DevOps as culture: what the history of DevOps can teach us about its implementation

Jacob Archambault

Derby DevOps

September 11, 2024

Challenges for DevOps today
A short history of DevOps
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1. Challenges for DevOps today
   - For developers and enquirers
   - For business
   - Common challenges

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DevOps challenges: developers and inquirers

- Overwhelming amount of toolchain growth

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DevOps challenges: developers and inquirers

- Overwhelming amount of toolchain growth
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DevOps challenges: developers and inquirers

- Overwhelming amount of toolchain growth
- added complexity
- doesn't feel like I'm going faster or solving problems.

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DevOps challenges: developers and inquirers

- Overwhelming amount of toolchain growth
- added complexity
- doesn't feel like I'm going faster or solving problems.
- Meaning of DevOps is opaque

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DevOps challenges: developers and inquirers

- Overwhelming amount of toolchain growth
- added complexity
- doesn't feel like I'm going faster or solving problems.
- Meaning of DevOps is opaque
    - CI/CD pipeline management

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  - CI/CD pipeline management
  - Docker, Kubernetes, Terraform

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    - CI/CD pipeline management
    - Docker, Kubernetes, Terraform
    - Identity and access permissions
    - AWS, Azure, Google Cloud

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DevOps challenges: business

- DevOps engineers are among the highest paid positions outside of management

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DevOps challenges: business

- DevOps engineers are among the highest paid positions outside of management
- Not using DevOps technologies poses a flight risk

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DevOps challenges: avoiding a worst-of-all-worlds scenario

- increased operating costs from hiring more experienced developers

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DevOps challenges: avoiding a worst-of-all-worlds scenario

- increased operating costs from hiring more experienced developers
- added unnecessary complexity in our dev stack

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DevOps challenges: avoiding a worst-of-all-worlds scenario

- increased operating costs from hiring more experienced developers
- added unnecessary complexity in our dev stack
- restricted the freedom of developers to get work done

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DevOps challenges: avoiding a worst-of-all-worlds scenario

- increased operating costs from hiring more experienced developers
- added unnecessary complexity in our dev stack
- restricted the freedom of developers to get work done
- forfeited ownership of our infrastructure

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DevOps challenges: avoiding a worst-of-all-worlds scenario

- increased operating costs from hiring more experienced developers
- added unnecessary complexity in our dev stack
- restricted the freedom of developers to get work done
- forfeited ownership of our infrastructure
- rebranded our operations team

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Just-in-time manufacturing and Goldratt's theory of constraints

- Increase: throughput

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Just-in-time manufacturing and Goldratt's theory of constraints

- Increase: throughput
- Decrease:

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Just-in-time manufacturing and Goldratt's theory of constraints

- Increase: throughput
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Just-in-time manufacturing and Goldratt's theory of constraints

- Increase: throughput
- Decrease:
  - operating costs
  - inventory

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Just-in-time manufacturing and Goldratt's theory of constraints

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  - operating costs
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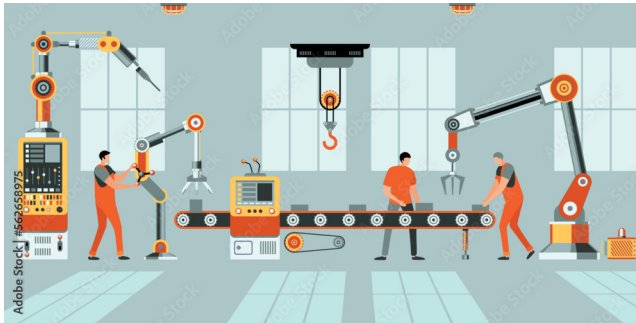
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Just-in-time manufacturing and Goldratt's theory of constraints

- Increase: throughput
- Decrease:
    - operating costs
    - inventory
    - scrap
- Remove bottlenecks

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Goldratt's theory of constraints (cont.)

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1967: Conway's law

'Organizations which design systems [...] are constrained
to produce designs which are copies of the communication
structures of these organizations.' - Melvin Conway, 'How
do Committees Invent?' Datamation, 1967

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Conway's law: examples

- 'If you have four groups working on a compiler, you'll get a 4-pass compiler' - The New Hacker's Dictionary, 1996

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Conway's law: examples

- 'If you have four groups working on a compiler, you'll get a 4-pass compiler' - The New Hacker's Dictionary, 1996
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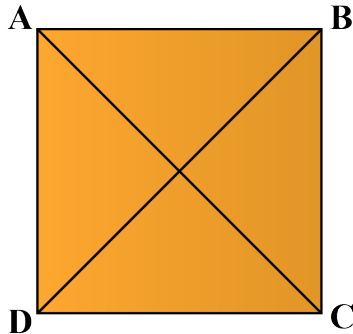Its emergence
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Conway's law: examples

- 'If you have four groups working on a compiler, you'll get a 4-pass compiler' - The New Hacker's Dictionary, 1996
- front-end [devs] business layer [backend devs] monolithic database [DBA team]
- a web api controller [manager] delegates most business logic to business classes [developers] which are part of the same in-memory process [team], while serving as a single entry-point for wider cross-network [cross-team] communication.

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1975: The Mythical Man Month, Fred Brooks

- number of direct communication paths for n individuals= $n(n-1)/2$

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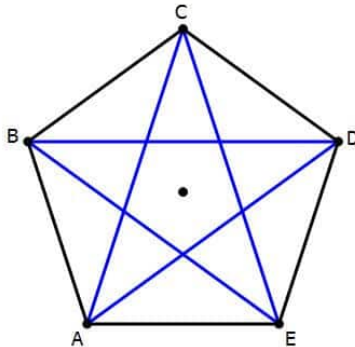DevOps anti-patterns and applications
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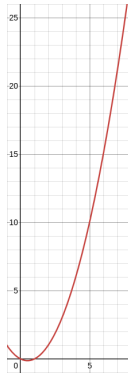
The Mythical Man Month, Fred Brooks (cont.)

- corollary: adding more people to a project can lead not only to diminishing returns on delivery speed, but to objectively less work being completed

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DevOps: its beginning

- Velocity Conference 2009: John Allspaw and Paul Hammond, "10+ Deploys Per Day: Dev and Ops Cooperation at Flickr"

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- Patrick Debois DevOps Days 2009, Ghent, Belgium

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2013: The State of DevOps Report

1. a series of surveys of over 36,000 professionals

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2013: The State of DevOps Report

1. a series of surveys of over 36,000 professionals
2. Led by a PhD statistician, Nicole Forsgren, from 2013-2019

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2013: The State of DevOps Report

1. a series of surveys of over 36,000 professionals
2. Led by a PhD statistician, Nicole Forsgren, from 2013-2019
3. Uses *cluster analysis* to discover groupings - has no prior understanding of what counts as good or bad.

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The State of DevOps Report: throughput metrics

1. lead time for changes

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The State of DevOps Report: throughput metrics

1. lead time for changes
2. deployment frequency

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The State of DevOps Report: stability metrics

1. change failure rate

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The State of DevOps Report: stability metrics

1. change failure rate
2. mean time to restore

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The State of DevOps Report: results

'Astonishingly, these results demonstrate that there is no trade-off between improving performance and achieving higher levels of stability and quality. Rather, high performers do better at all of these measures. This is precisely what the Agile and Lean movements predict, but much dogma in our industry still rests on the false assumption that moving faster means trading off against other performance goals, rather than enabling and reinforcing them.'
- Nicole Forsgren, Jez Humble, and Gene Kim, Accelerate (2017), p. 14

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Anti-pattern 1: local optimization
Anti-pattern 2: Gandalf vs. the Balrog

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Anti-pattern 1: local optimization
Anti-pattern 2: Gandalf vs. the Balrog

Anti-pattern 1: local optimization

- example 1: separate (DevOps, QA, operations, support) team

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Anti-pattern 1: local optimization
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Anti-pattern 1: local optimization

- example 1: separate (DevOps, QA, operations, support) team
- leads to bottlenecks

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Anti-pattern 1: local optimization

- example 1: separate (DevOps, QA, operations, support) team
- leads to bottlenecks
- delays communication

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Anti-pattern 1: local optimization
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Anti-pattern 1: local optimization

- example 1: separate (DevOps, QA, operations, support) team
- leads to bottlenecks
- delays communication
- punishes untracked work (e.g. thorough code reviews/dev testing, helping blocked colleagues)

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Anti-pattern 1: local optimization
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Anti-pattern 1 solution

- cross-functional teams with 't-shaped' employees

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Anti-pattern 1: local optimization
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Anti-pattern 1 solution

- cross-functional teams with 't-shaped' employees
- guild system

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- change approval boards

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- change approval boards
- pre-merge code reviews

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- change approval boards
- pre-merge code reviews
- 'bridge-to-nowhere' pipelines

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Anti-pattern 1: local optimization
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- change approval boards
- pre-merge code reviews
- 'bridge-to-nowhere' pipelines
- these all increase lead time

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Anti-pattern 1: local optimization
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Anti-pattern 2 solutions: aggressively parallelize work

- pair programming

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Anti-pattern 2 solutions: aggressively parallelize work

- pair programming
- parallelized pipeline builds for 'wide' pipelines

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- pair programming
- parallelized pipeline builds for 'wide' pipelines
- one build artifact for all pipeline stages

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Anti-pattern 2 solutions: aggressively parallelize work

- pair programming
- parallelized pipeline builds for 'wide' pipelines
- one build artifact for all pipeline stages
- share responsibility

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1. Reduce goal misalignment

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1. Reduce goal misalignment
2. stop people from waiting on each other

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1. Reduce goal misalignment
2. stop people from waiting on each other
3. work in small batches

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Conclusion

1. Reduce goal misalignment
2. stop people from waiting on each other
3. work in small batches
4. That's mostly it

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'DevOps is whatever you do to bridge friction created by silos, and all the rest is engineering' - Patrick Debois, Puppet State of DevOps report 2021

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