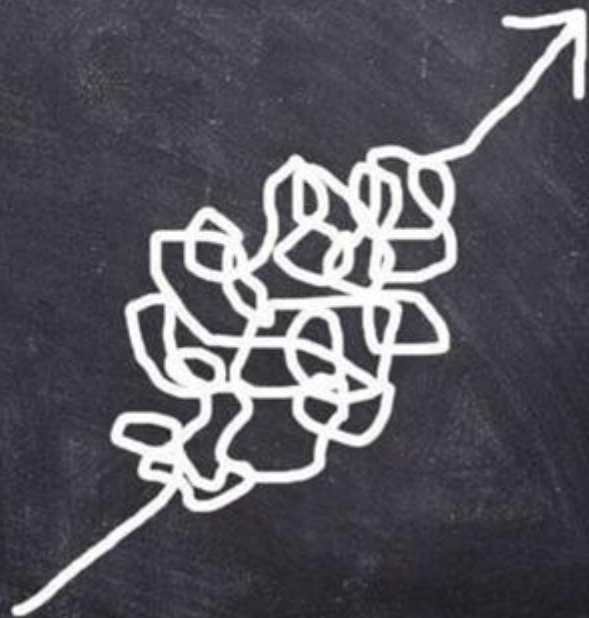
If you have to hold a release until another team is ready, you are not an independent team.



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

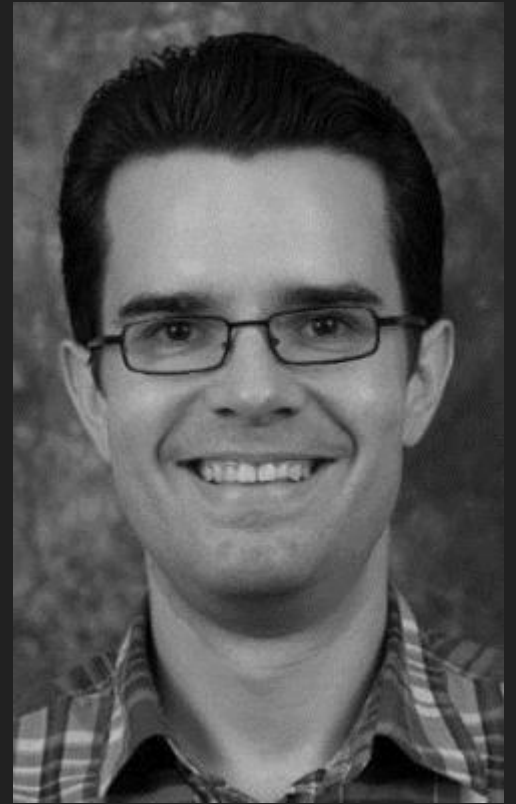
“If you want to build a ship, don't drum up people together to collect wood and don't assign them tasks and work, but rather teach them to long for the endless immensity of the sea.”

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

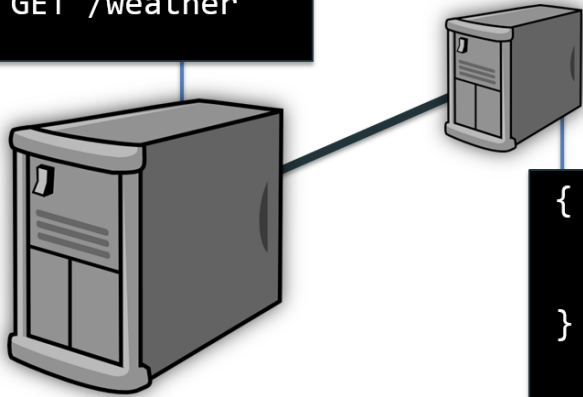


Harmonizing Speed and Safety at Scale



API Platforms

GET /weather

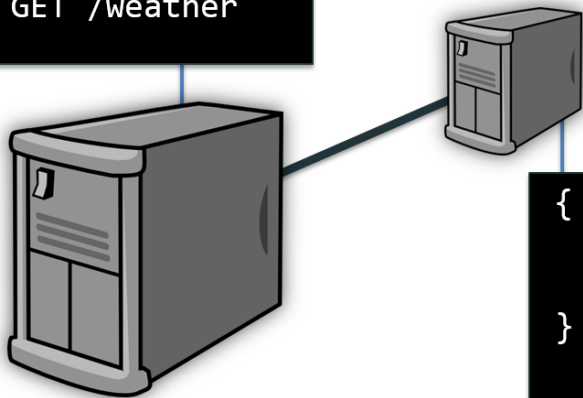


```
{  
  "city": "London",  
  "temp": 22  
}
```

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

