

A Cell-Based Architecture for Microservices

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@pzfreo



March 4-8, 2019

$$e^{i\pi} + 1 = 0$$

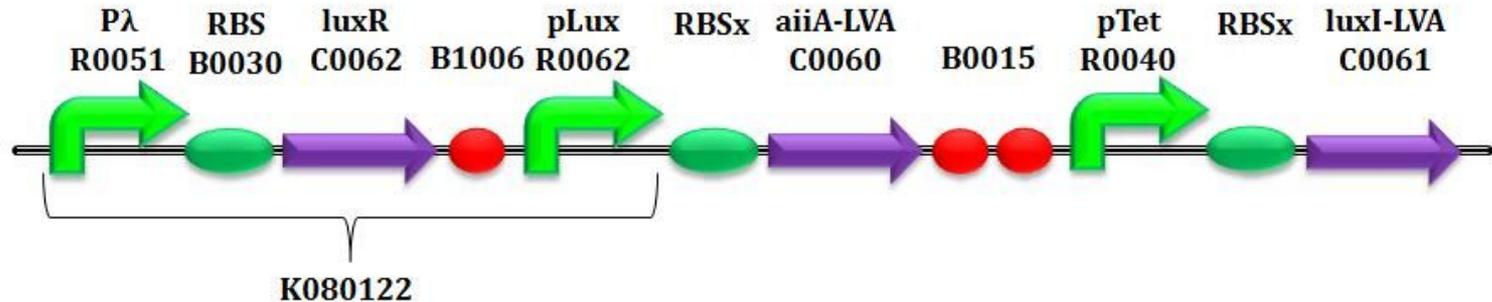
$$e = mc^2$$

$$(1) \quad \frac{d[LuxI]}{dt} = \alpha_{pTet} \cdot \left(\delta_{pTet} + \left(\frac{1 - \delta_{pTet}}{1 + \left(\frac{k_{pTet}}{aTc} \right)^{\eta_{pTet}}} \right) \right) - \left(\gamma_{LuxI} + \mu \cdot \left(\frac{N_{max} - N}{N_{max}} \right) \right) \cdot LuxI;$$

$$(2) \quad \frac{d[AiiA]}{dt} = \alpha_{pLux} \cdot \left(\delta_{pLux} + \left(\frac{1 - \delta_{pLux}}{1 + \left(\frac{k_{pLux}}{HSL} \right)^{\eta_{pLux}}} \right) \right) - \left(\gamma_{AiiA} + \mu \cdot \left(\frac{N_{max} - N}{N_{max}} \right) \right) \cdot AiiA;$$

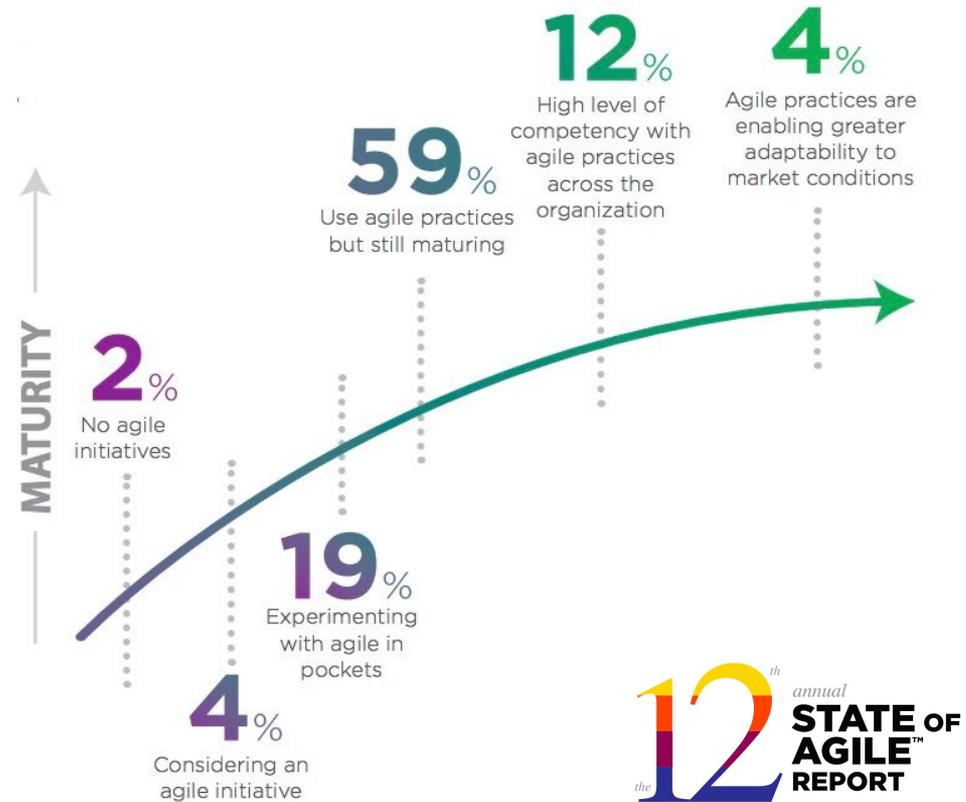
$$(3) \quad \frac{d[HSL]}{dt} = N \cdot V_{max} \cdot \frac{1}{1 + \frac{k_{M,LuxI}}{LuxI}} - N \cdot \frac{k_{cat} \cdot AiiA \cdot HSL}{k_{M,AiiA} + AiiA} - \gamma_{HSL} \cdot HSL;$$

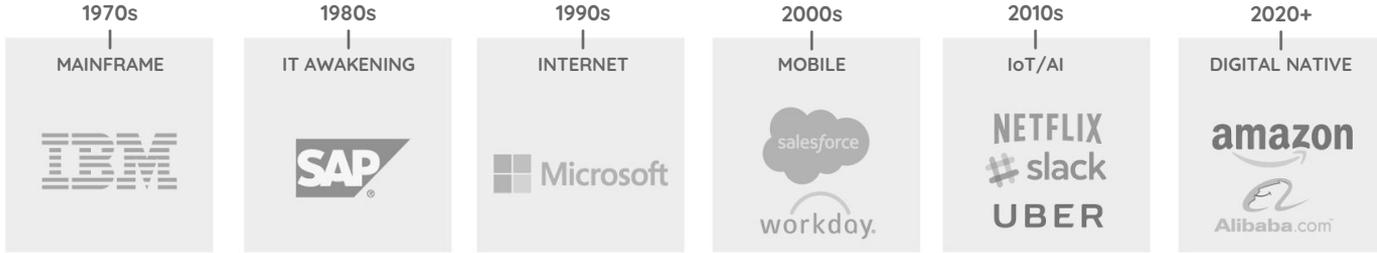
$$(4) \quad \frac{d[N]}{dt} = \mu \cdot N \cdot \left(\frac{N_{max} - N}{N_{max}} \right);$$



Biology is fundamentally the study
of **complex systems**

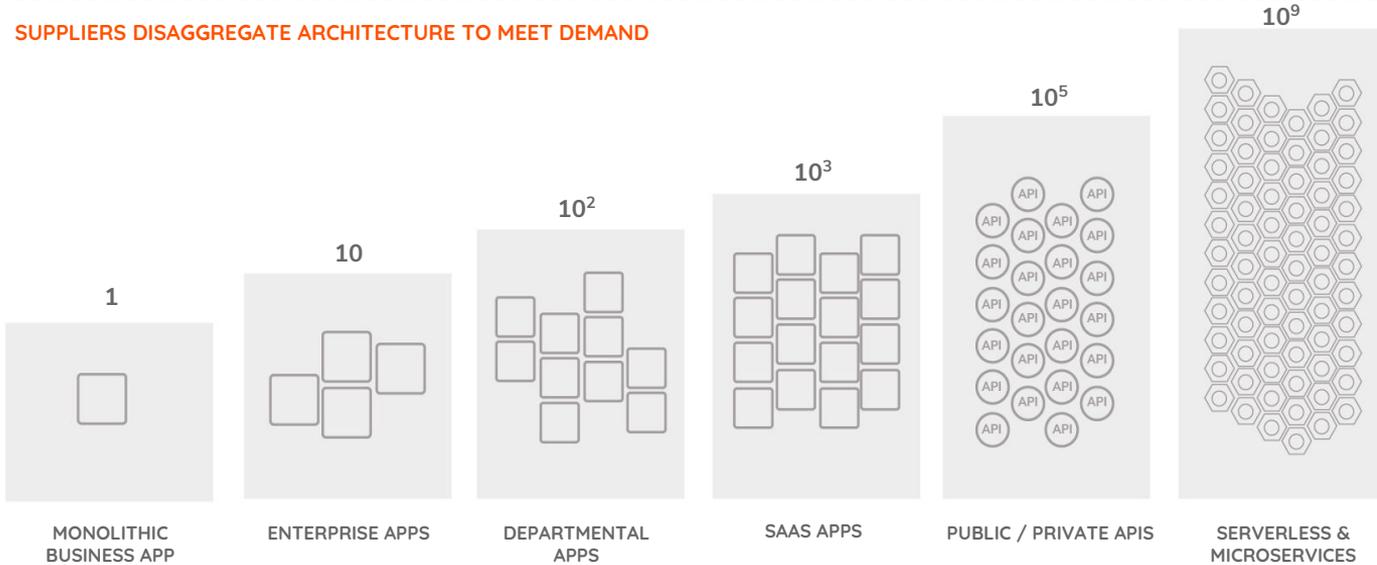
Agile is here
- just not very
evenly distributed

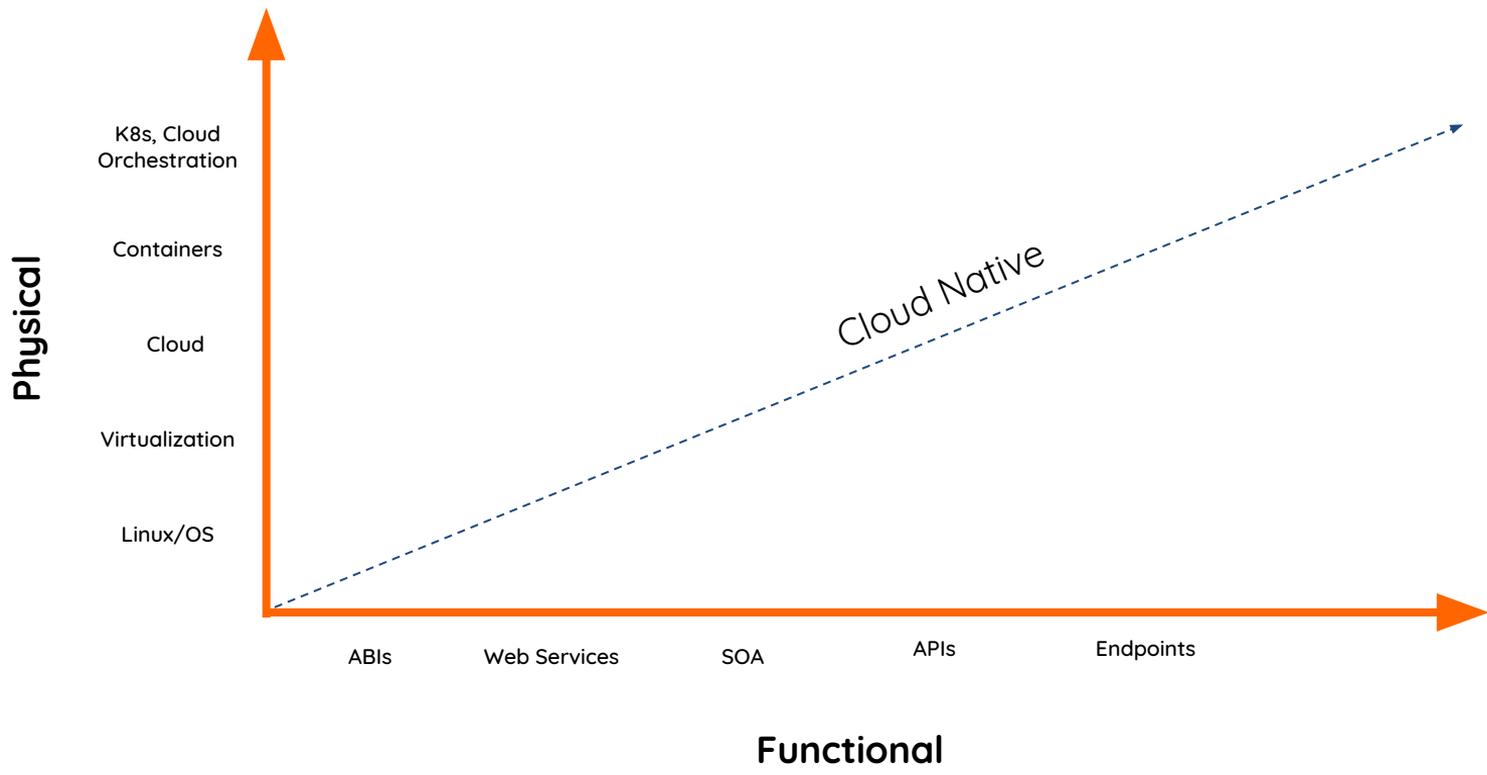




CONSUMER DEMAND

SUPPLIERS DISAGGREGATE ARCHITECTURE TO MEET DEMAND





Agile - Developer Flow





Agile Flow for Development Teams



The wrong organization interrupts flow



Donnie Berkholz

@dberkholz

Following



You say "center of excellence," I hear "new silo."

8:01 PM - 23 Feb 2018

40 Retweets 118 Likes



16 40 118



Donnie Berkholz @dberkholz · Feb 23

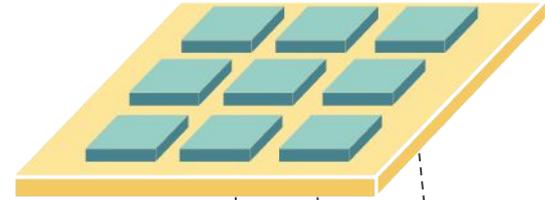
We're creating Communities of Practice at CWT. Bringing together expertise from across the company, with people sharing practices, patterns and code.

1 2 10

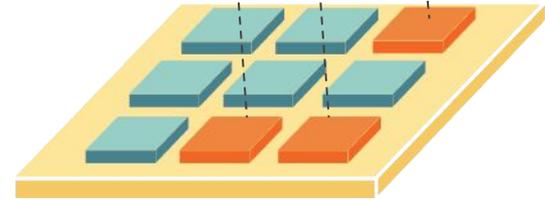
Complex processes interrupt flow

SGMM

SOA
Governance
Planning
Assessment



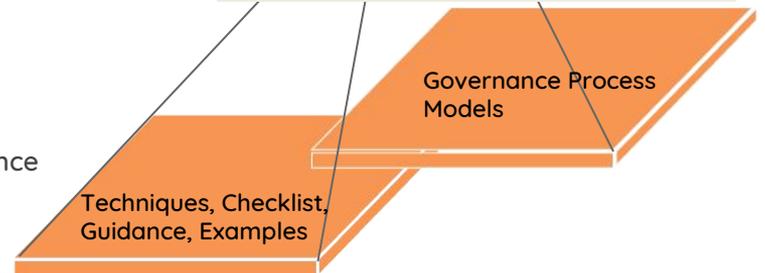
SOA
Governance
Capabilities
Heat Map

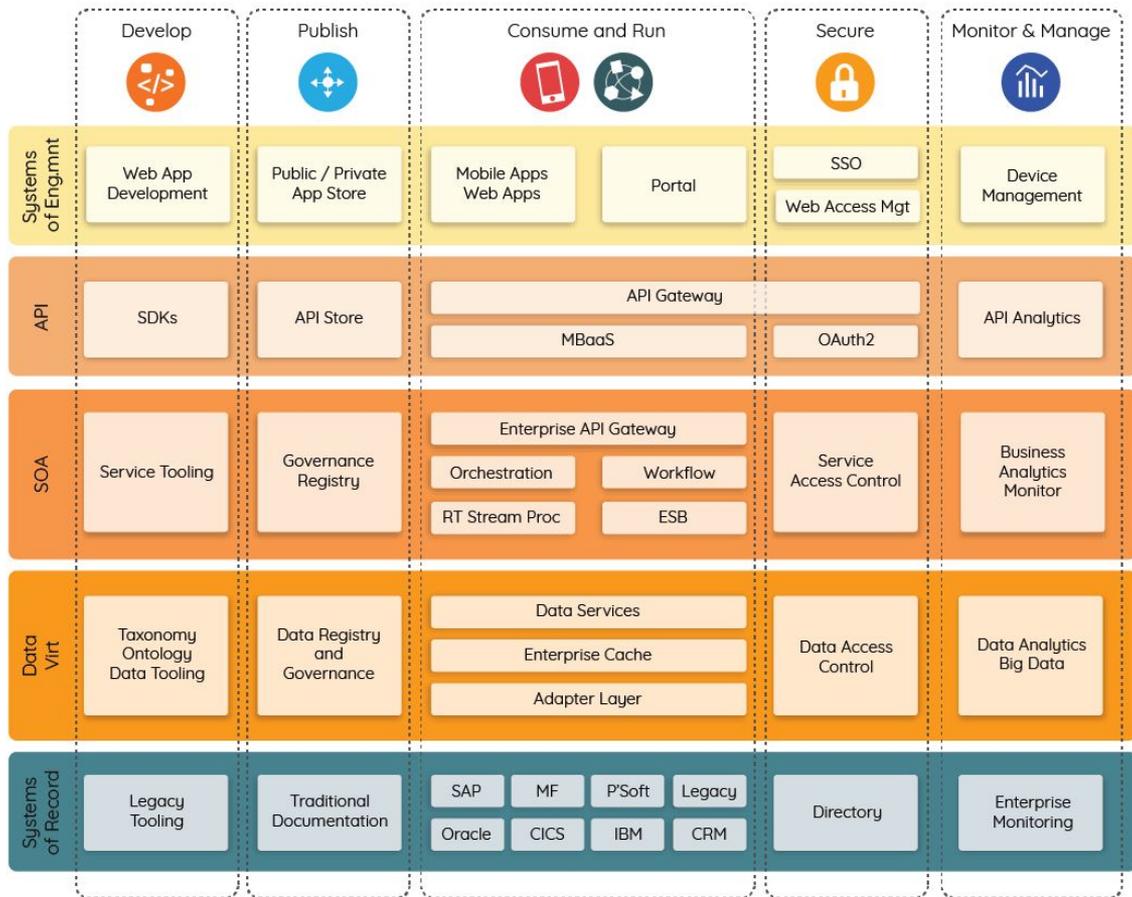


SOA
Governance
Transition
Plan

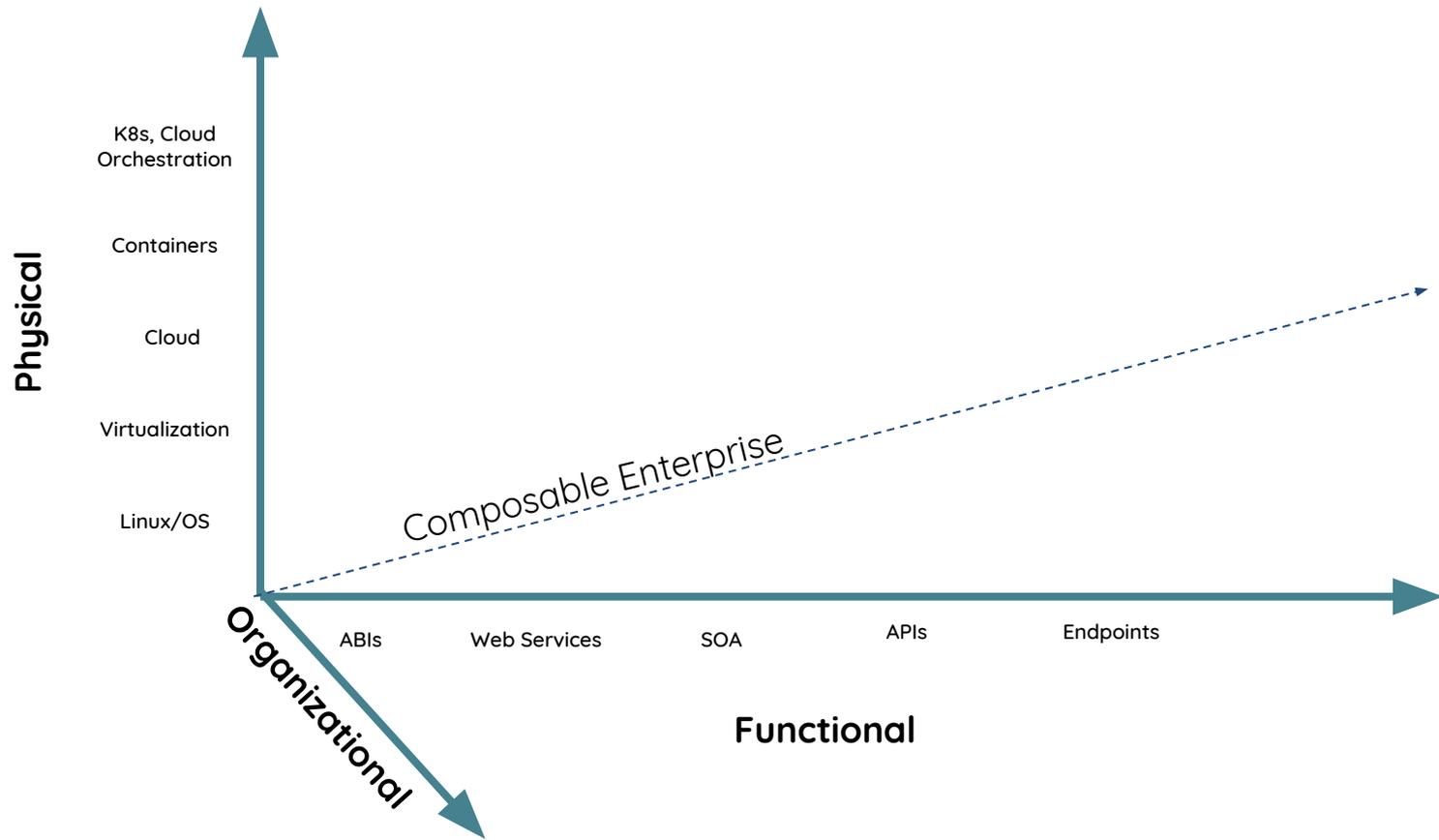
| | | |
|--------|--------|--------|
| Step 1 | Step 1 | Step 1 |
| Step 2 | Step 2 | Step 2 |
| ... | ... | ... |
| Step n | Step p | Step q |

SOA
Governance
Assets





The wrong technology stack interrupts flow



The Agile Manifesto

“

The best architectures, requirements, and designs emerge from self-organizing teams.

“

Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

“

Deliver working software frequently with a preference to the shorter timescale.

The Agile Manifesto

“

The best architectures, requirements, and designs emerge from self-organizing teams.

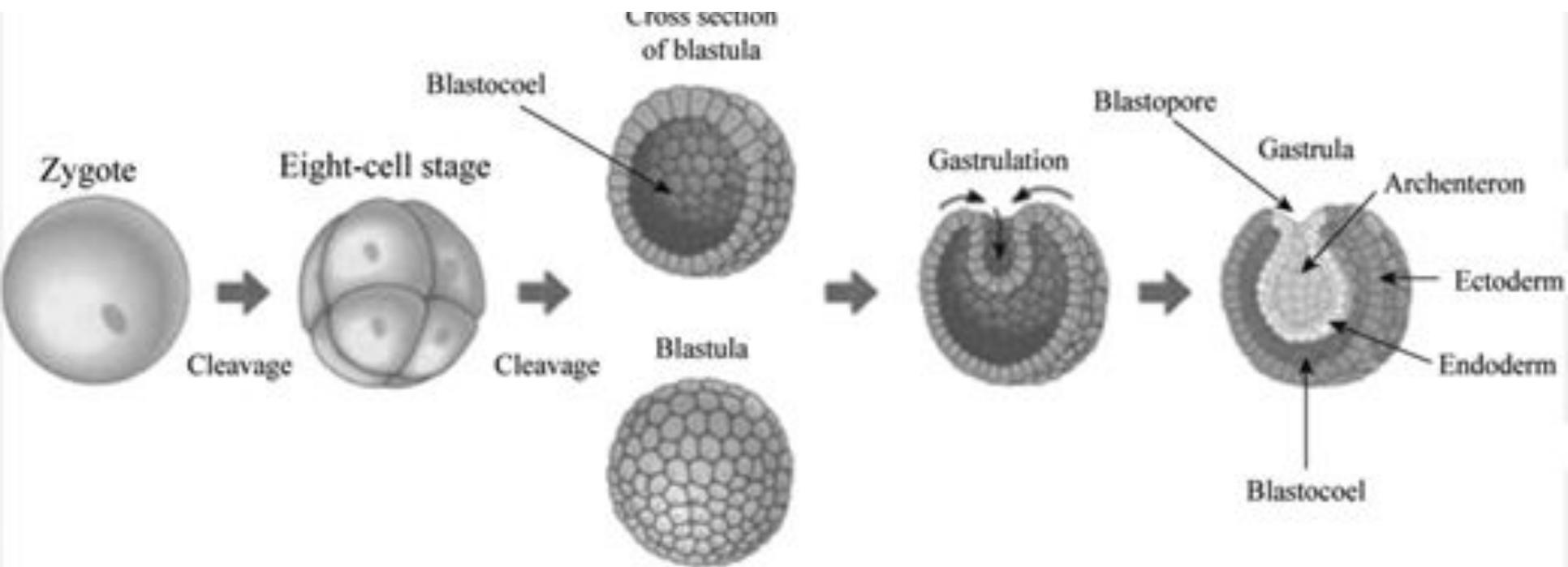
“

Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

“

Deliver working software frequently with a preference to the shorter timescale.





What is a “self-organizing” team?

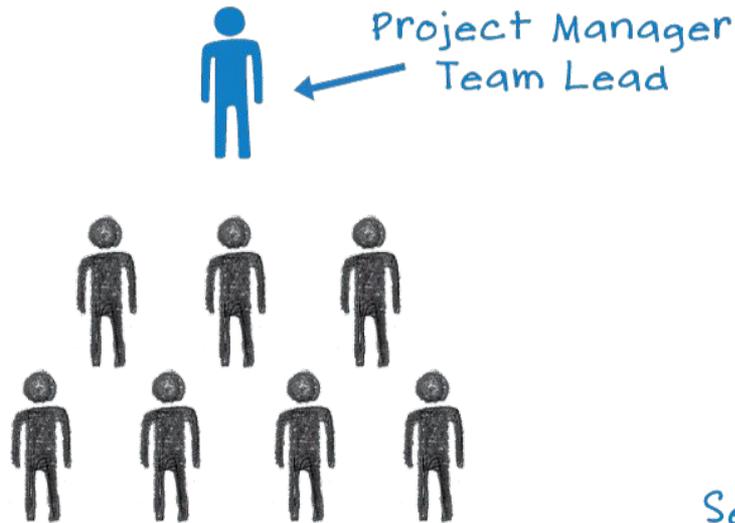
A team which:

- Manages its own work
- Pulls work
- Doesn't require “command and control”
- Communicates effectively with each other
- Is not afraid to ask questions
- Continuously evolves skills and capabilities

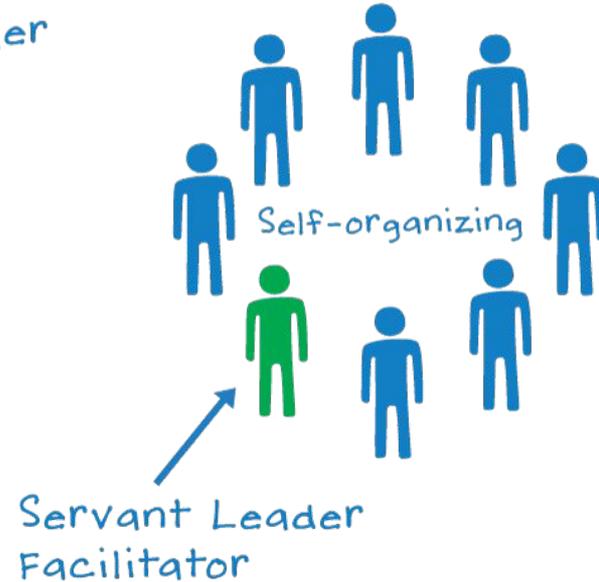


Self Organizing Teams

Traditional Teams



Agile Teams





<https://flic.kr/p/X9B7CH>

Two Pizza Rule

Simple maths

$$\frac{n(n-1)}{2}$$



Why individuals in larger teams perform worse

Jennifer S. Mueller*

University of Pennsylvania, The Wharton School, Management Department, 3620 Locust Walk, Suite 3014 SHDH, Philadelphia, PA 19104, United States

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Process loss

Coordination

ABSTRACT

Research shows that individuals in larger teams perform worse than individuals in smaller teams; however, very little field research examines why. The current study of 212 knowledge workers within 26 teams, ranging from 3 to 19 members in size, employs multi-level modeling to examine the underlying mechanisms. The current investigation expands upon Steiner's (1972) model of individual performance in group contexts identifying one missing element of process loss, namely relational loss. Drawing from the literature on stress and coping, relational loss, a unique form of individual level process, loss occurs when an employee perceives that support is less available in the team as team size increases. In the current study, relational loss mediated the negative relationship between team size and individual performance even when controlling for extrinsic motivation and perceived coordination losses. This suggests that larger teams diminish perceptions of available support which would otherwise buffer stressful experiences and promote performance.

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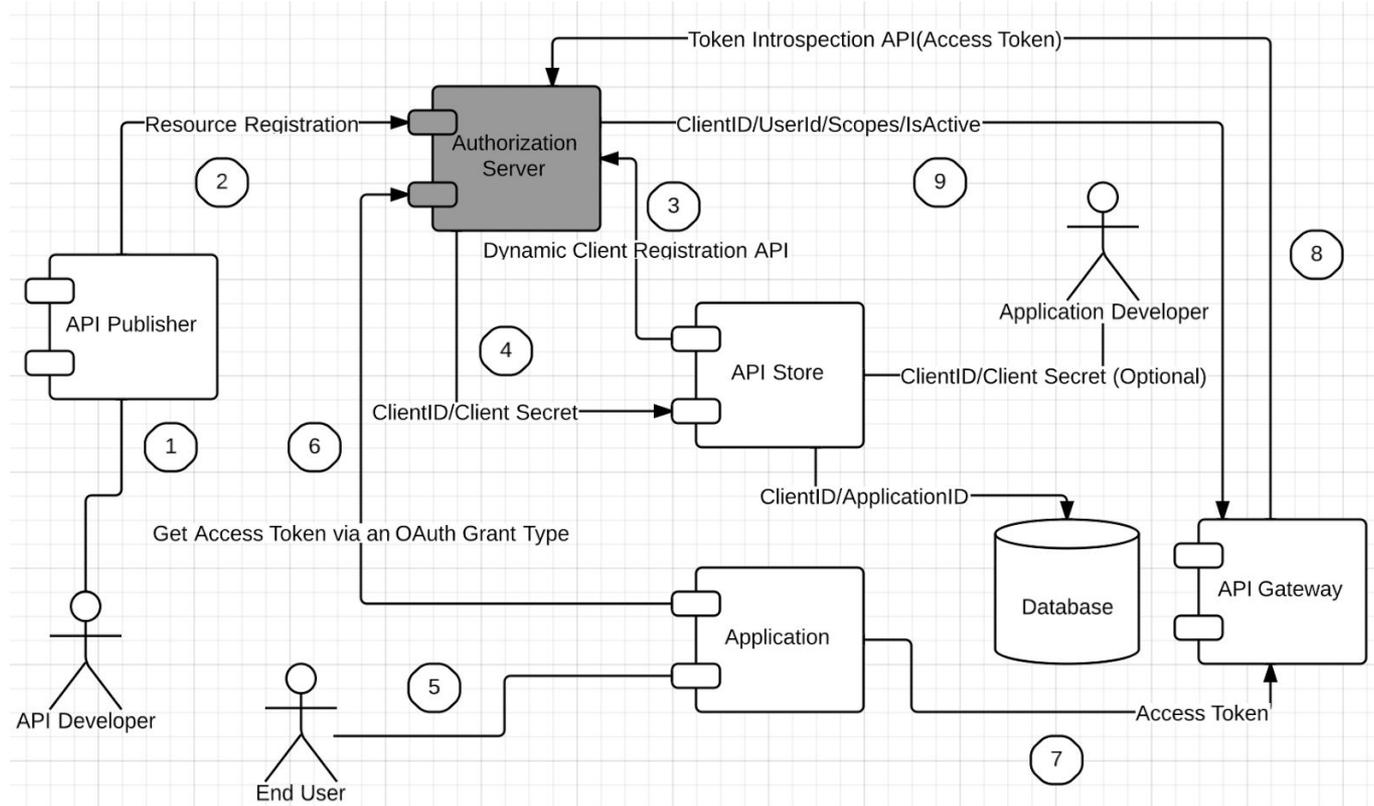


APIs are designed for boundaries

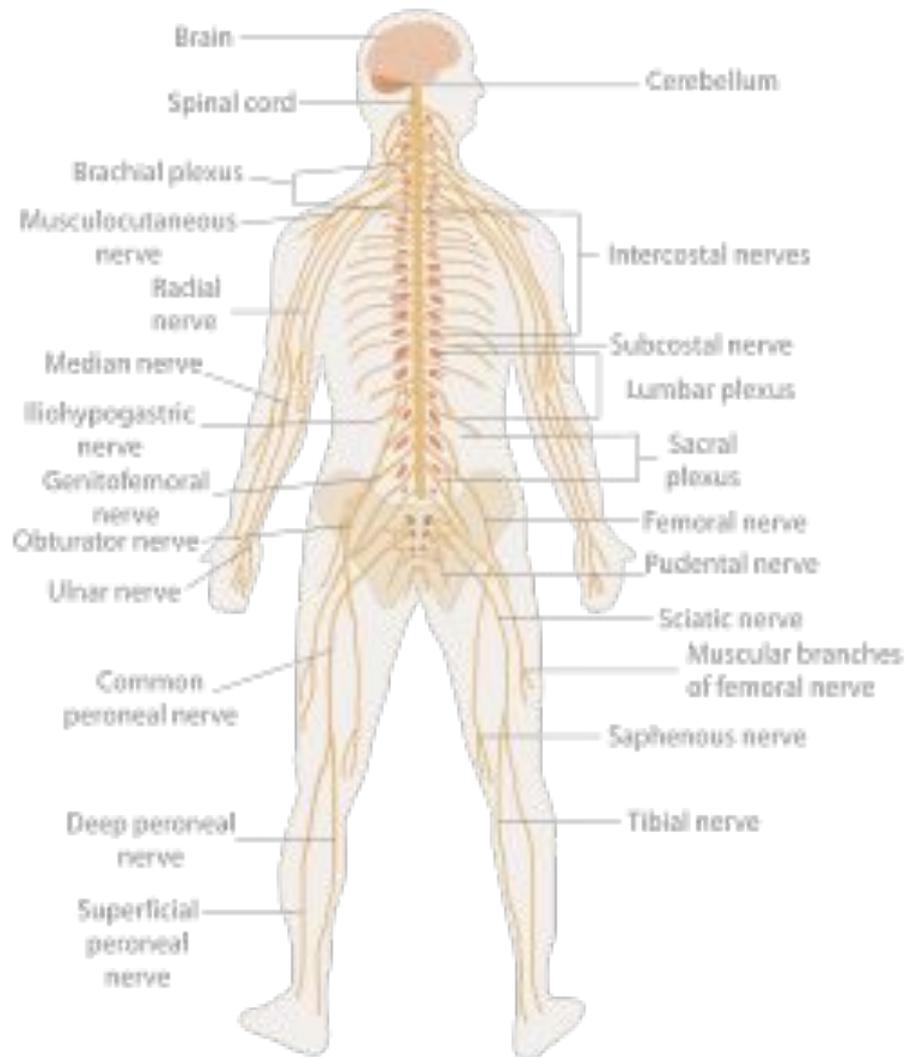
- Authentication required and expected
- Authorization
- Rate limiting / Throttling
- Analytics and Observability
- No assumption that others will use it:
 - Developer-friendly portals
 - SDKs, samples, forums
 - Developer-friendly governance
 - Versioning, Deprecation notification, etc



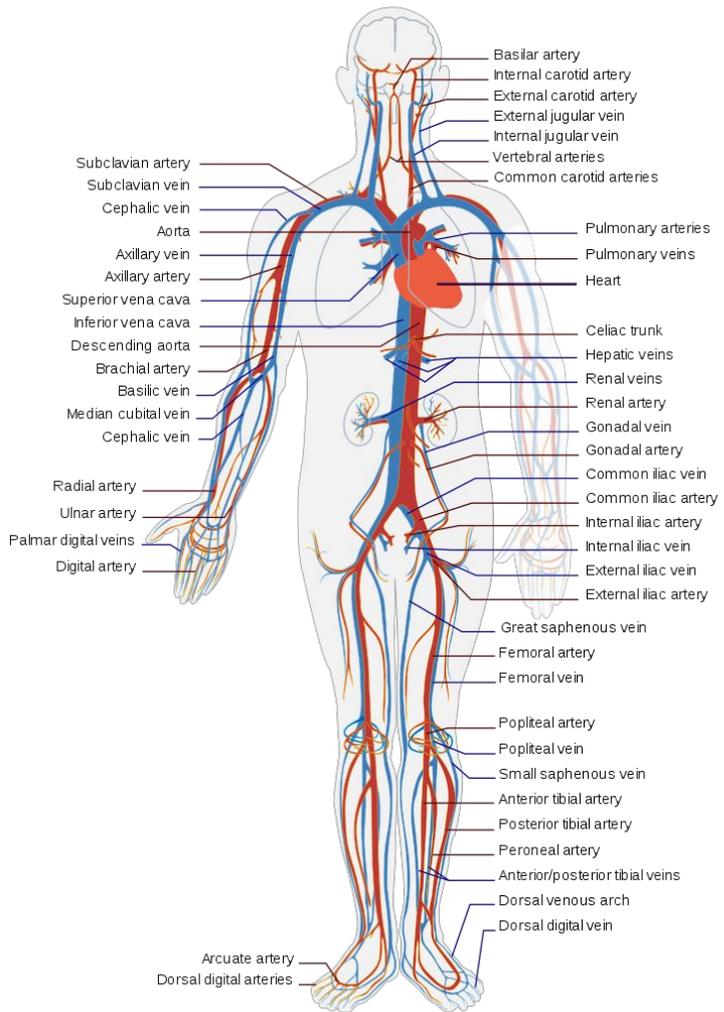
Boundaries require identity and access control



Control Plane



Data Plane





Brownfield

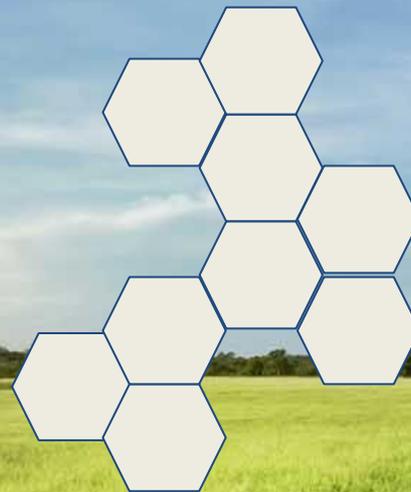
Greenfield

Core
Systems

Core
Systems

Core
Systems

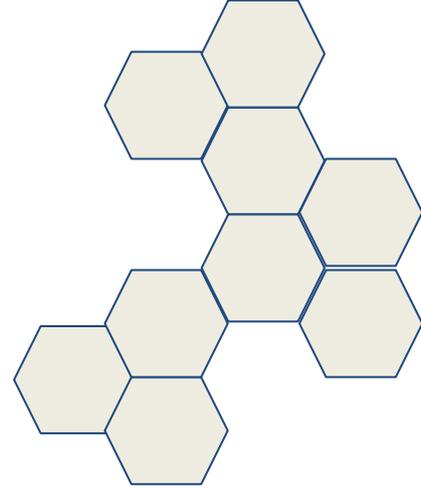
Disaggregated systems

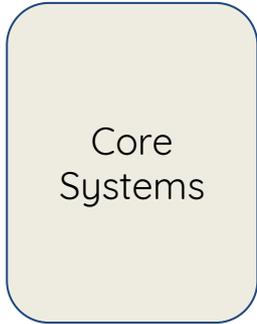
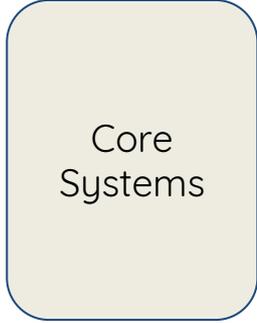
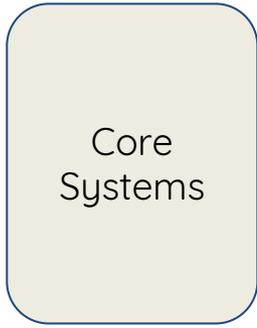


Core Systems

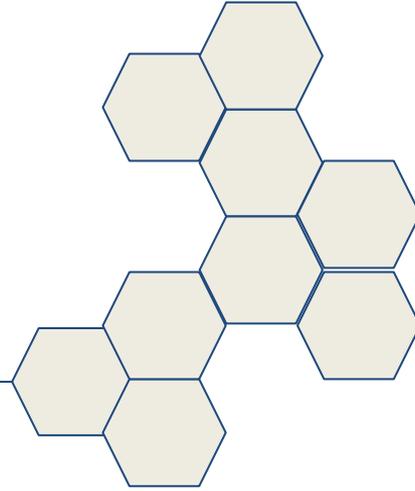
Core Systems

Core Systems

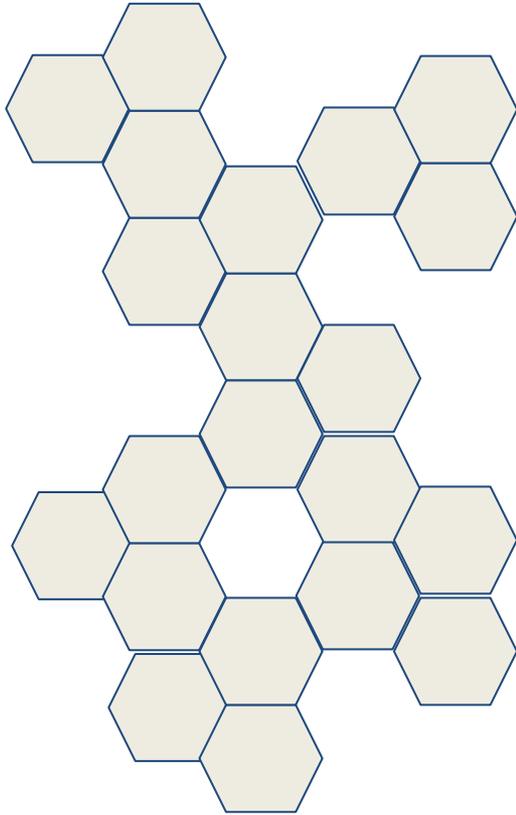
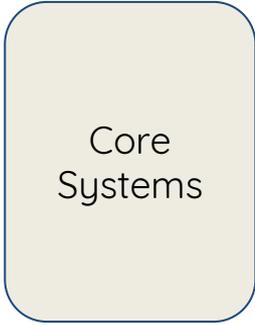
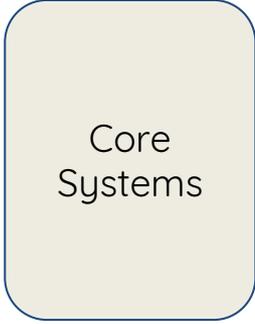
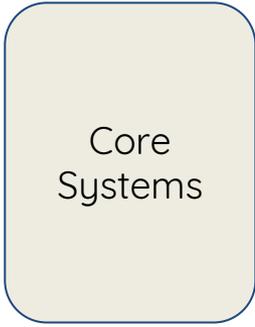




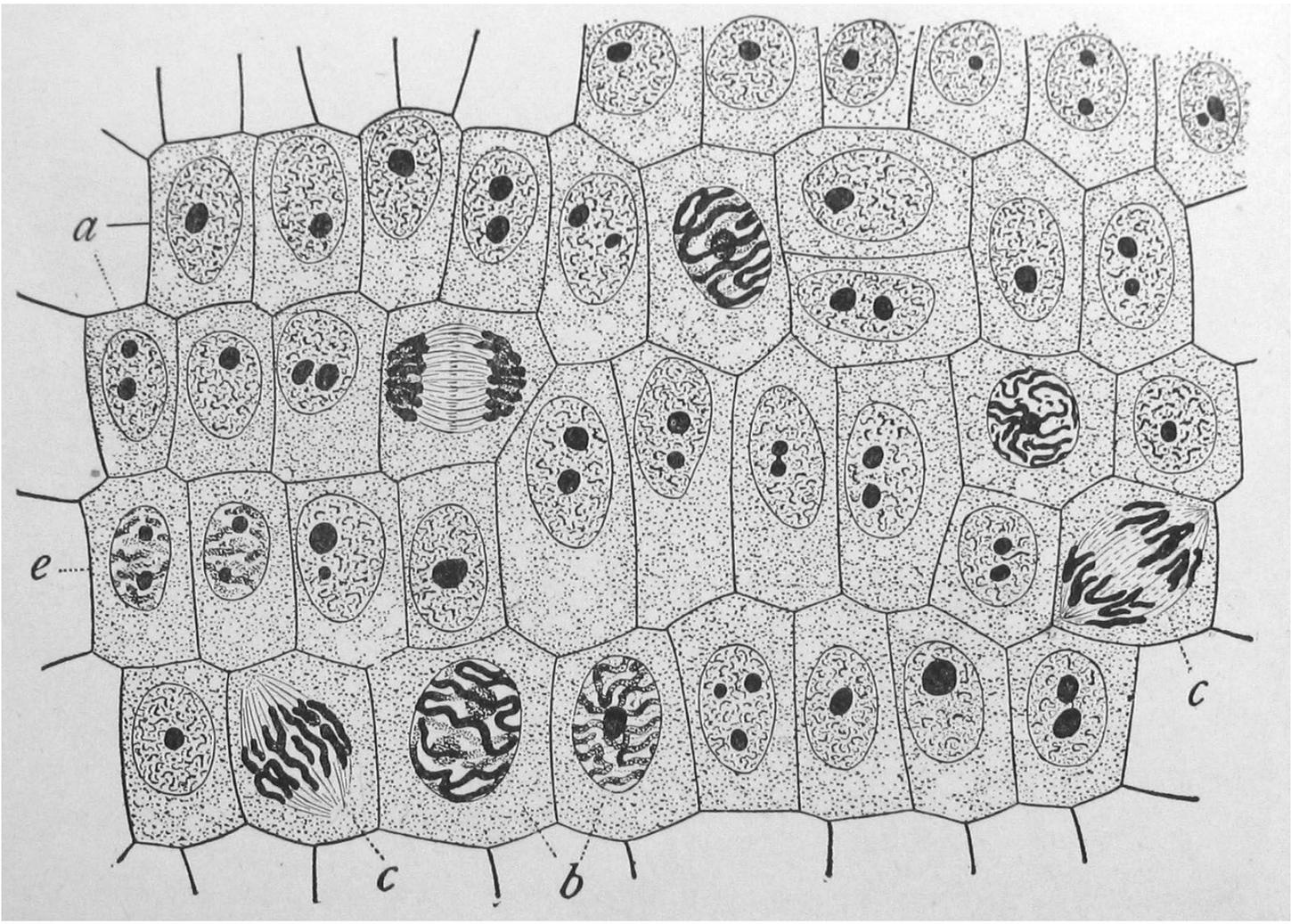
Governance
Self-Service
Identity
Dependency Management
Notification
Versioning



Microservices deliver agility



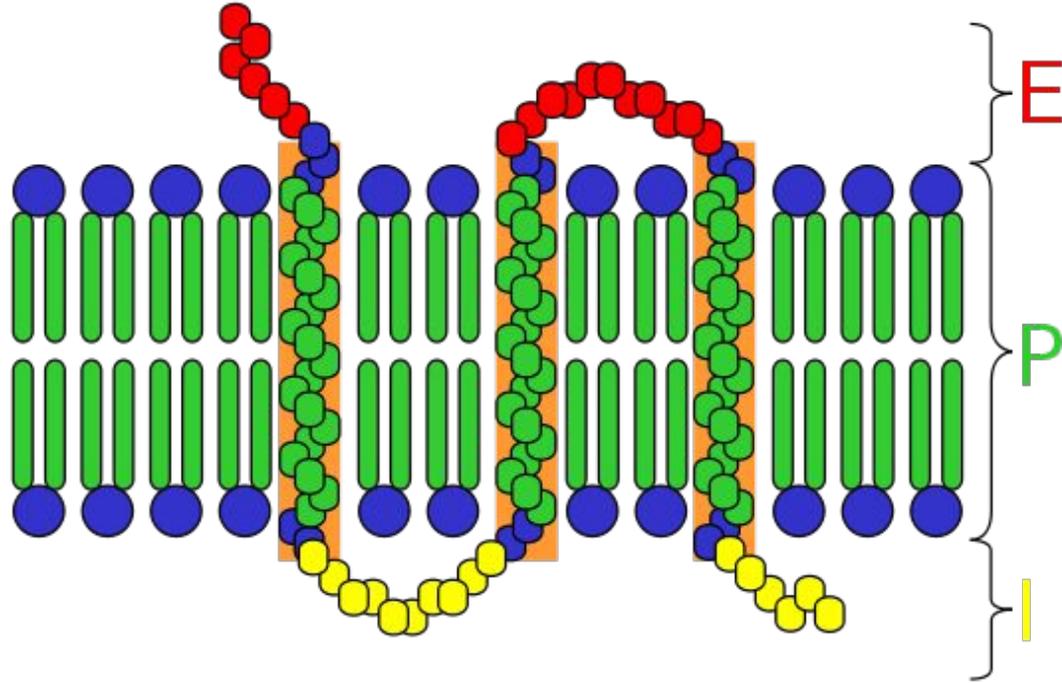
Microservices at scale require some
governance....

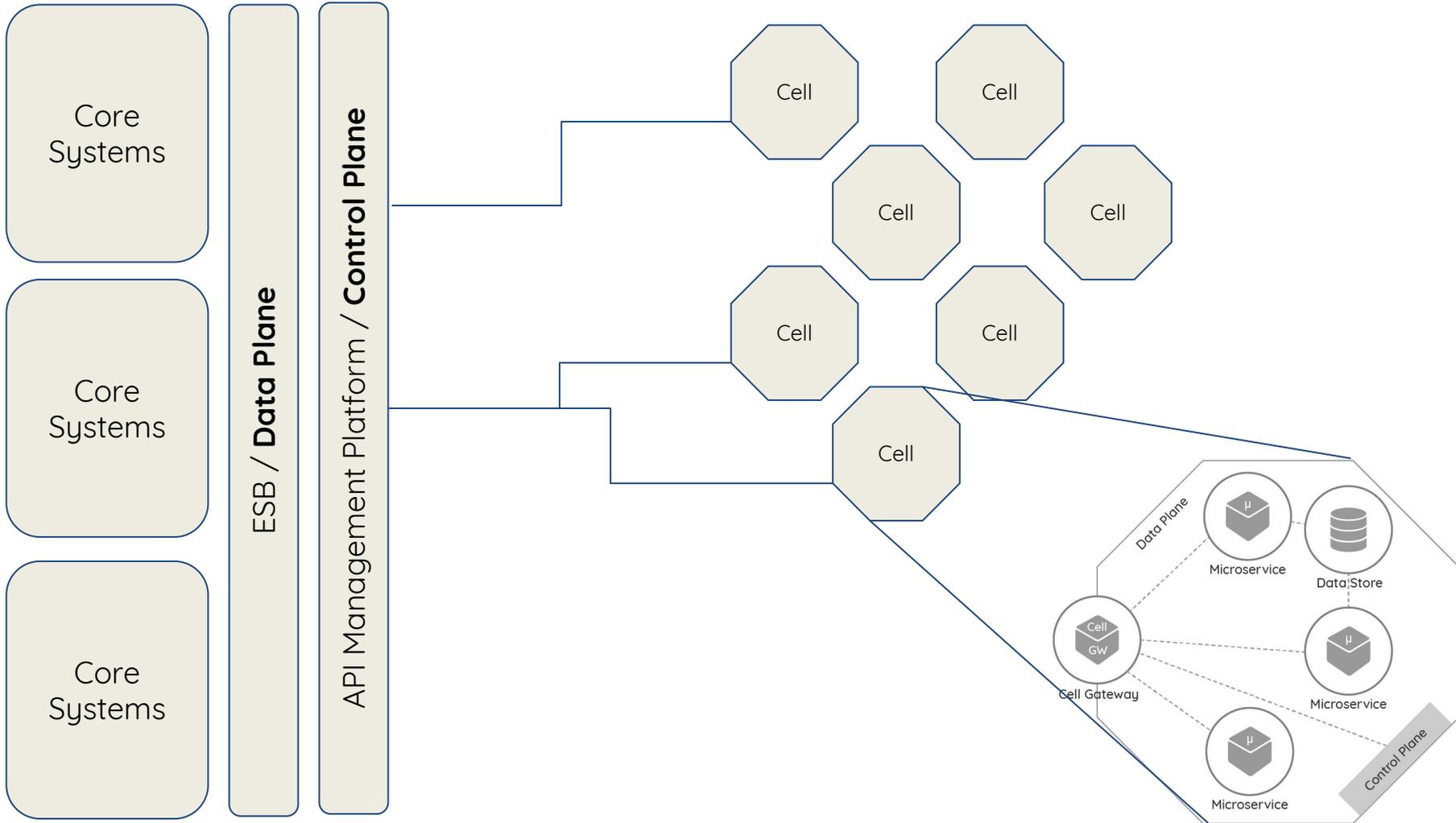


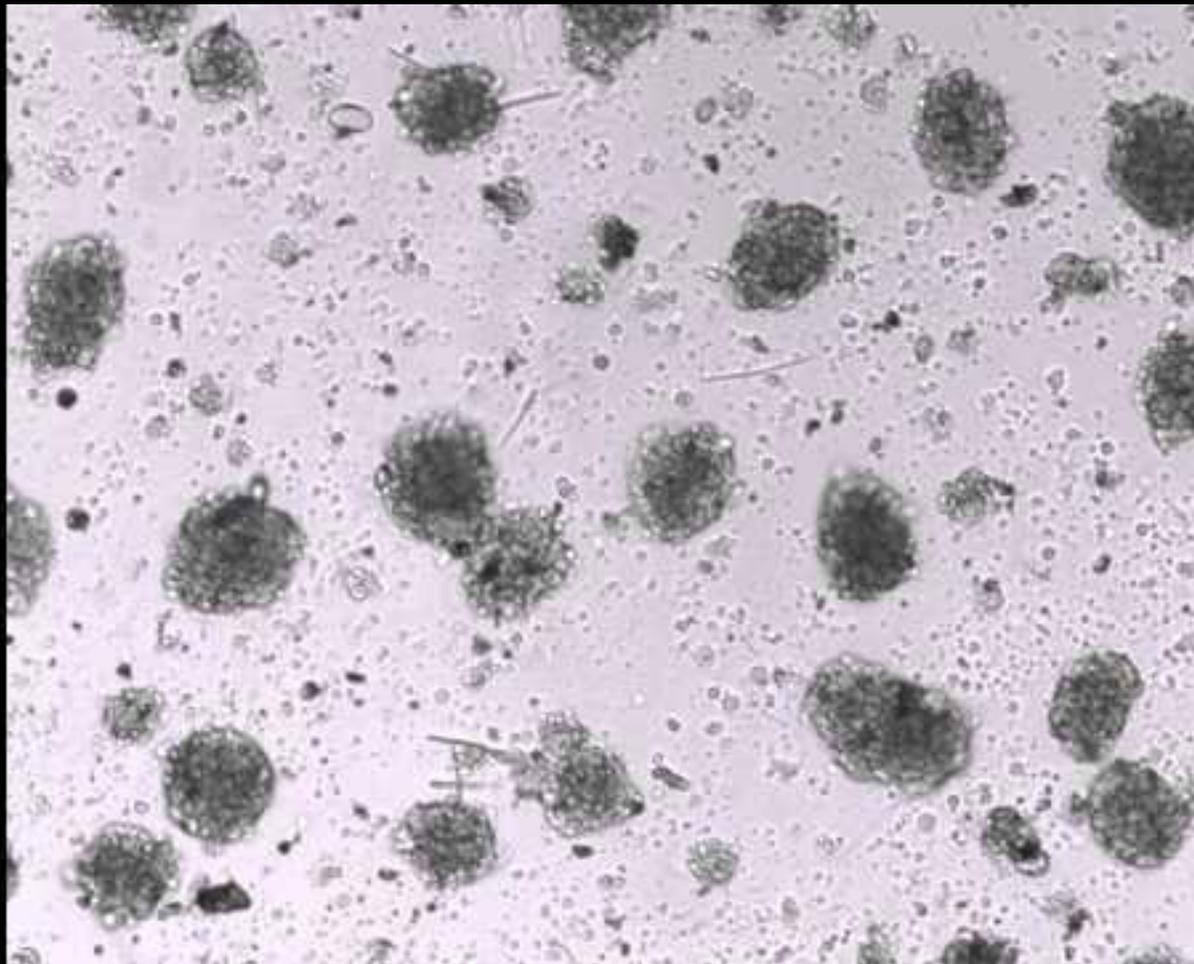
The cell is the basic structural,
functional, and
biological unit of all known living
organisms

Cell boundaries

Transmembrane receptors and signalling

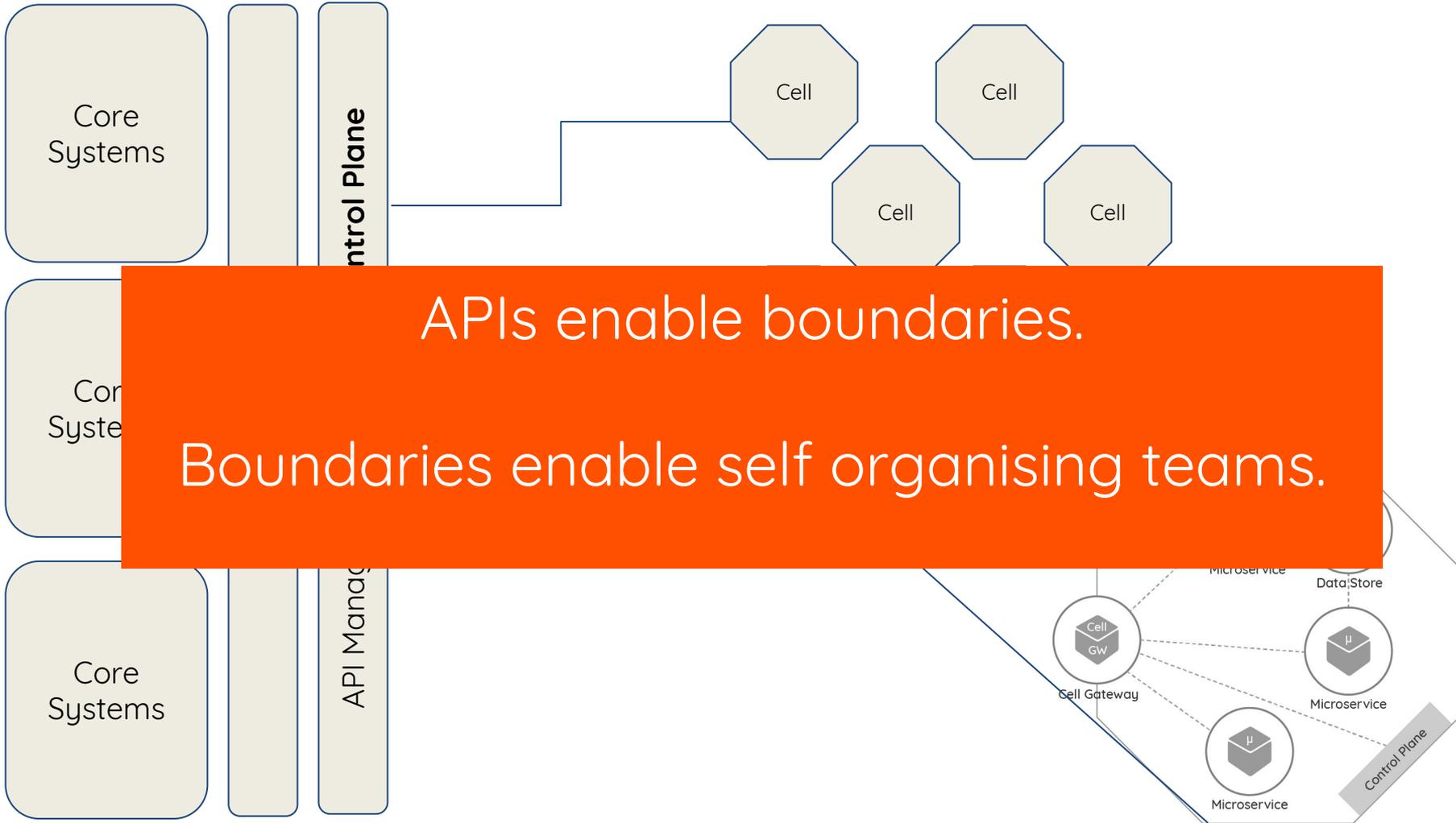






Timelapse of Sponge Reaggregation - <https://www.youtube.com/watch?v=SvtDMo7fjAc>

Cell boundary =
Team boundary





archiloque Typo

a88686c 15 days ago

2 contributors



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Blame

History



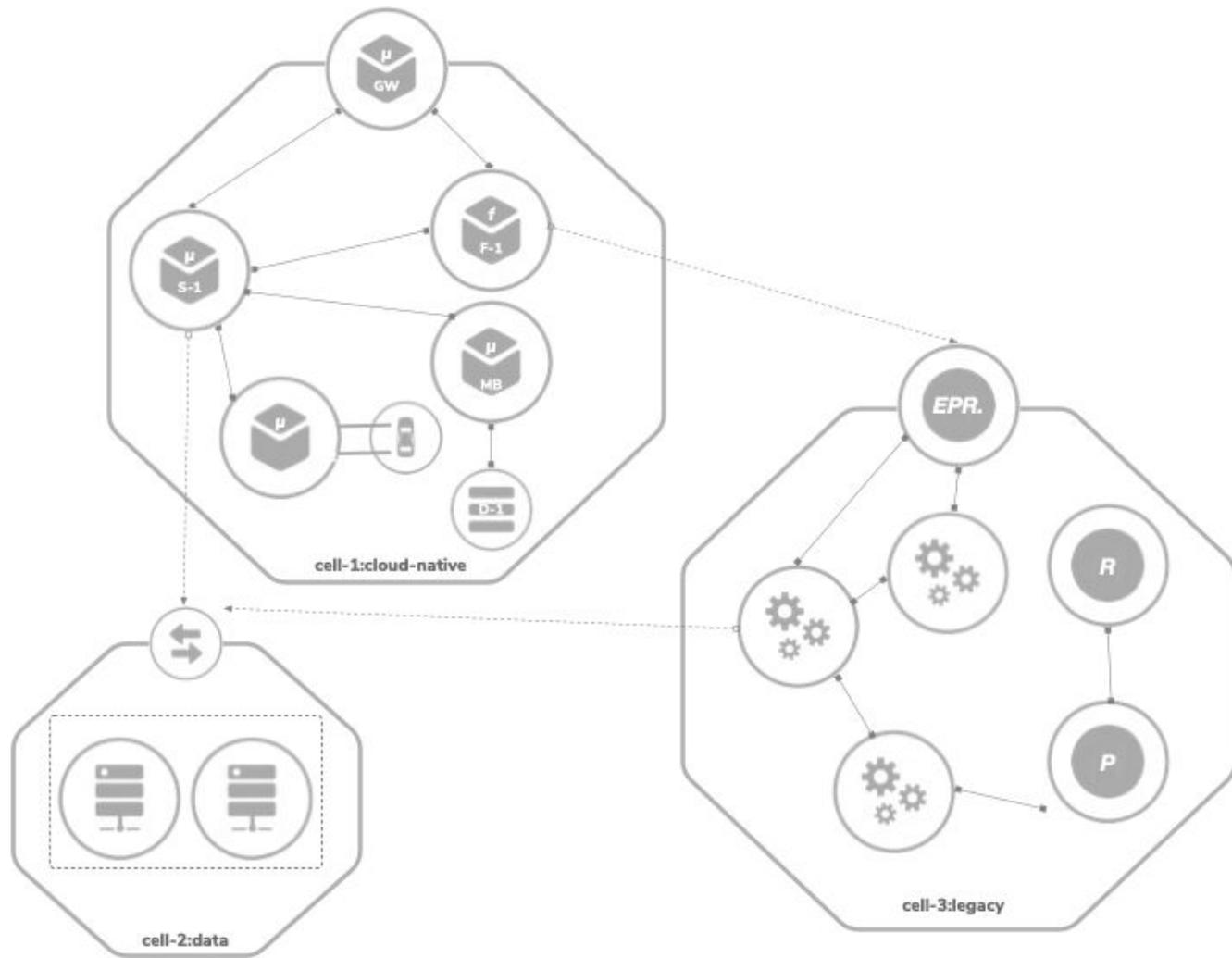
Cell-based Reference Architecture

Version Q2-2018

Original Authors

- Asanka Abeysinghe, Vice President, Architecture - CTO Office asankaa@wso2.com
- Paul Fremantle, CTO and Co-Founder paul@wso2.com

This document describes a reference architecture for modern agile digital enterprises. This reference architecture offers a logical architecture based on a disaggregated cloud-based model that can be instantiated to create an



Boundaries for Microservices

- **Have a clear global data and control plane**
 - An API management platform provides an effective global control plane
- **Ensure teams **offer** clear boundaries**
 - Versioned APIs managed through the global control plane
- **Give teams freedom to evolve within those boundaries**
 - Within a cell they are free to use any approach



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asankaa center h1 and added version

c48076d on 10 Dec 2018

1 contributor

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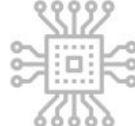
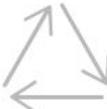
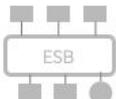
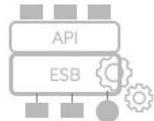
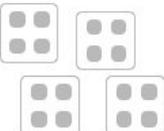
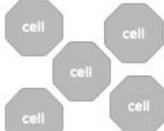
Reference Methodology for Agility

Version Q2-2018

Original Authors

- Asanka Abeysinghe, Vice President - Architecture, CTO Office asankaa@wso2.com
- Paul Fremantle, CTO and Co-Founder paul@wso2.com

This document describes a reference methodology for modern agile digital enterprises. Our goal is to move organizations from the current maturity stage towards the integration agile stage. The outcome of moving higher in

| | MONOLITHIC | FAST WATERFALL | API-DRIVEN | EARLY AGILITY | INTEGRATION AGILE | | |
|-------------------|--|---|---|--|---|--------------------------------|--|
| PEOPLE | <p>Centralized</p>  | <p>COE</p>  | <p>API Teams</p>  | <p>Decentralized</p>  | <p>Self-Organized</p>  | | |
| PROCESS | <p>Waterfall</p>  | <p>Fast Waterfall</p>  | <p>API Iterative</p>  | <p>Semi-Continuous</p>  | <p>Continuous</p>  | | |
| TECHNOLOGY | <p>Silo</p>  | <p>EAI/ESB</p>  | <p>API-Driven</p>  | <p>Early Agility</p>  | <p>Continuous Agility</p>  | | |
| | | <p>Layered Architecture</p> | | <p>Segmented Architecture</p> | | <p>Cell-based Architecture</p> | |
| DIGITAL ALIGNMENT | <p>Separate</p>  | <p>Ad-hoc</p>  | <p>Early Strategic</p>  | <p>Digital-First</p>  | <p>Adaptive</p>  | | |



The **recoupling** of decoupled components into new agile teams

Based on **teams**, with devops, cloud infrastructure and intra-cell comms

Agile inside the cell, **versioned and gatewayed** at the boundary



“Remember that every science is based upon an abstraction... All sciences are differentiated by their abstraction.”

Fulton J. Sheen

Everyone is on a **journey** towards agility

Integration agility needs to **catch up** with project agility

This means a shift towards enabling **integration agile teams**

Reaggregating with a cellular architecture and self-organising teams creates a **composable enterprise**

Flow metrics allow you to understand **cell health**



Thank you!

More information:

Cell based architecture

<https://github.com/wso2/reference-architecture>

Reference Methodology

<https://github.com/wso2/reference-methodology>

