

# **Software Engineering Practices**

**Introduction to Software Systems**

**Spring 2025**

**Software Engineering Research Center**

**IIT Hyderabad, India**

- Software Offerings
- Software Industry
- Software Engineering Teams
- Software Development Life Cycle
- Software Product Methods
- Continuous Development and Continuous Integration
- DevOps and MLOps
- Software Productivity
- Technical Debt
- Software Development Waste

# SaaS

## PaaS

## IaaS



Hosted Application /  
Apps



Development tools,  
database  
management, business  
analytics



Operating Systems



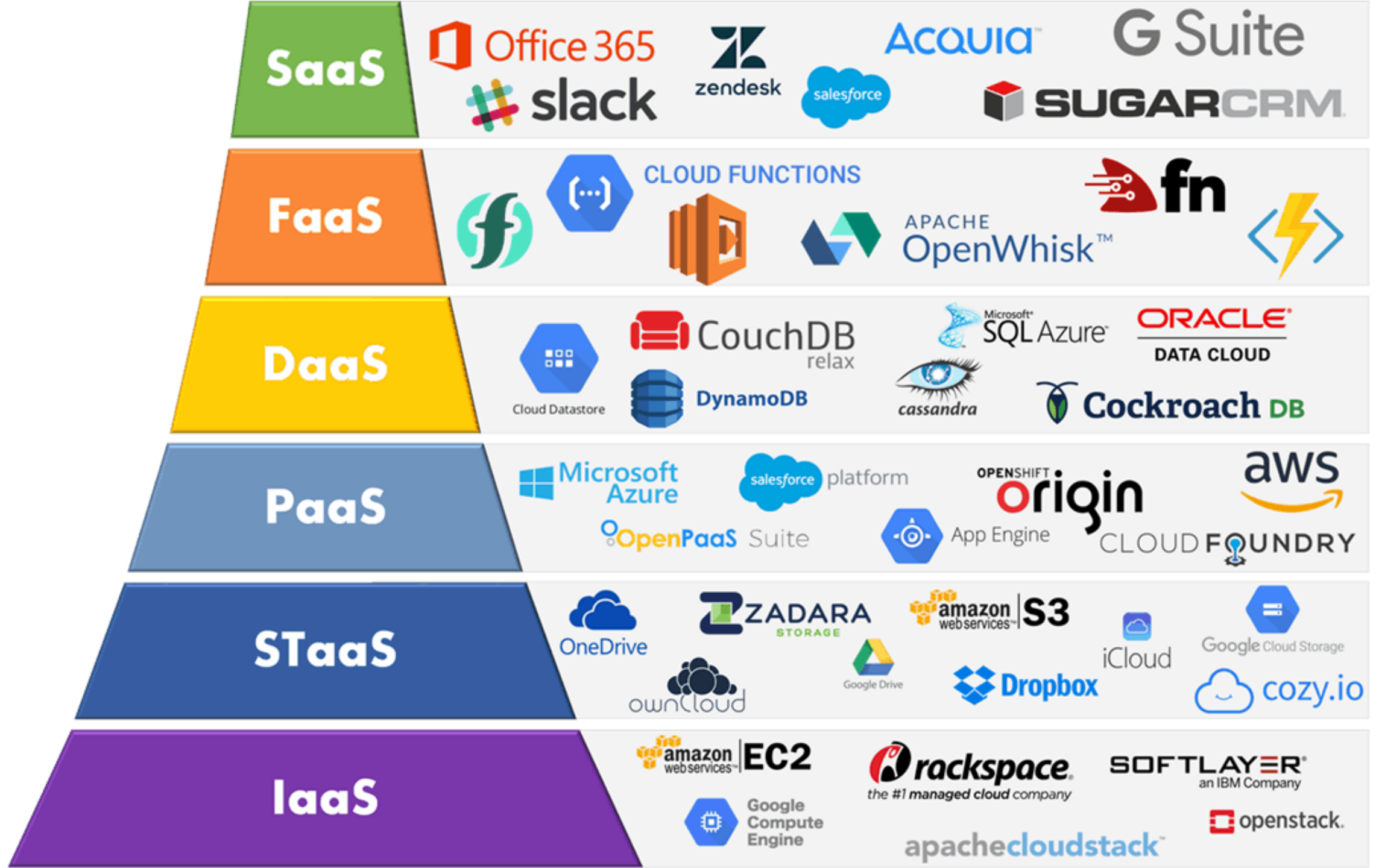
Servers and storage



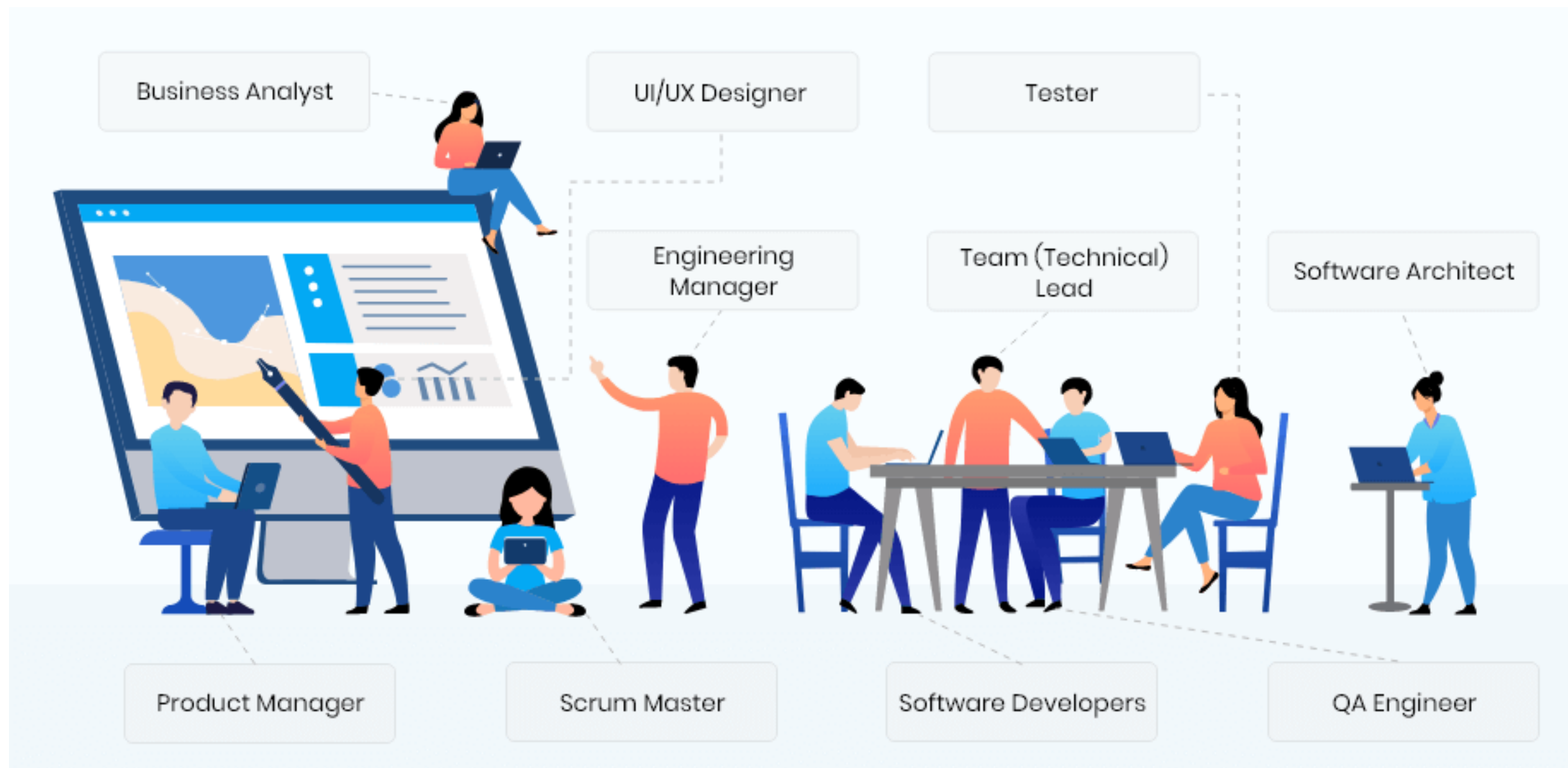
Networking  
firewalls/security



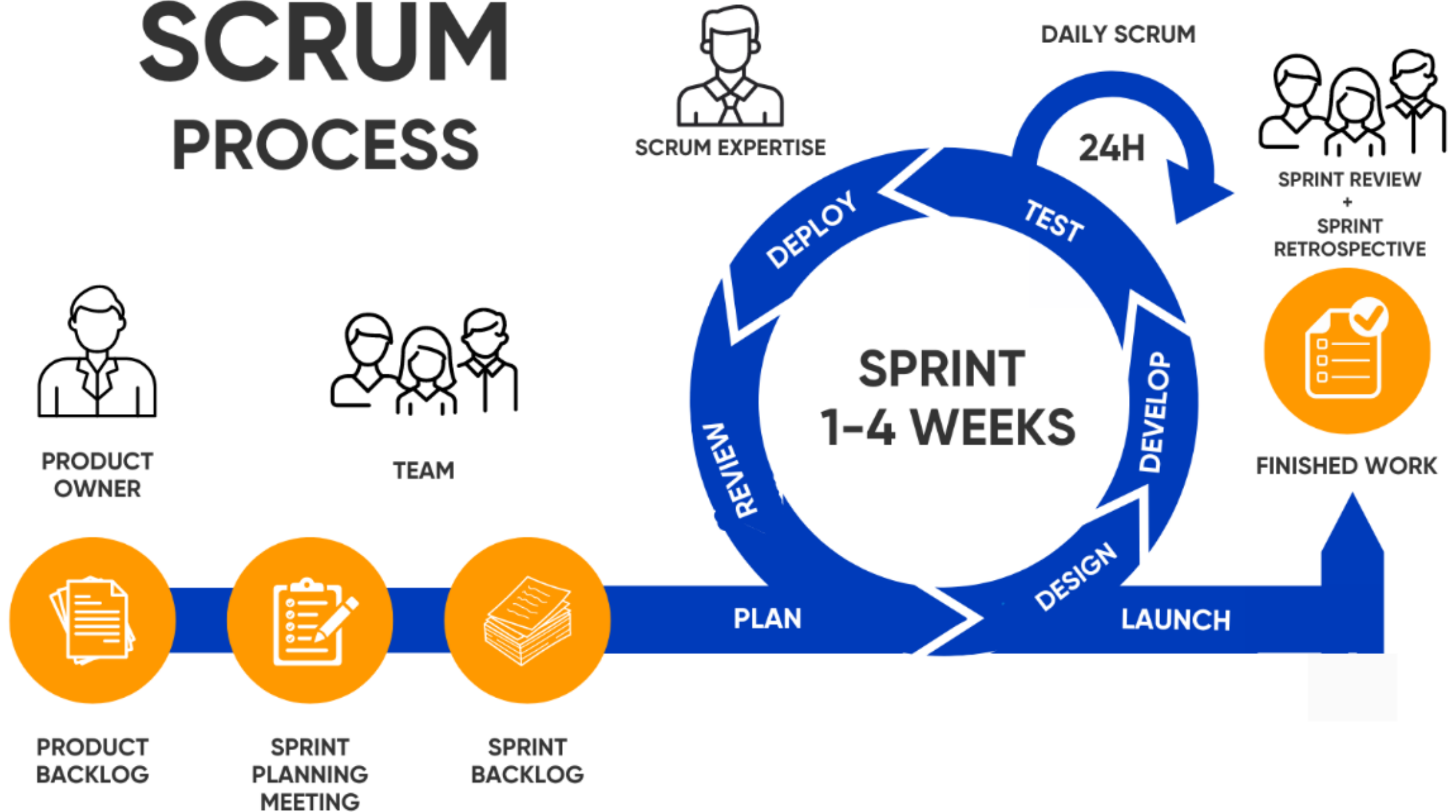
Data center physical  
plant/building



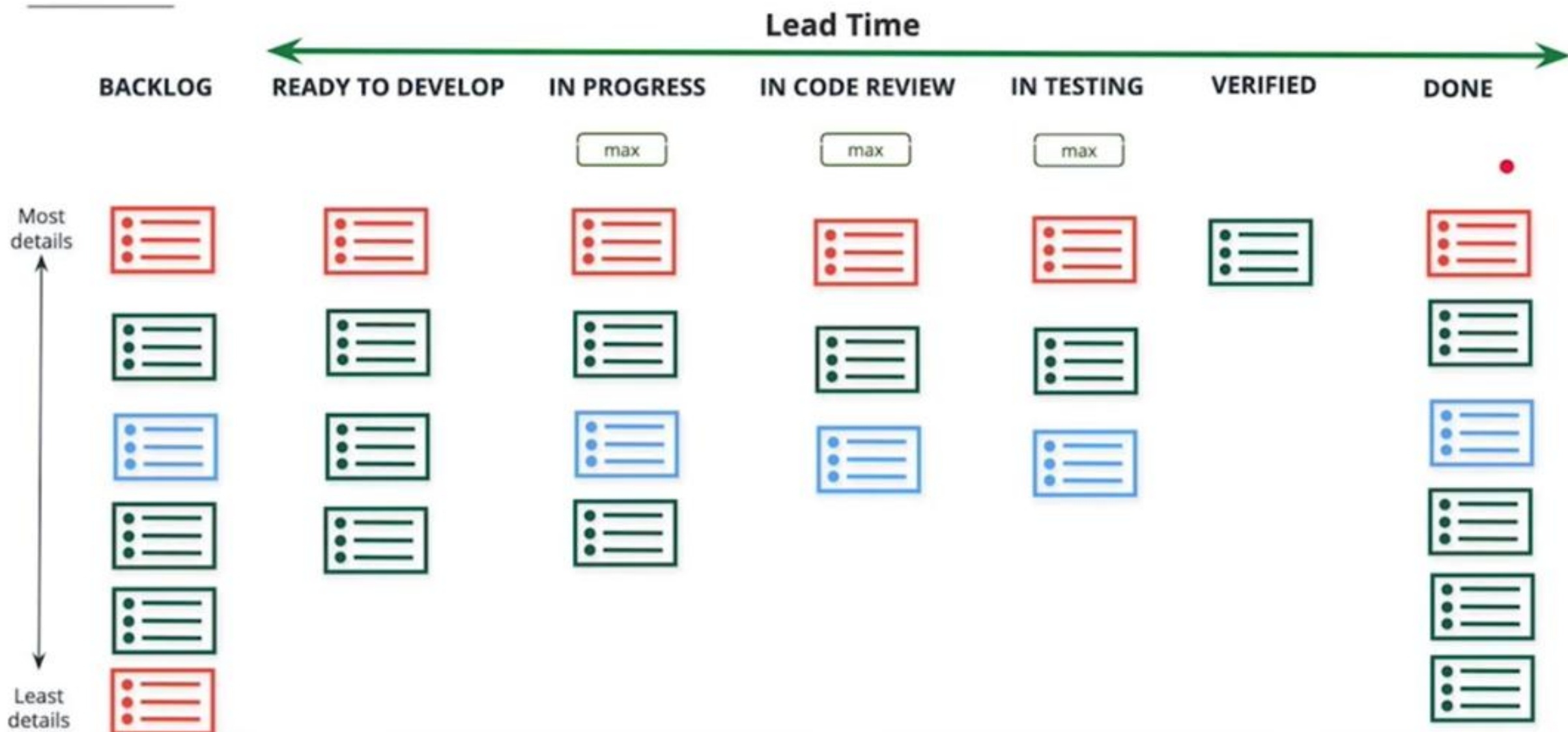




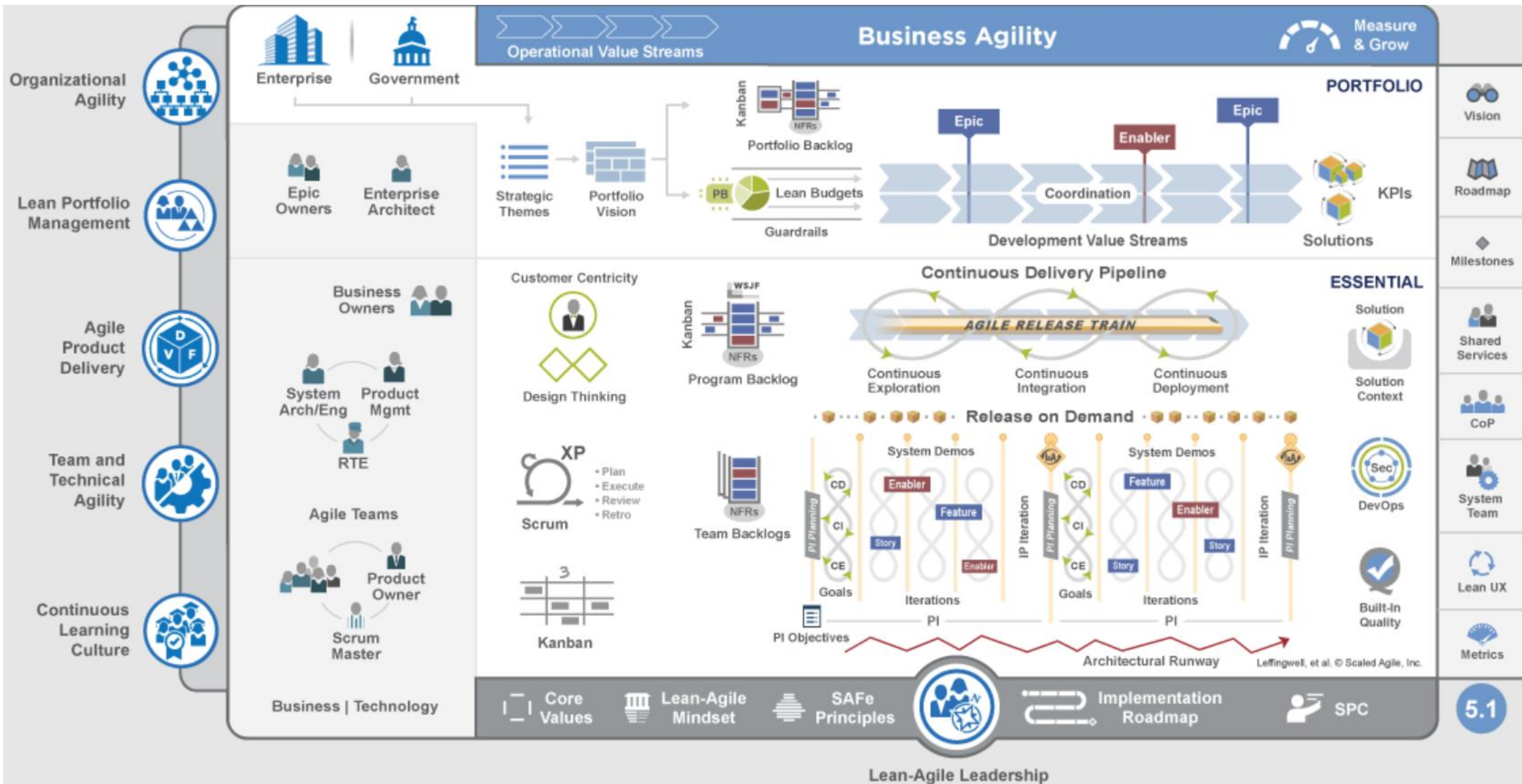
# SCRUM PROCESS

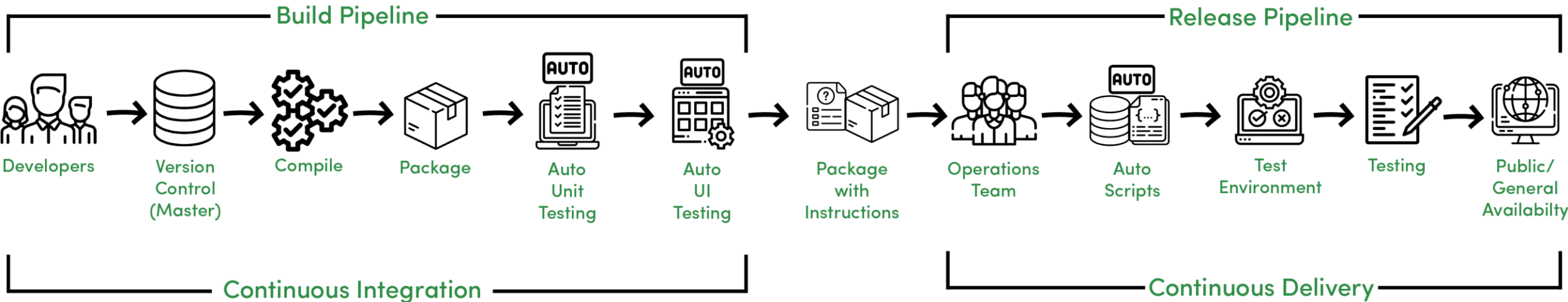


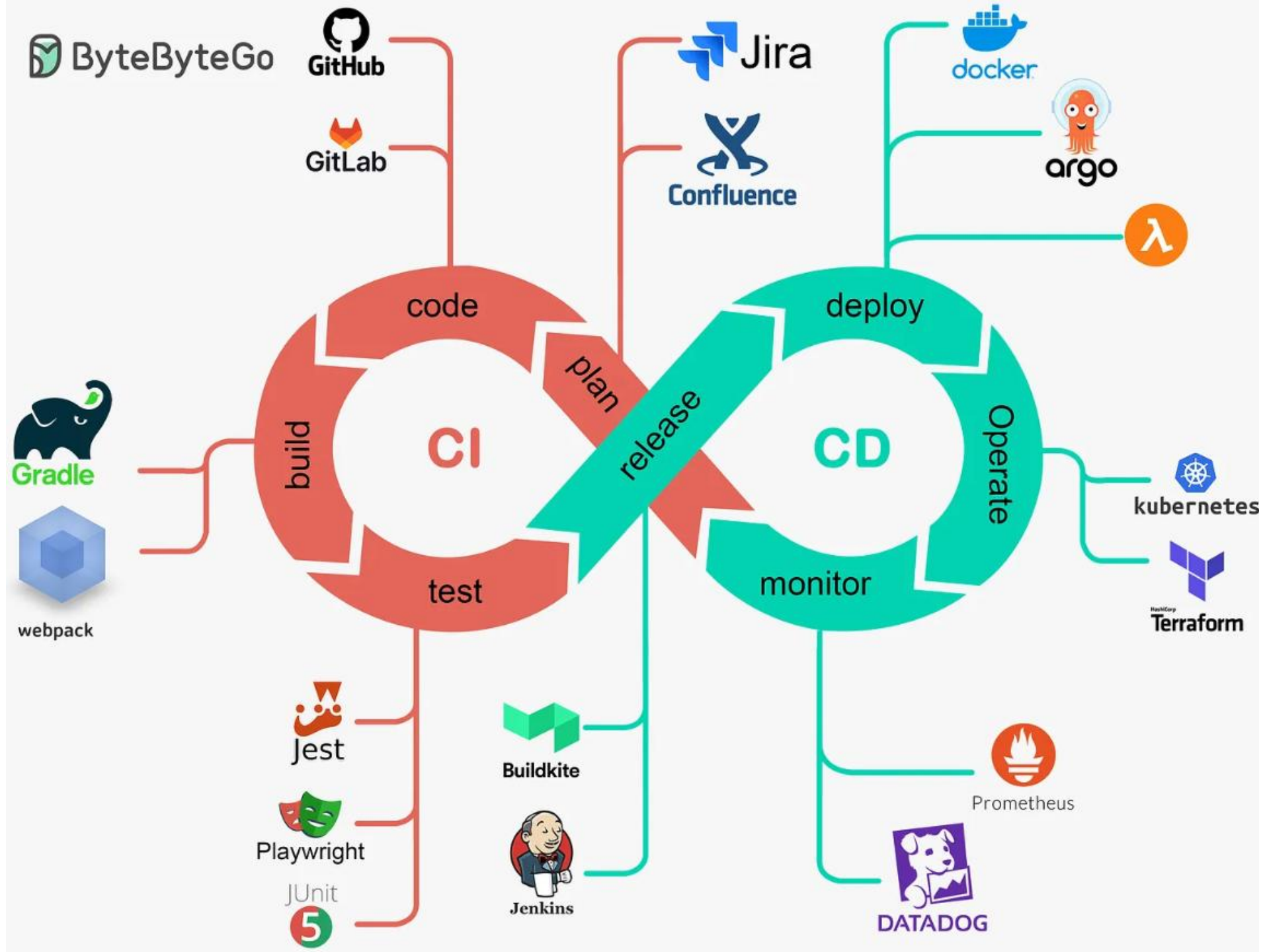




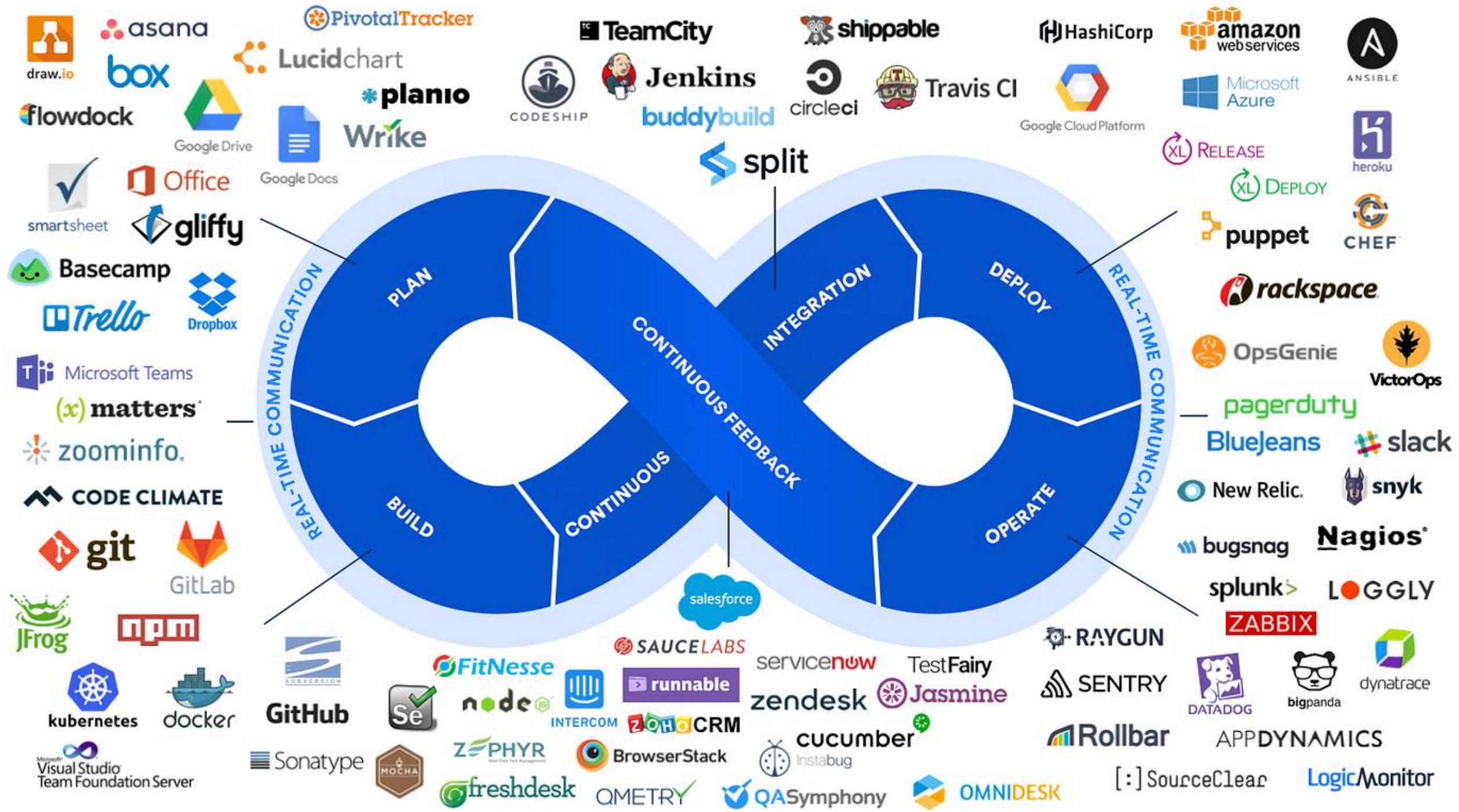












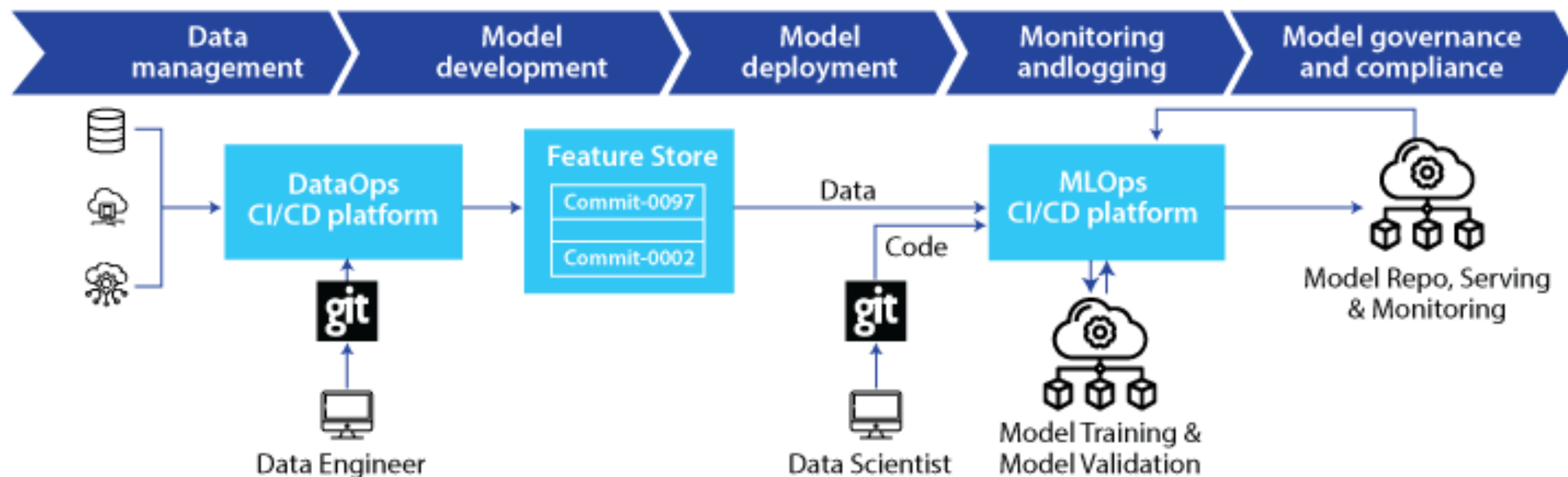
# MLOps= ML + DEV + OPS



Experiment  
Data Acquisition  
Business Understanding  
Initial Modeling

Develop  
Modeling+Testing  
Continuous integration  
Continuous Deployment

Operate  
Continuous Delivery  
Data Feedback Loop  
System + Model Monitoring



## **DORA**

4 key metrics

Published in 2018



Lead Time  
for Changes



Change  
Failure Rate



Deployment  
Frequency



Mean Time  
to Recovery  
(MTTR)

## **SPACE**

5 dimensions

Published in 2021



Satisfaction  
and Well-being



Performance



Activity



Communication  
and  
Collaboration



Efficiency  
and Flow

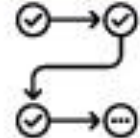
## **FLOW METRICS**

5 key metrics

Published in 2018



Flow  
Velocity



Flow  
Efficiency



Flow  
Time

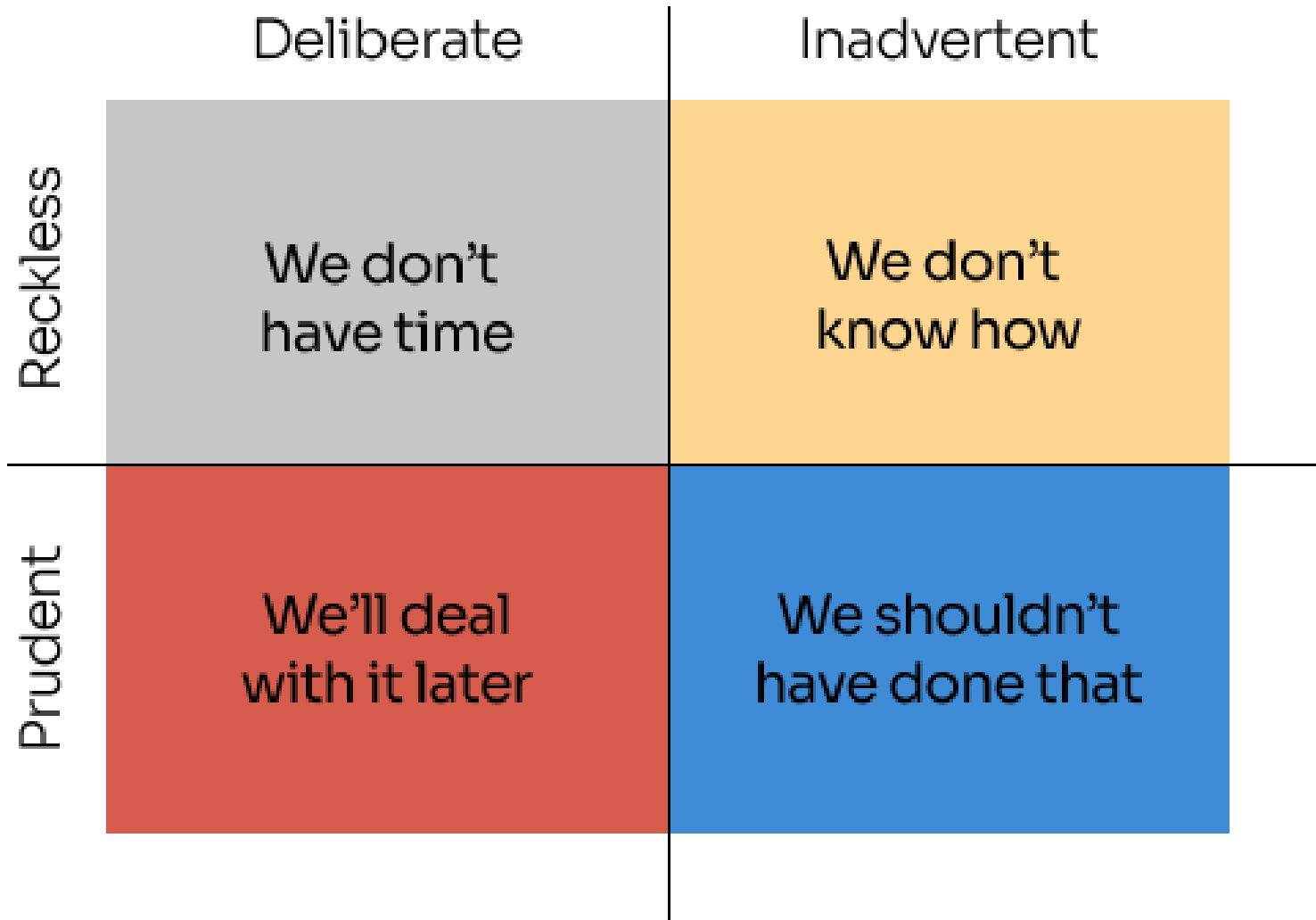


Flow  
Load

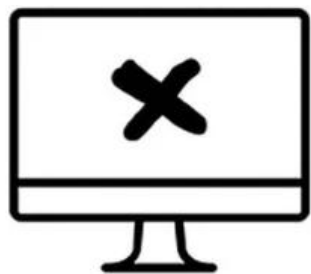


Flow  
Distribution

# Technical debt quadrants







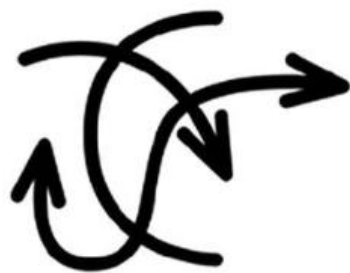
Building the wrong  
feature or product



Mismanaging the  
backlog



Rework



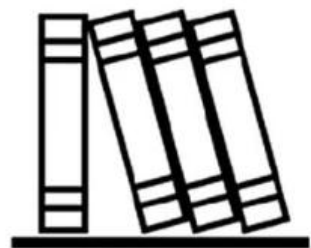
Unnecessarily complex  
solutions



Extraneous cognitive  
load



Psychological distress



Knowledge loss



Waiting/multitasking



Ineffective communication