DevOps Seminar

for the Louisiana State University, Oct 2024

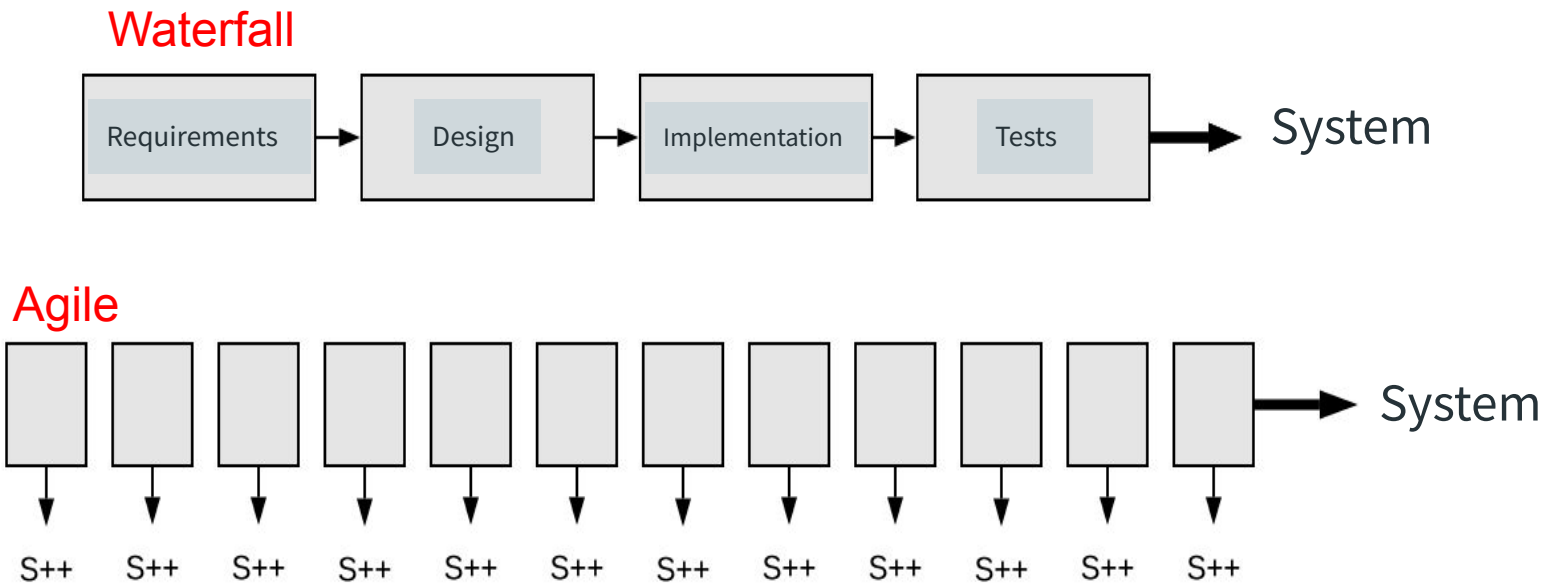
Leonardo Leite

University of São Paulo

Part I -
What is DevOps?

DevOps history:
fulfill the promises of agile

Agile development



DevOps definition

DevOps is a collaborative and multidisciplinary effort within an organization to

automate continuous delivery of new software versions,

while guaranteeing their correctness and reliability.

LEITE, Leonardo; ROCHA, Carla; KON, Fabio; MILOJICIC, Dejan; MEIRELLES, Paulo.
A Survey of DevOps Concepts and Challenges. ACM Computing Surveys, v. 52, n. 6., p. 1-35. 2019.

A Survey of DevOps Concepts and Challenges

Authors: Leonardo Leite, Carla Rocha, Fabio Kon, Dejan Milojicic, Paulo Meirelles Authors Info & Claims

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Information and Software Technology
Volume 139, November 2021, 106672

The organization of software teams in the quest for continuous delivery: A grounded theory approach

Leonardo Leite [a, b], Gustavo Pinto [c], Fabio Kon [a], Paulo Meirelles [d, a]

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A Theory of Organizational Structures for Development and Infrastructure Professionals

Publisher: IEEE Cite This PDF

Leonardo Leite ; Nelson Lago ; Claudia Melo ; Fabio Kon ; Paulo Meirelles All Authors

Abstract:
DevOps and continuous delivery have impacted the organizational structures of development and infrastructure groups in software-producing organizations. Our research aims at revealing the different options adopted by the software industry to organize such groups, understanding why different organizations adopt distinct structures, and discovering how organizations handle the drawbacks of each structure. We interviewed 68 carefully-selected IT professionals, 45 working in Brazil, 10 in the USA, 8 in Europe, 1 in Canada, and 4 in globally distributed teams. By analyzing these conversations through a Grounded Theory process, we identified conditions, causes, reasons to avoid, consequences, and contingencies related to each discovered structure (segregated departments, collaborative departments, API-mediated departments, and single department). In this way, we offer a theory to explain organizational structures for development and infrastructure professionals. This theory can support practitioners and researchers in comprehending and discussing the DevOps phenomenon and its related issues, and also provides valuable input to practitioners' decision-making.

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Page(s): 1 - 30

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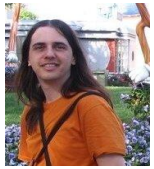
Date of Publication: 22 August 2022

Publisher: IEEE


Thesis award

Book (in Portuguese)

DevOps definition

path

DevOps is a collaborative and multidisciplinary effort within an organization to

goal

automate continuous delivery of new software versions,

while guaranteeing their correctness and reliability.

condition

LEITE, Leonardo; ROCHA, Carla; KON, Fabio; MILOJICIC, Dejan; MEIRELLES, Paulo.
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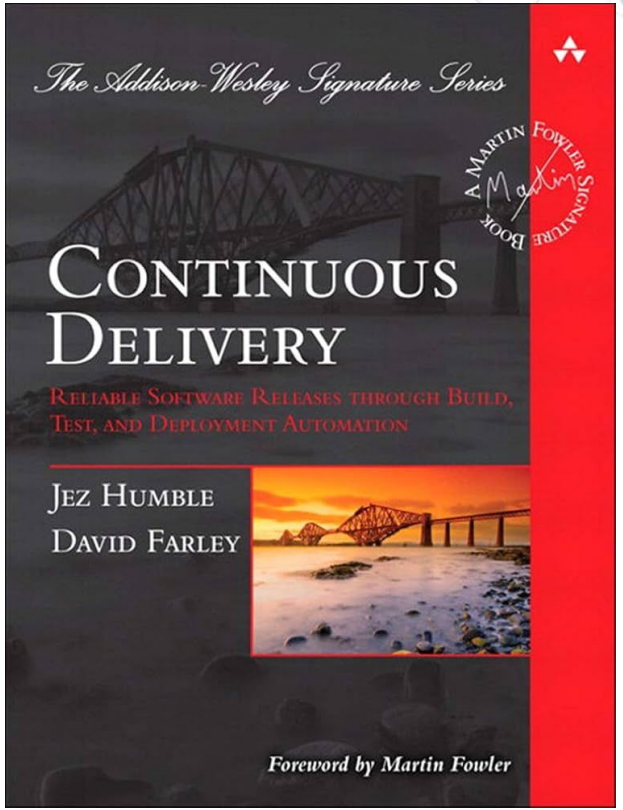
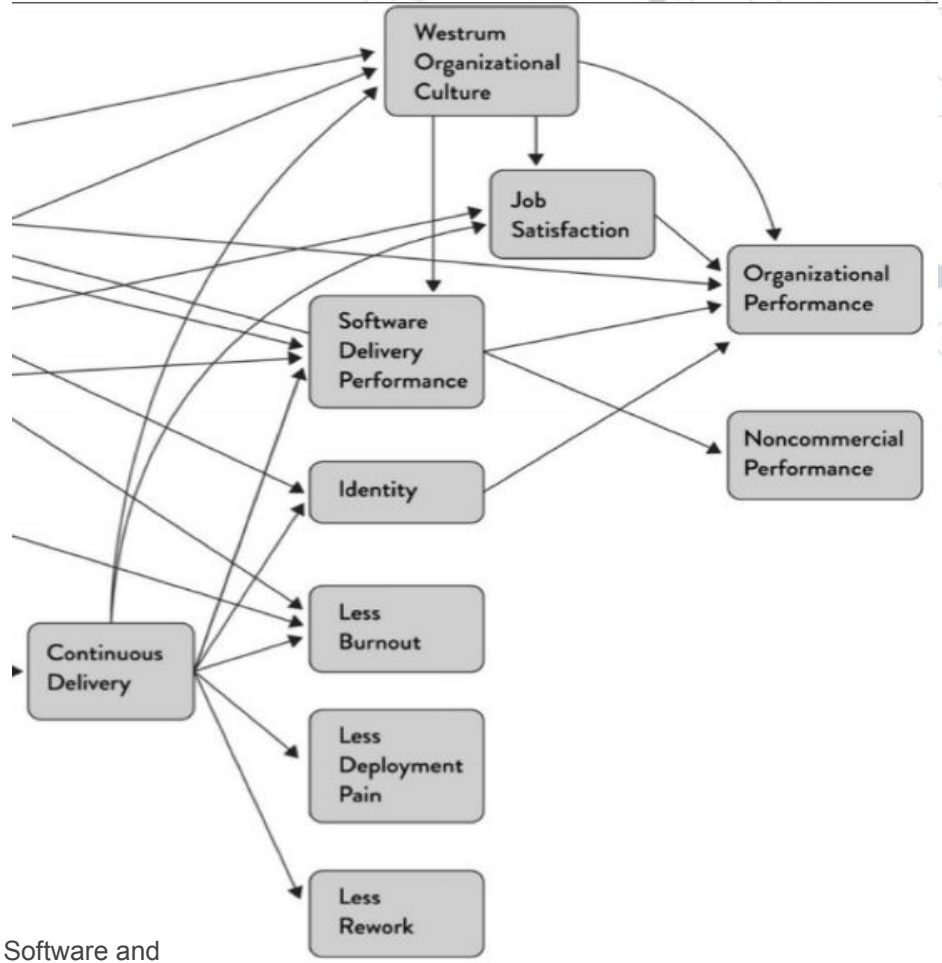
Continuous delivery

- Any software version committed to the repository must be a production-candidate version
- After passing through stages, such as compilation and automated tests, the software is sent to production by the press of a button

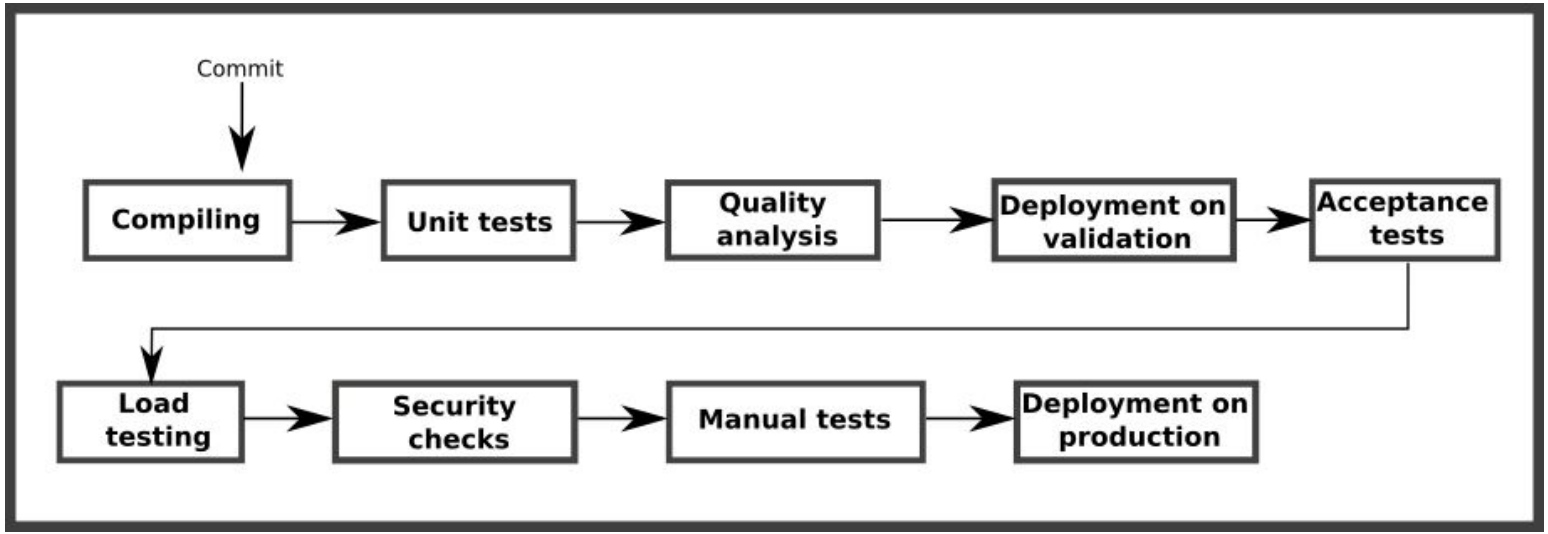


Continuous delivery matters

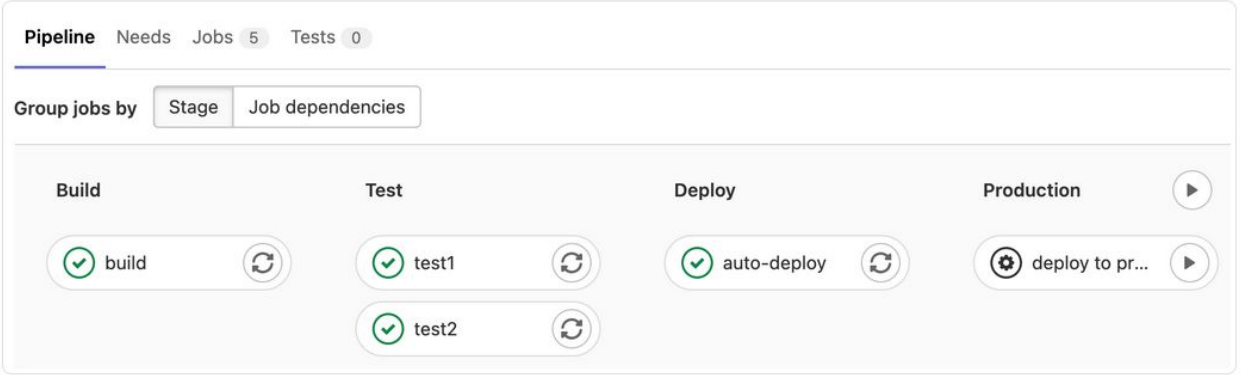


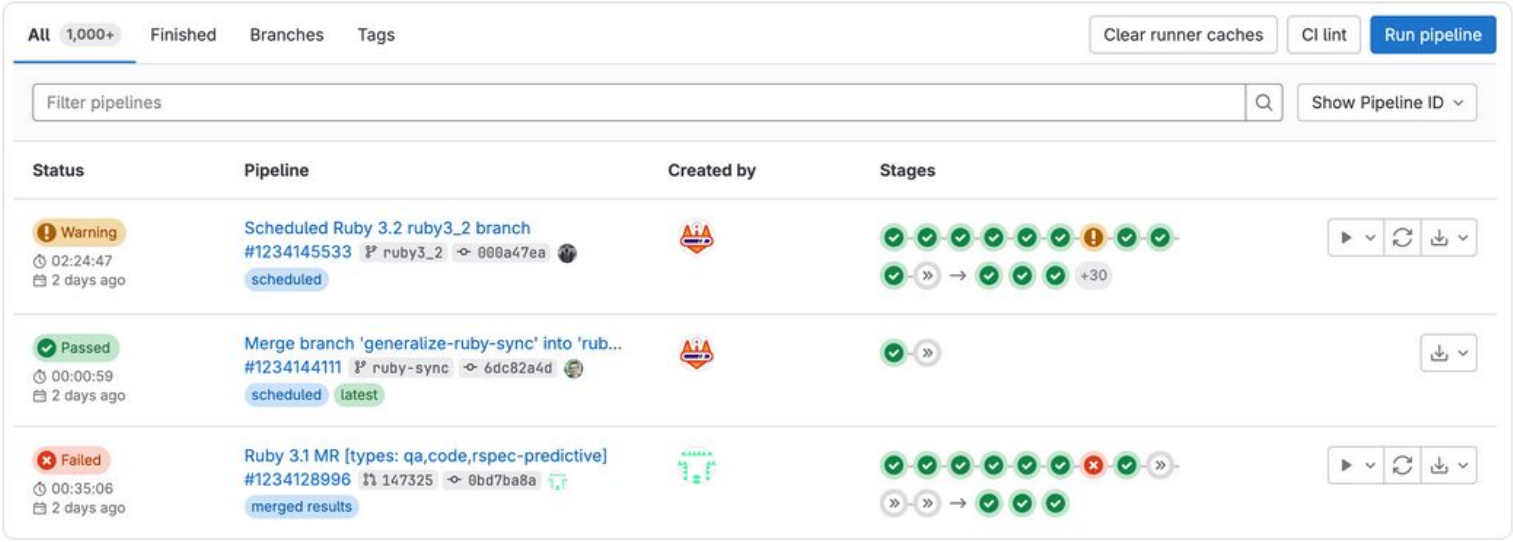
Nicole Forsgren, Jez Humble, Gene Kim. **Accelerate:** The Science of Lean Software and DevOps: Building and Scaling High Performing Technology Organizations. 2018

Continuous delivery - the deployment pipeline



The deployment pipeline on Gitlab

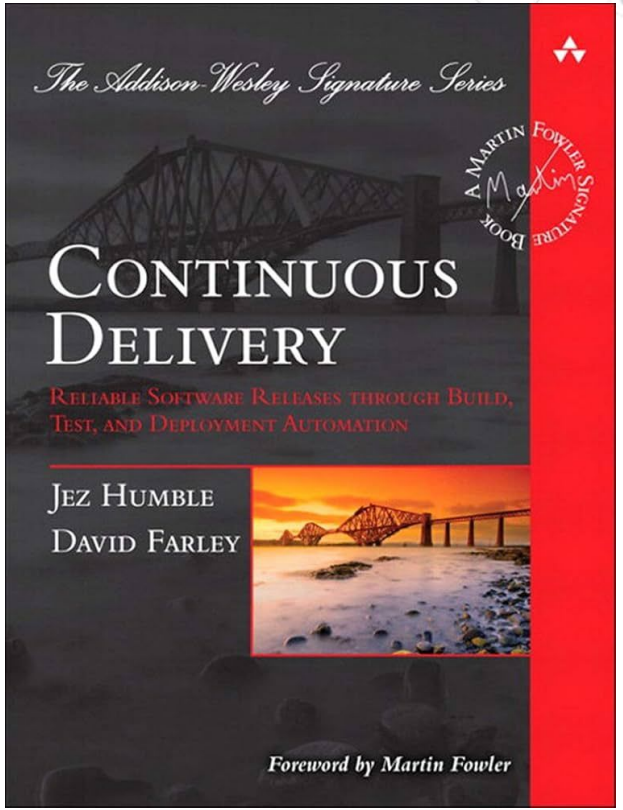




What is not continuous delivery?

Continuous delivery

- Any software version committed to the repository must be a production-candidate version
- After passing through stages, such as compilation and automated tests, the software is sent to production by the press of a button



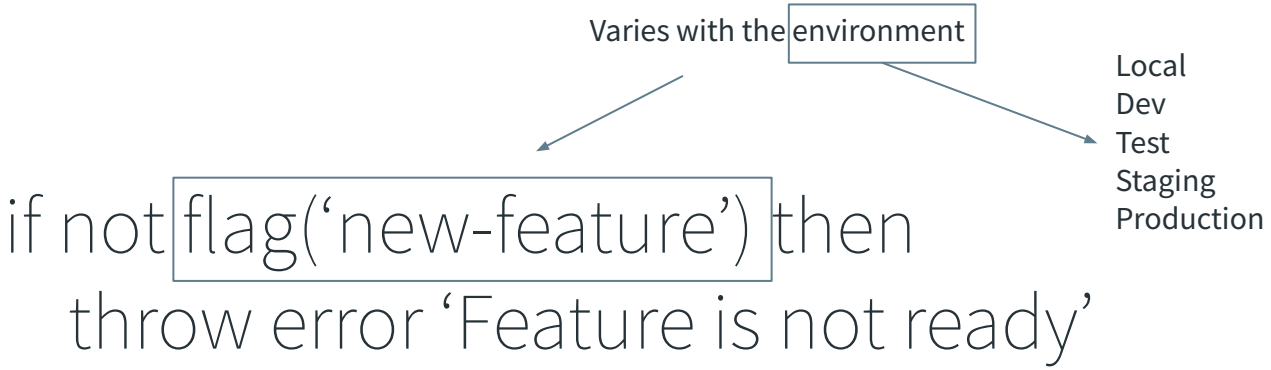
What is not continuous delivery?

Commits that cannot be deployed!

Usually feature under development blocking small fixes.

Continuous delivery - how to?

Feature toggles (flags)!



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tests

```
893  Tests run: 5, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.01 sec
894  Running fatiador.parser.NumericParserTest
895  Tests run: 10, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.017 sec
896  Results :
897  Tests run: 149, Failures: 0, Errors: 0, Skipped: 1
898  [INFO] ------------------------------------------------------------------------
899  [INFO] BUILD SUCCESS
900  [INFO] ------------------------------------------------------------------------
901  [INFO] Total time:  29.554 s
902  [INFO] Finished at: 2023-01-24T18:59:35Z
903  [INFO] ------------------------------------------------------------------------
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DevOps definition

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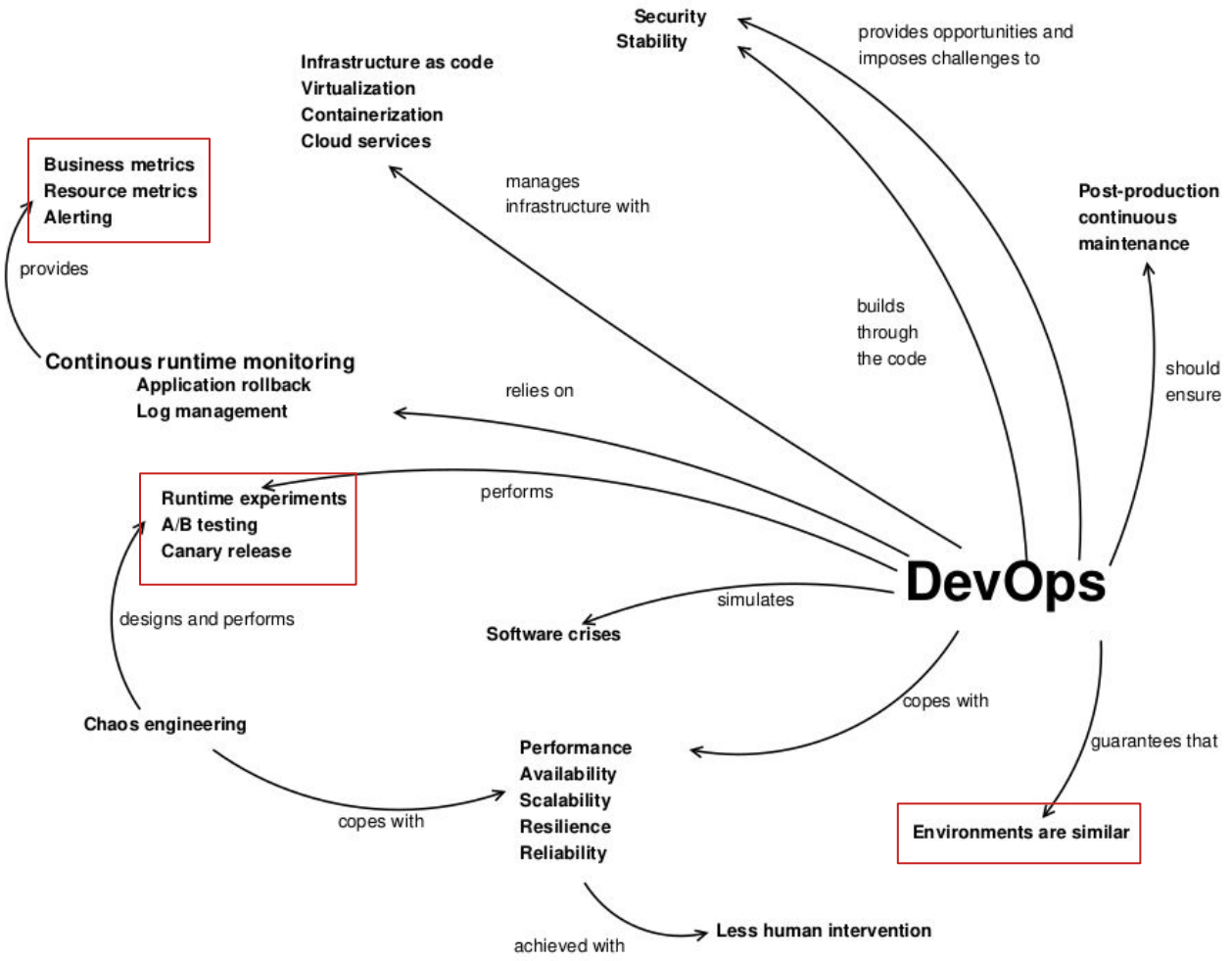
...

Reliability



Part II - Organizing DevOps

What changed with DevOps?

Deployment has changed dramatically:

What happens when that old "manual" process is no longer needed? What happens to the people (in operations/infrastructure) who were involved in that process?

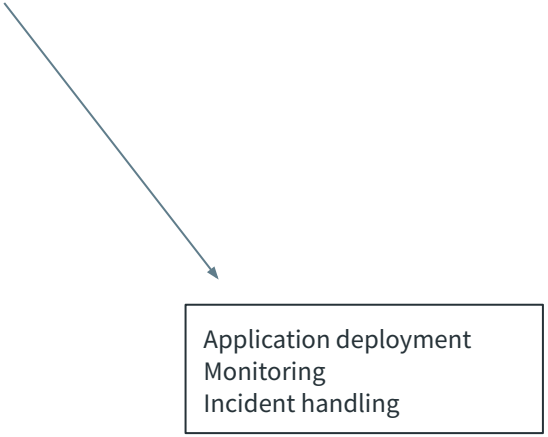
Who is responsible for operations activities now?

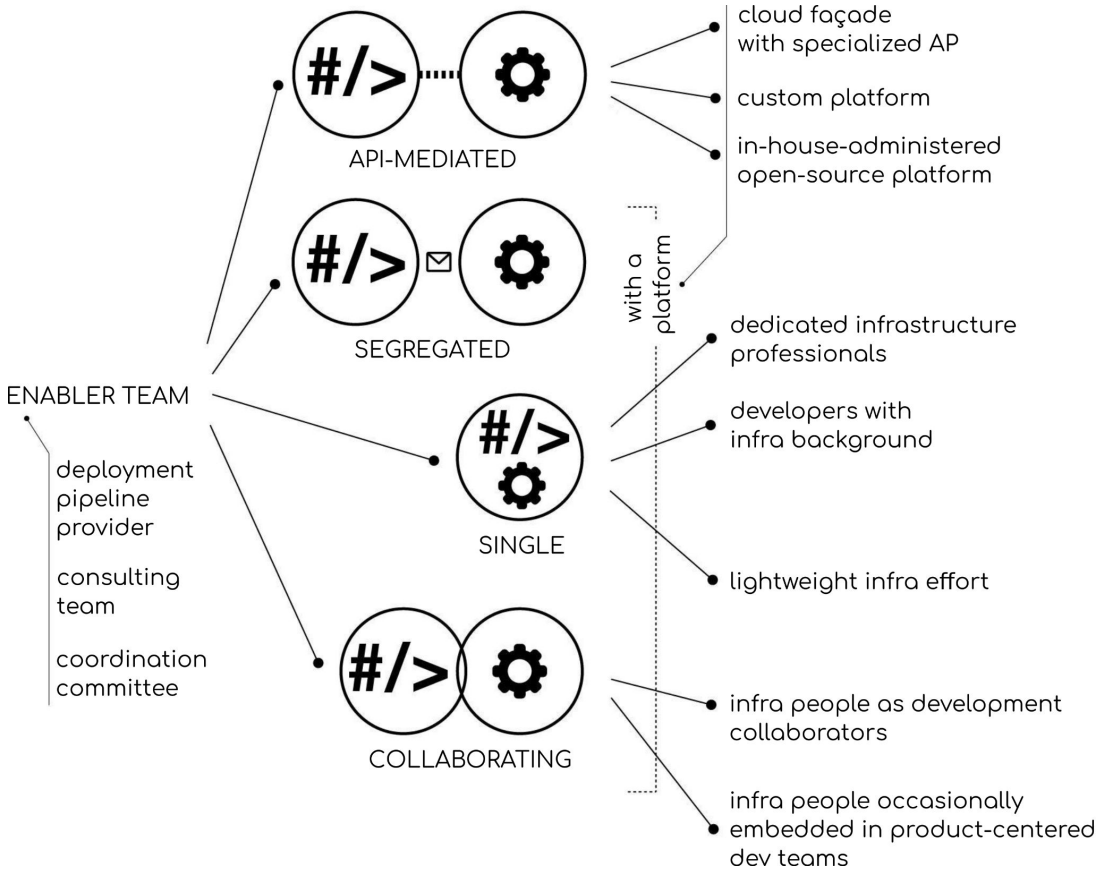
Infrastructure people?

Development people?

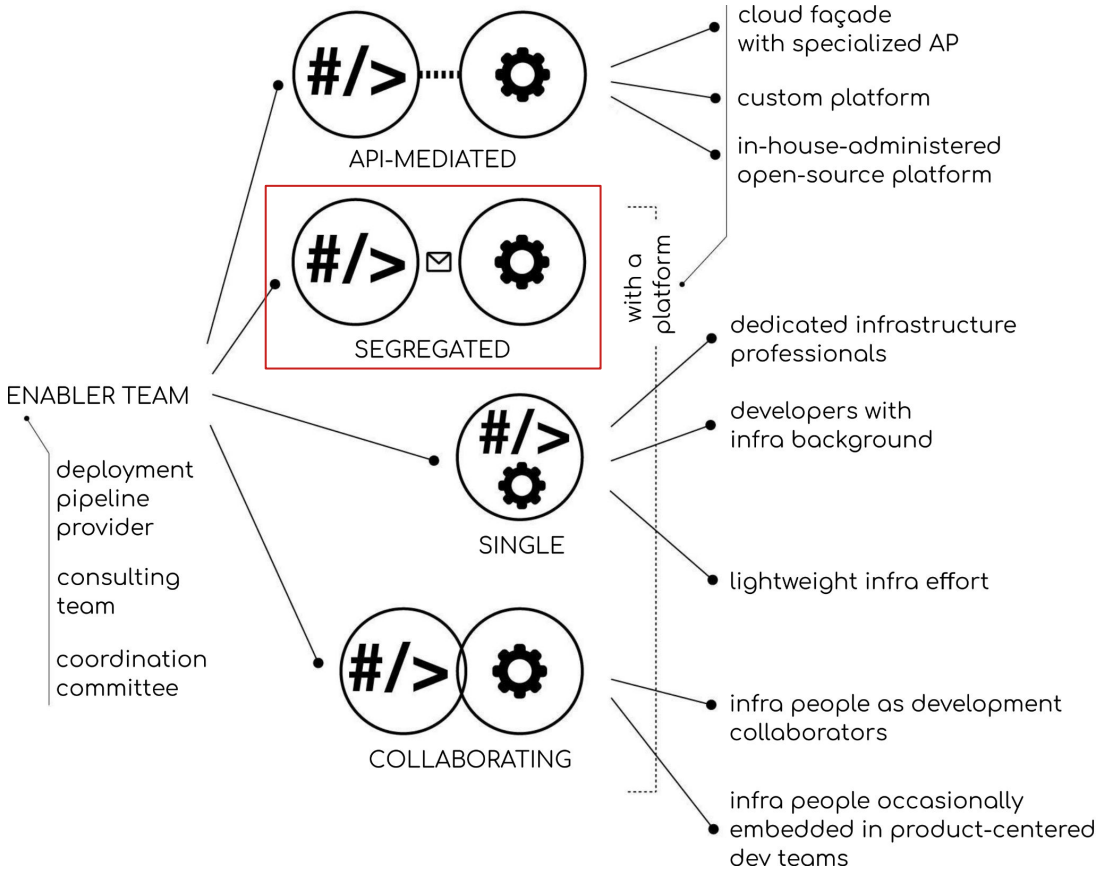
Everyone?

No one?





Our taxonomy of structures for organizing development and infrastructure professionals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API-MEDIATED
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SEGREGATED
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SINGLE
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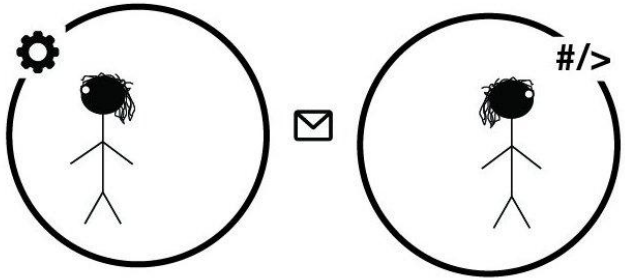
COLLABORATING
ENABLER TEAM
deployment pipeline provider
consulting team
coordination committee
with a platform
cloud façade with specialized AP
custom platform
in-house-administered open-source platform
dedicated infrastructure professionals
developers with infra background
lightweight infra effort
infra people as development collaborators
infra people occasionally embedded in product-centered dev teams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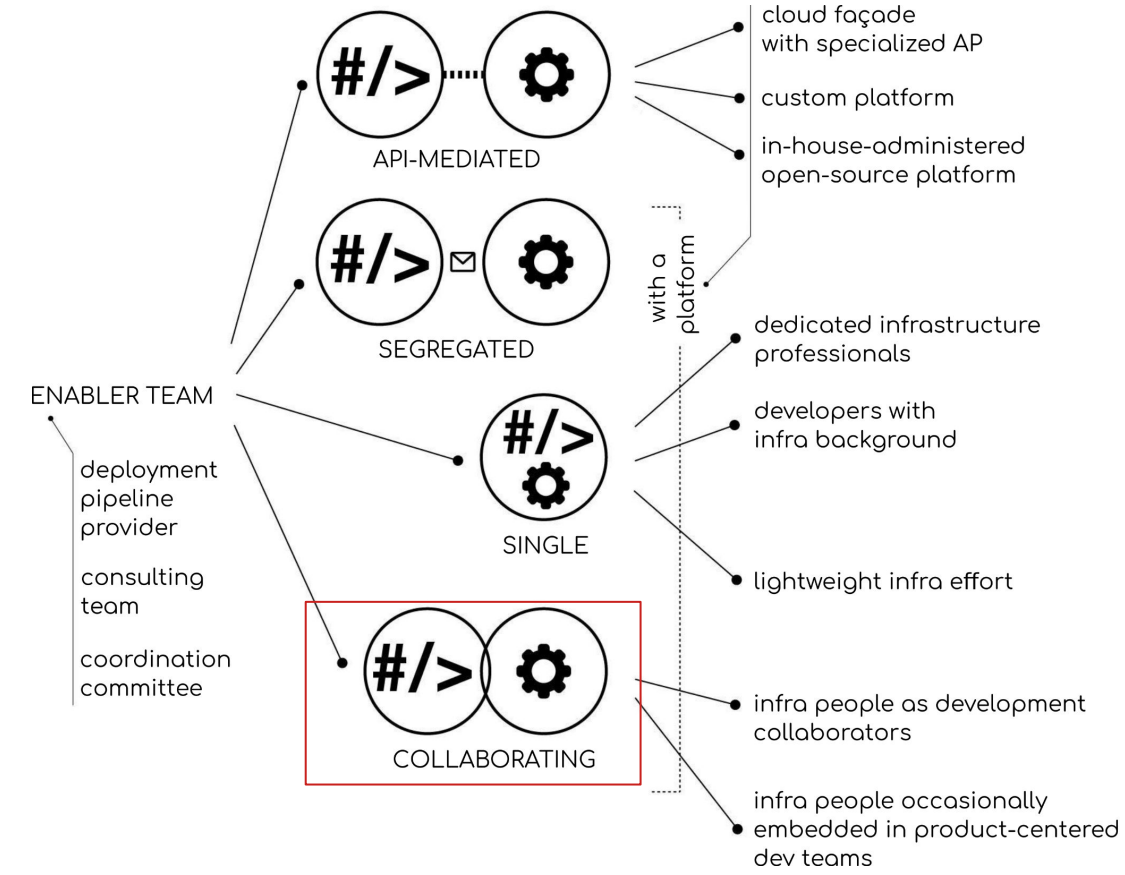
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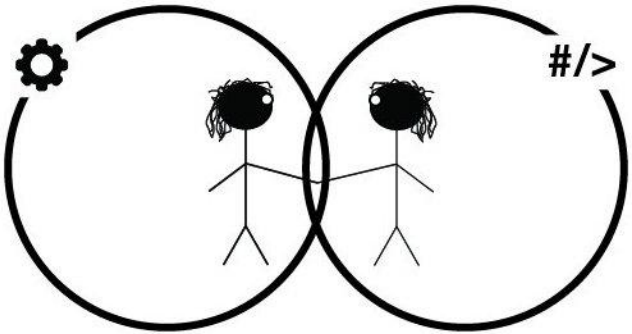
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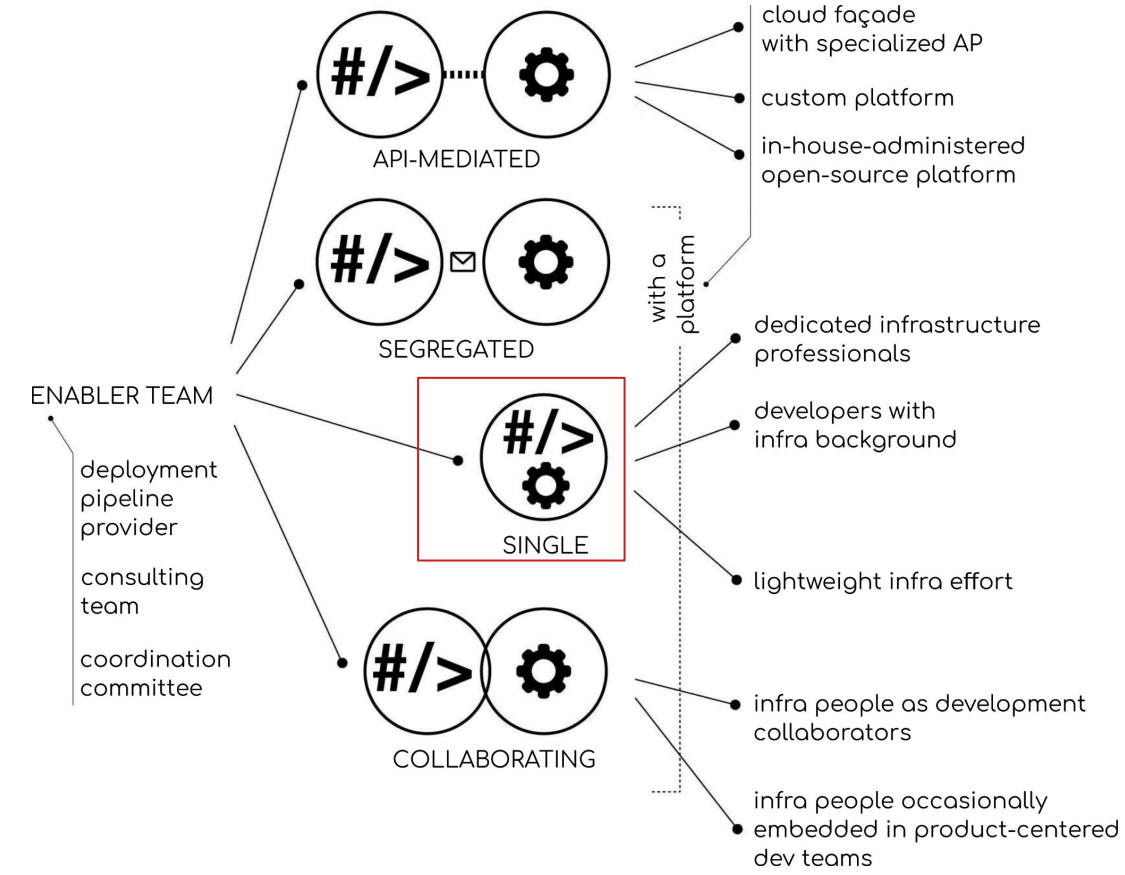
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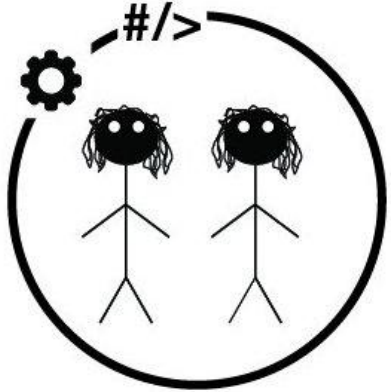
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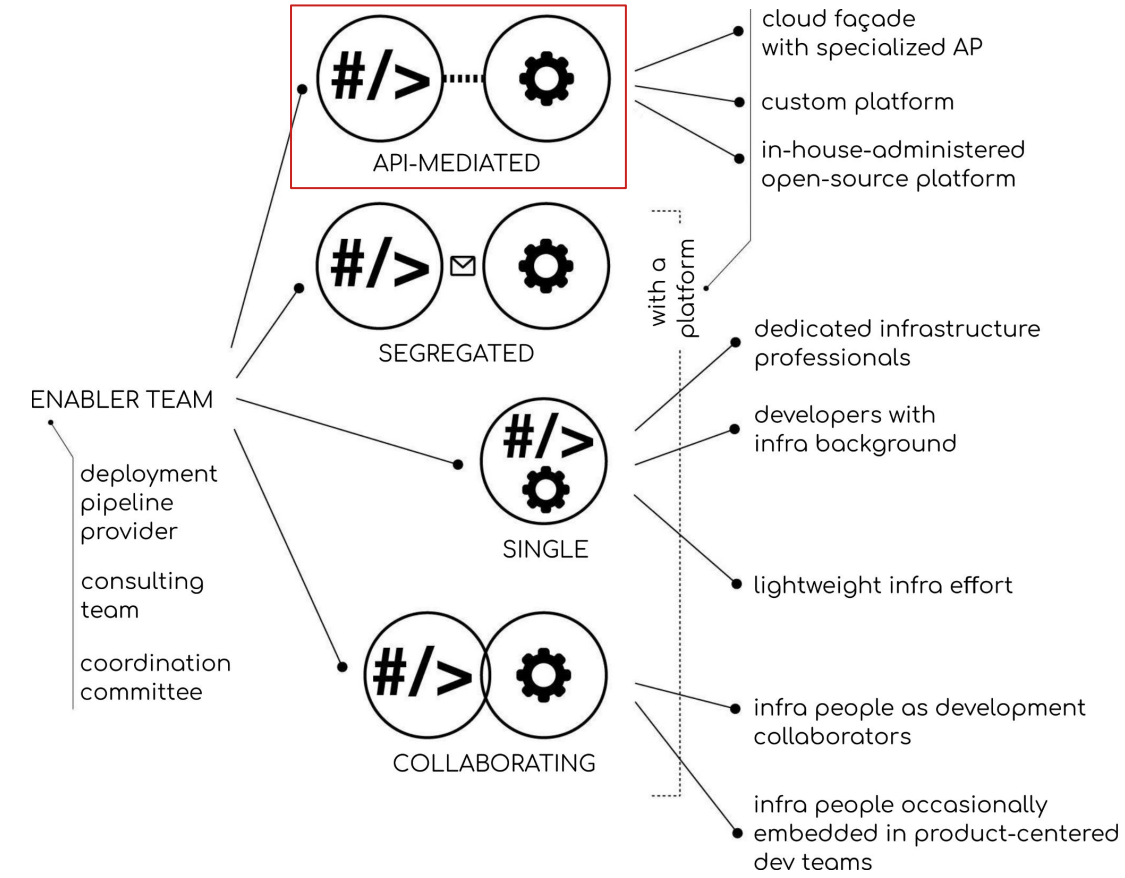
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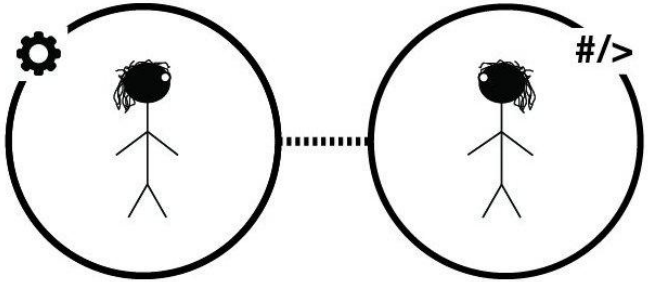
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Our taxonomy of structures for organizing development and infrastructure professionals

Organizational structure	*Development differentiation*	*Infrastructure differentiation*	*Integration*
Siloed departments	Just builds the application package	Responsible for all operations activities	Limited collaboration among the groups
Classical DevOps	Participates/collaborates in some operations activities	Responsible for all operations activities	Intense collaboration among the groups
Cross-functional teams	Responsible for all operations activities	Does not exist	—
Platform teams	Responsible for all operations activities with the platform support	Provides the platform, automating much of the operations activities	Interaction happens in specific situations, not on a daily basis

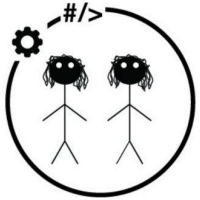
Delivery performance

- Deployment frequency
- Time from commit to production
- Recovery time

Nicole Forsgren et al., **A taxonomy of software delivery performance profiles: investigating the effects of DevOps practices**. AMCIS 2020.

Evidence that API-mediated departments leverage delivery performance

DEV #/>
INFRA ⚙
DEPARTAMENTS



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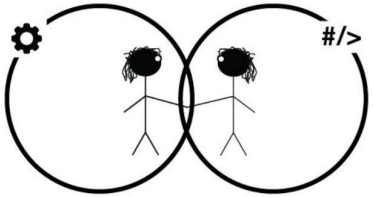
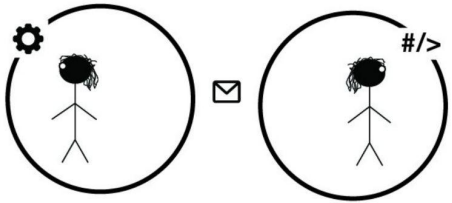


COLLABORATING



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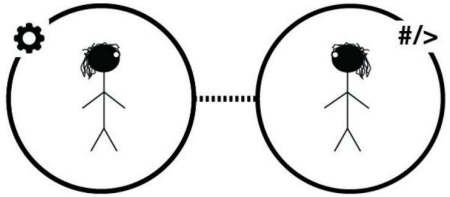

API-MEDIATED

https://ccsl.ime.usp.br/devops/