How to Improve Developer Productivity

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YOW!

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DORA
DEVOPS RESEARCH & ASSESSMENT

TLDR

- Software has lots of bad productivity measures
- There is a valid and reliable measure of software delivery performance
- A combination of technical, process, management, and product development capabilities drive culture and performance
- Culture can be measured and changed
- Individual productivity can be measured and improved

Bad ways to measure productivity

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Bad ways to measure productivity

01

Lines of code

Bad ways to measure productivity

01

Lines of code

02

Velocity

Bad ways to measure productivity

01

Lines of code

02

Velocity

03

Utilization

Measuring productivity: considerations

01

Team metric

People don’t create outcomes, teams do

02

System-level outcome

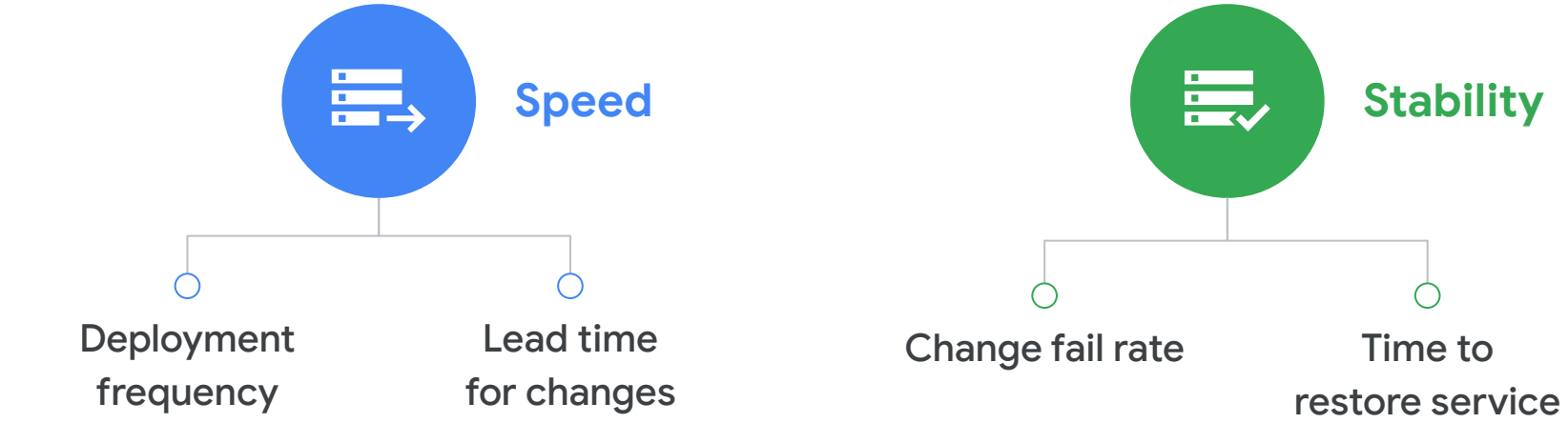
Don’t create trade-offs

03

Outcomes, not outputs

Minimize output, maximize outcomes

Software Delivery & Operations Performance



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Software delivery as a competitive advantage

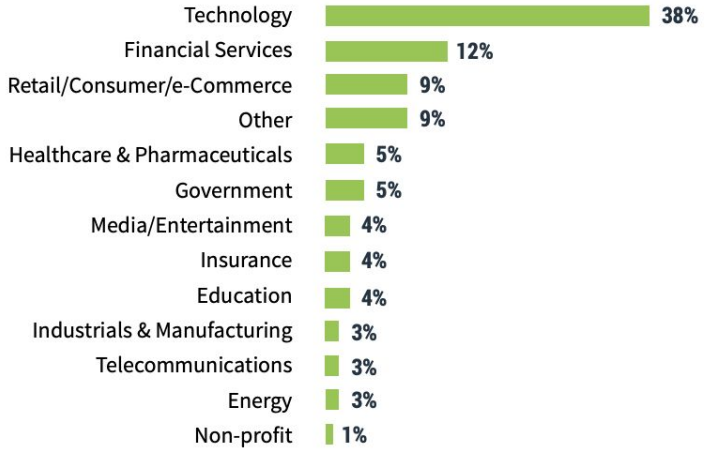
Elite performers are *twice as likely* to meet or exceed their organizational performance goals:

- Profitability
- Productivity
- Market share
- Number of customers
- Quality of products or services
- Operating efficiency
- Customer satisfaction
- Quantity of products or services provided
- Achieving organizational and mission goals

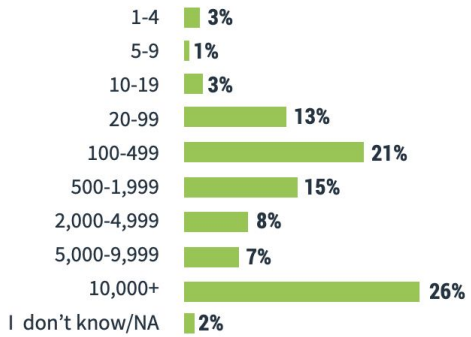
Aspect of Software Delivery Performance	Elite	High	Medium	Low
Deployment frequency For the primary application or service you work on, how often does your organization deploy code to production or release it to end users?	On-demand (multiple deploys per day)	Between once per day and once per week	Between once per week and once per month	Between once per month and once every six months
Lead time for changes For the primary application or service you work on, what is your lead time for changes (i.e., how long does it take to go from code committed to code successfully running in production)?	Less than one day	Between one day and one week	Between one week and one month	Between one month and six months
Time to restore service For the primary application or service you work on, how long does it generally take to restore service when a service incident or a defect that impacts users occurs (e.g., unplanned outage or service impairment)?	Less than one hour	Less than one day	Less than one day	Between one week and one month
Change failure rate For the primary application or service you work on, what percentage of changes to production or released to users result in degraded service (e.g., lead to service impairment or service outage) and subsequently require remediation (e.g., require a hotfix, rollback, fix forward, patch)?	0-15%	0-15%	0-15%	46-60%

Firmographics

Industry



Number of employees



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High performing teams

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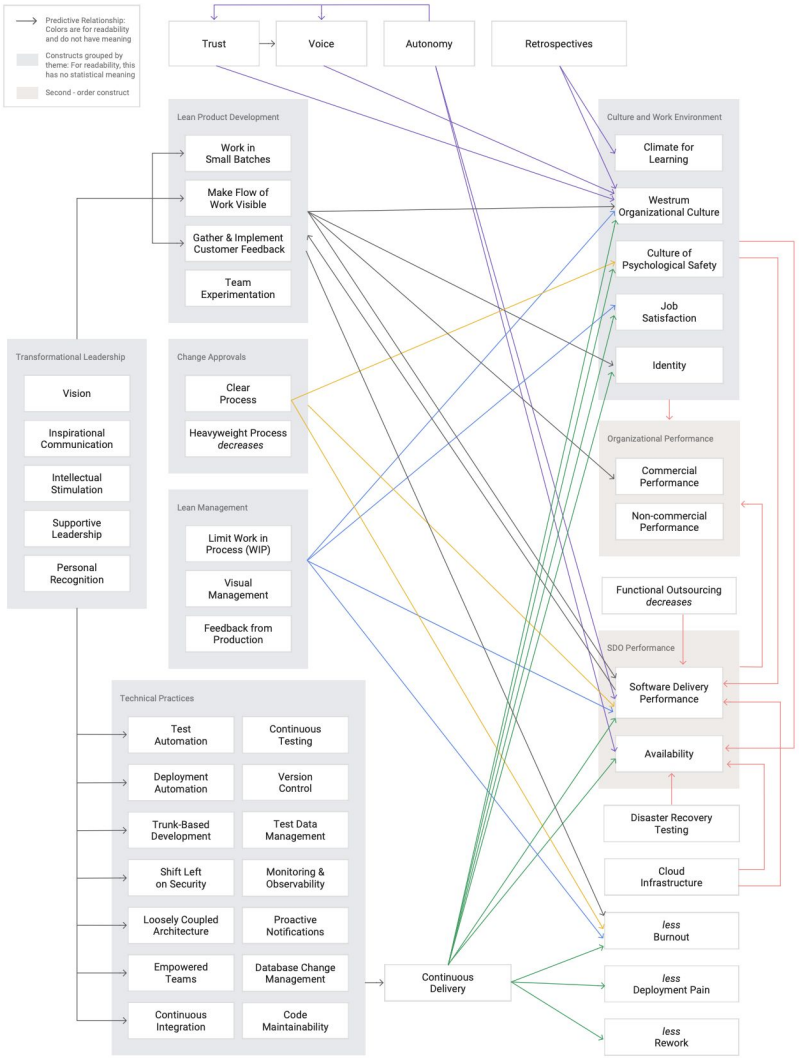

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bit.ly/dora-bfd

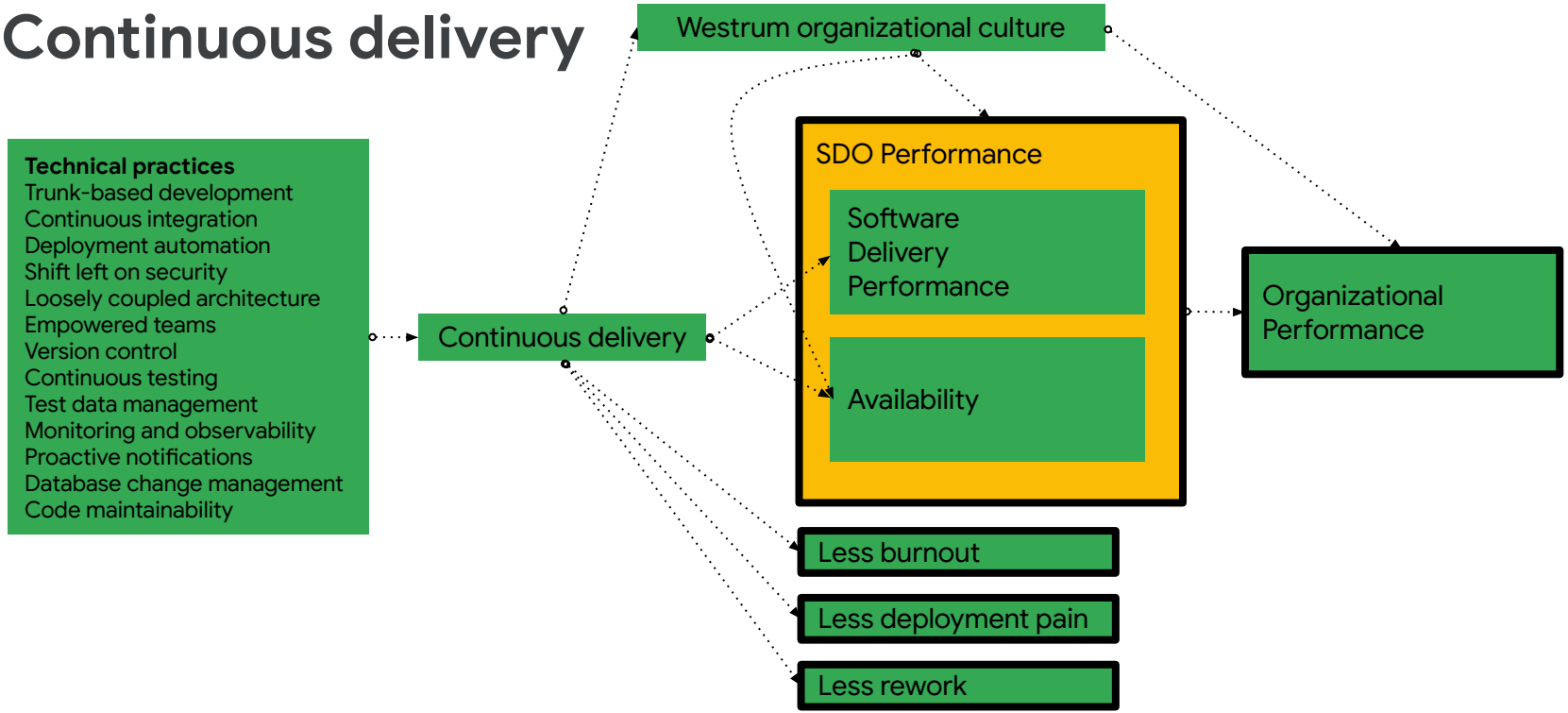
Org structure and culture

Teams deliver results, not individuals. How do we build high performing teams and enable them to deliver with speed and stability?

What is continuous delivery?

“The ability to get changes—features, configuration changes, bug fixes, experiments—into production or into the hands of users *safely* and *quickly* in a *sustainable* way.”

Continuous delivery



Build quality in

“Cease dependence on mass inspection to achieve quality. Improve the process and *build quality into the product* in the first place”

— W. Edwards Deming

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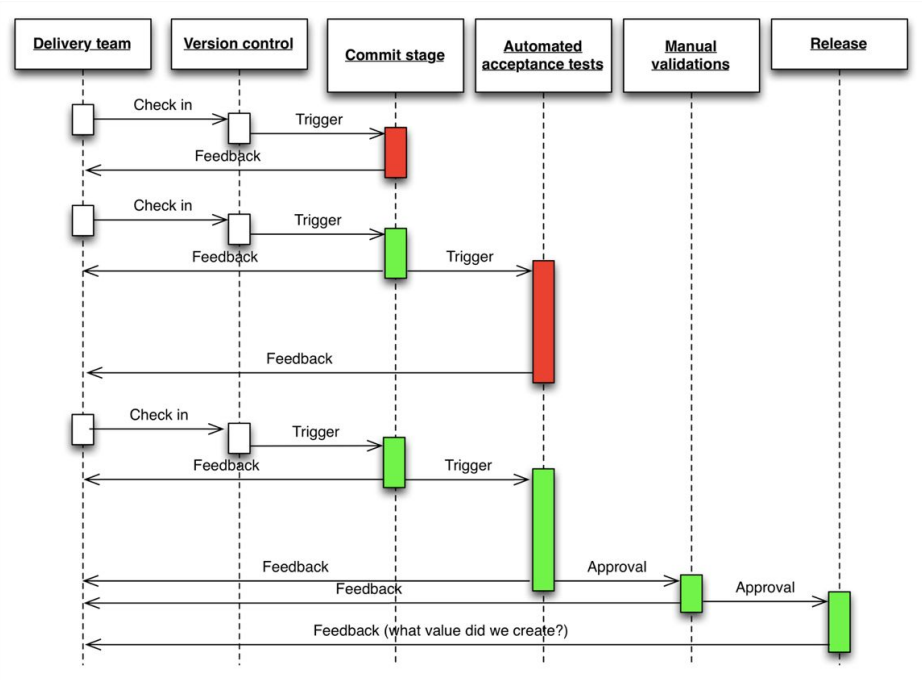
Deployment pipeline



Lead time

“How long would it take your organization to deploy a change that involves just one single line of code? Do you do this on a repeatable, reliable basis?”

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Mary and Tom Poppendieck, *Implementing Lean Software Development: From Concept to Cash*, p59.

Lead time and TTR in the enterprise

When you discover a vulnerability in your stack, how long would it take you to find, patch and redeploy all impacted applications?

> The flaw in the Apache Struts framework was fixed on March 6. Three days later, the bug was already under mass attack by hackers who were exploiting the flaw to install rogue applications on Web servers. Five days after that, the exploits showed few signs of letting up. Equifax has said the breach on its site occurred in mid-May, more than two months after the flaw came to light and a patch was available.

https://arstechnica.com/information-technology/2017/09/massive-equifax-breach-caused-by-failure-to-patch-two-month-old-bug/

Security as a technical practice

Building security into software development improves performance and security quality.

Elite performers build security in and conduct security reviews and complete changes in just days.

Low performers take weeks to conduct security reviews and complete the changes identified.

Build security in by running security tests as part of the deployment pipeline.

InfoSec can make it easy to consume pre-approved libraries, packages, toolchains, and processes.

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Architectural outcomes: can my team...

01

...make large-scale changes to the design of its system without the permission of somebody outside the team, or depending on other teams?

02

...complete its work without needing fine-grained communication and coordination with people outside the team?

03

...deploy and release its product or service on demand, independently of other services the product or service depends upon?

04

...do most of its testing on demand, without requiring an integrated test environment?

05

...perform deployments during normal business hours with negligible downtime?

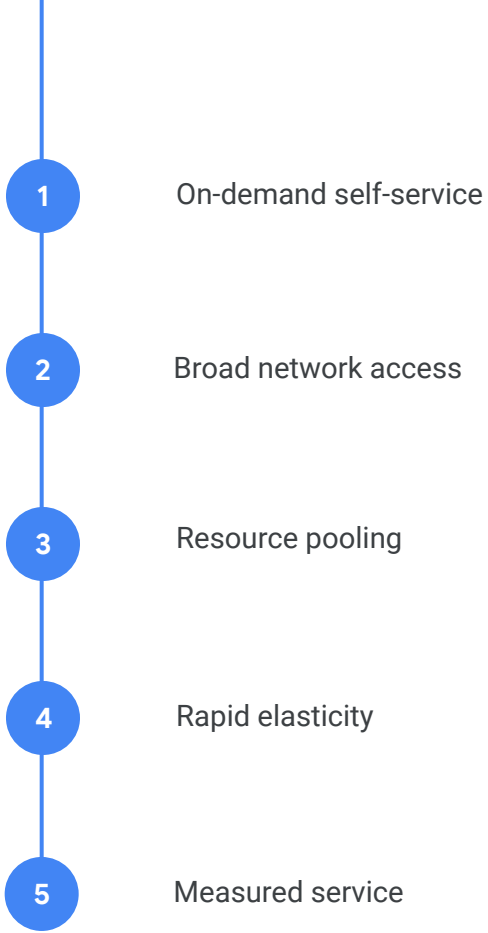
Cloud is a differentiator

Elite performers were 24 times more likely to have met all essential cloud characteristics than low performers*.

But only 29% of respondents met all five!

2019 State of DevOps Report: cloud.google.com/devops

*Five essential characteristics of cloud computing defined by NIST in Special Publication 800-145



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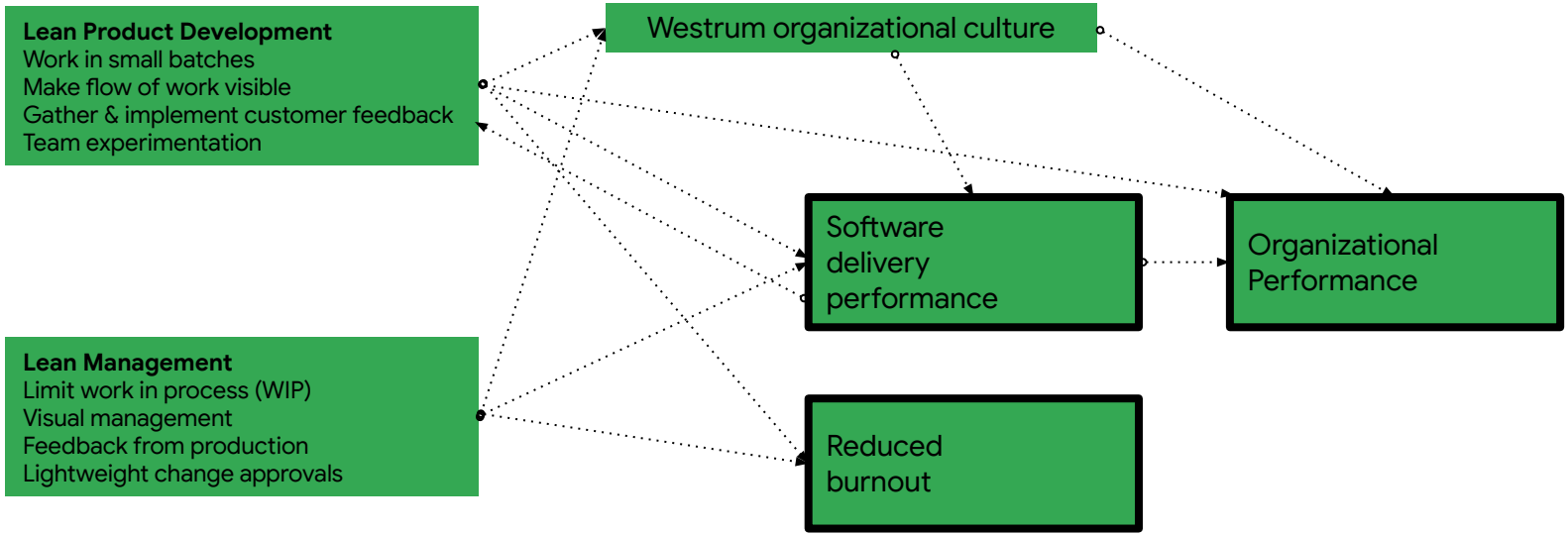
Lean management & product development



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2015, 2016 & 2017 State of DevOps Report: cloud.google.com/devops

Autonomous teams in practice

Highly Aligned, Loosely Coupled

- Highly Aligned
  - Strategy and goals are clear, specific, broadly understood
  - Team interactions focused on strategy and goals, rather than tactics
  - Requires large investment in management time to be transparent and articulate and perceptive
- Loosely Coupled
  - Minimal cross-functional meetings except to get aligned on goals and strategy
  - Trust between groups on tactics without previewing/approving each one – so groups can move fast
  - Leaders reaching out proactively for ad-hoc coordination and perspective as appropriate
  - Occasional post-mortems on tactics necessary to increase alignment

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Reed Hastings, CEO Netflix
https://www.slideshare.net/reed2001/culture-1798664/94-Highly_Aligned_Loosely_Coupled_Highly

Culture

How organizations process information

Pathological (power oriented)	Bureaucratic (rule oriented)	Generative (performance oriented)
Low cooperation	Modest cooperation	High cooperation
Messengers shot	Messengers neglected	Messengers trained
Responsibilities shirked	Narrow responsibilities	Risks are shared
Bridging discouraged	Bridging tolerated	Bridging encouraged
Failure leads to scapegoating	Failure leads to justice	Failure leads to enquiry
Novelty crushed	Novelty leads to problems	Novelty implemented

Westrum, “A Typology of Organizational Cultures” | http://bmj.co/1BRGh5q

	1	2	3	4	5	6	7	
Strongly Disagree	○	○	○	○	○	○	○	Strongly Agree

1. On my team, information is actively sought.
2. Messengers are not punished when they deliver news of failures or other bad news.
3. On my team, responsibilities are shared.
4. On my team, cross-functional collaboration is encouraged and rewarded.
5. On my team, failure causes inquiry.
6. On my team, new ideas are welcomed.

Culture of psychological safety

- Predicts software delivery performance *and* organizational performance
- Implement by adopting continuous delivery and lean product management practices

https://rework.withgoogle.com/blog/five-keys-to-a-successful-google-team/

Disaster recovery testing

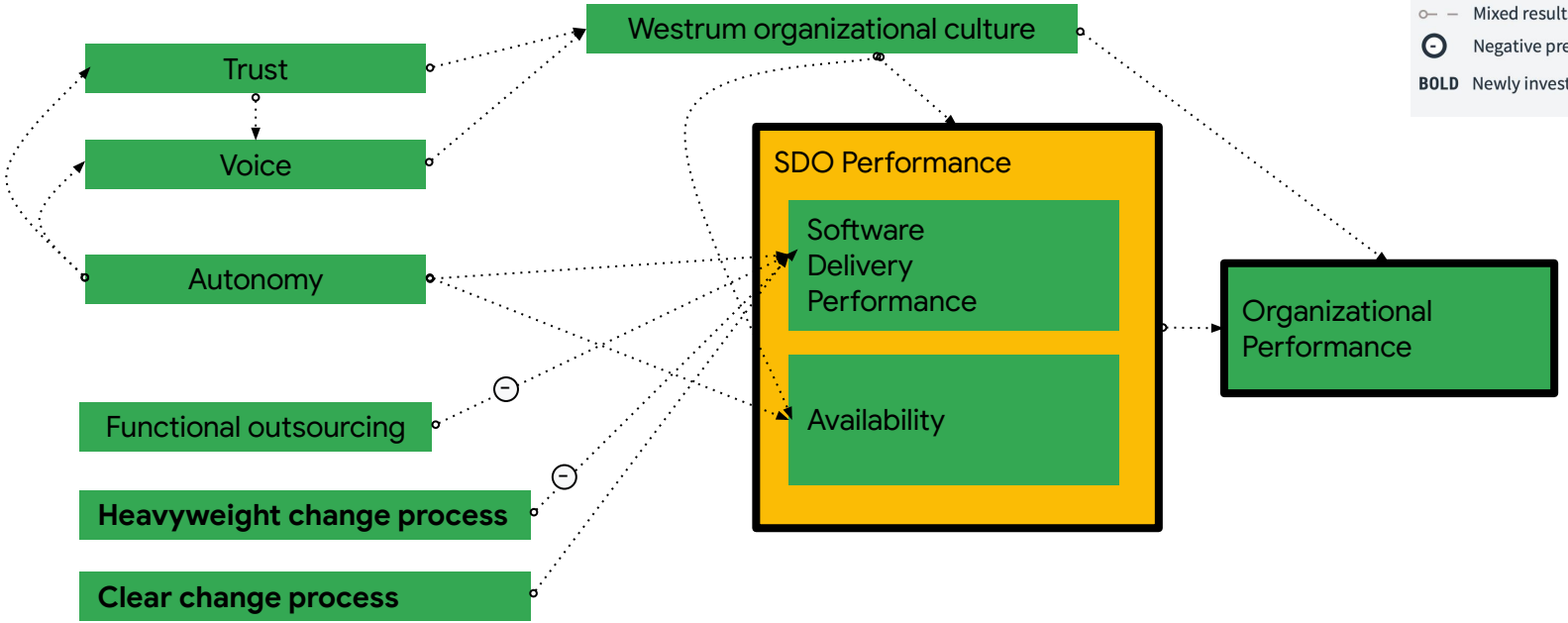
“For DiRT-style events to be successful, an organization first needs to accept system and process failures as a means of learning… We design tests that require engineers from several groups who might not normally work together to interact with each other. That way, should a real large-scale disaster ever strike, these people will already have strong working relationships”

—Kripa Krishnan, Director, Cloud Operations, Google

Only 40% of respondents perform disaster recovery testing at least annually on production infrastructure

—State of DevOps Report 2019

Growing autonomous teams



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2018 & 2019 State of DevOps Report: cloud.google.com/devops

Elite teams favor strategies that create community structures

- Communities of practice
- Grassroots
- Proof of Concept (POC) as a template
- POC as seed

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Individual Productivity

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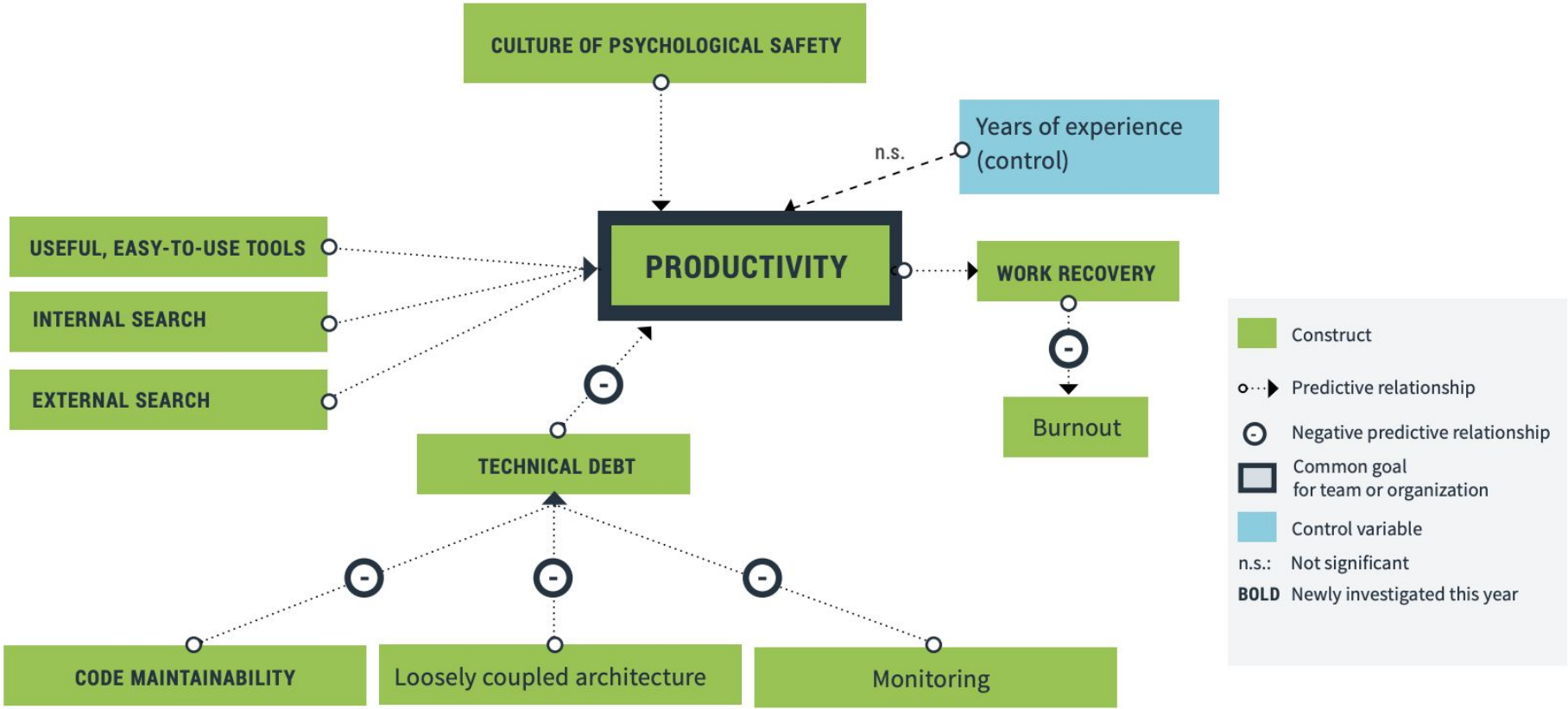
Individual productivity

“Productivity is the ability to get complex, time-consuming tasks completed with minimal distractions and interruptions”

—State of DevOps Report 2019


CULTURE OF PSYCHOLOGICAL SAFETY
Years of experience (control)
n.s.
USEFUL, EASY-TO-USE TOOLS
INTERNAL SEARCH
EXTERNAL SEARCH
PRODUCTIVITY
WORK RECOVERY
Burnout
TECHNICAL DEBT
CODE MAINTAINABILITY
Loosely coupled architecture
Monitoring
Construct
Predictive relationship
Negative predictive relationship
Common goal for team or organization
Control variable
n.s.: Not significant
BOLD Newly investigated this year

COVID and remote work

“Activity has stayed consistent and even increased throughout the pandemic and the shift to working from home … sustained activity through large shifts in how we work show that flexible tools, processes, and solutions can support developer productivity and even continued innovation in the face of disruption”

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Nicole Forsgren, *State of the Octoverse: Finding Balance between Work and Play*
https://octoverse.github.com/

cloud.google.com/
devops

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