

# Agile + DevOps **EAST**

A TECHWELL EVENT

## **AT29**

DevOps Practices

Thursday, November 7th, 2019 4:45 PM

# **Feature Flagging: Proven Patterns for Control and Observability in Continuous Delivery**

Presented by:

**Dave Karow**

Split

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# Dave Karow

Dave Karow is an energetic and animated speaker known for demystifying technology and democratizing access to tools. Dave was fortunate to grow up watching Silicon Valley evolve from chips to software to internet services all around him, affording him a unique perspective on the long arc of technology evolution. Dave punched computer cards at age five, managed an online forum on CompuServe (when that was a thing!), learned grep, sed, and awk before you could just google recipes for regular expressions, and was tech director for the first Webby Awards in San Francisco. Before joining Split, Dave evangelized the shift of performance testing left at BlazeMeter, helping dev teams ship faster with greater confidence. As evangelist at Split Software, Dave speaks about feature flag strategies that connect progressive feature delivery with user-level measurement of system health, user experience, and user behavior.

# Feature Flagging: Proven Patterns for Control and Observability in Continuous Delivery



 @davekarow

The future is already here  
— it's just not very evenly  
distributed.

William Gibson

 @davekarow

## Coming up:

- What a Long Strange Trip It's Been
- Definitions
- Stories From Role Models
- Summary Checklist

## What a long, strange trip it's been...

- Punched my first computer card at age 5
- Unix geek in the 80's
- Wrapped apps at Sun in the 90's to modify execution on the fly
- PM for developer tools
- PM for synthetic monitoring
- PM for load testing
- Dev Advocate for "shift left" performance testing
- Evangelist for progressive delivery & "built in" feedback loops



# Definitions

## Continuous Delivery

From Jez Humble

<https://continuousdelivery.com/>

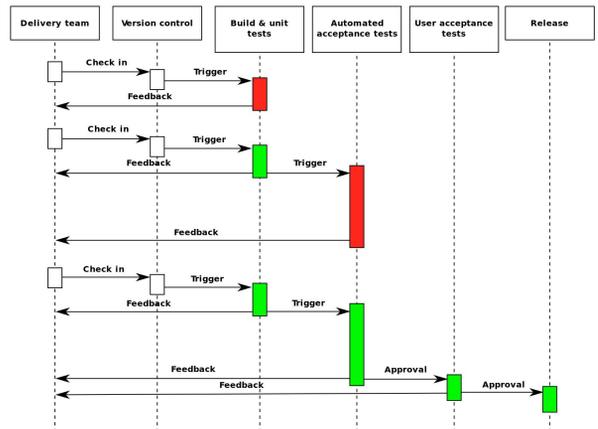
...the ability to get changes of all types—including new features, configuration changes, bug fixes and experiments—into production, or into the hands of users, safely and quickly in a sustainable way.

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So what sort of **control**  
and **observability** are we  
talking about here?

Control of  
the CD Pipeline?

Nope.



Grégoire Détrez, original by Jez Humble [CC BY-SA 4.0]

# Observability of the CD Pipeline?

Nope.



[https://hygieia.github.io/Hygieia/product\\_dashboard\\_intro.html](https://hygieia.github.io/Hygieia/product_dashboard_intro.html)

# If not the pipeline, what then?

# The **payload**

Whether you call it code, configuration, or change, it's in the **delivery**, that we “show up” to others.

# Control of Exposure

...blast radius  
...propagation of goodness  
...surface area for **learning**

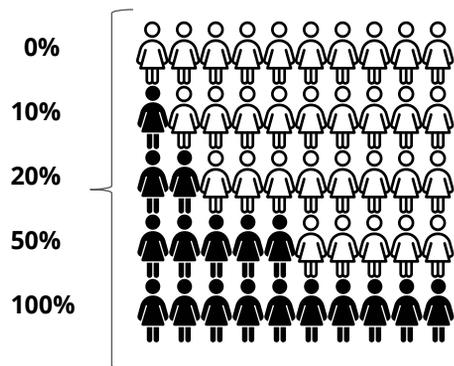
## How Do We Make Deploy != Release

## and Revert != Rollback

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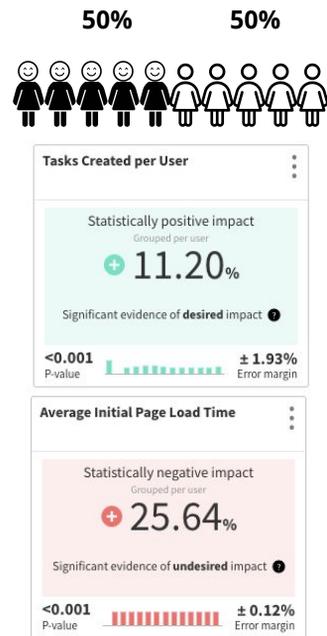
# Feature Flag

Progressive Delivery Example



# Feature Flag

Experimentation Example



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## What a Feature Flag Looks Like In Code

Simple "on/off" example:

```
treatment = flags.getTreatment("related-posts");  
if (treatment == "on") {  
  // show related posts  
} else {  
  // skip it  
}
```

Multivariate example:

```
treatment = flags.getTreatment("search-algorithm");  
if (treatment == "v1") {  
  // use v1 of new search algorithm  
} else if (feature == "v2") {  
  // use v2 of new search algorithm  
} else {  
  // use existing search algorithm  
}
```

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## **Observability of Exposure**

**Who have we  
released to so far?**

**How is it going for  
them (and us)?**

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**Who Already Does This Well?  
(and is generous enough to share how)**

# LinkedIn XLNT

## LinkedIn early days: a modest start for XLNT

- Built a targeting engine that could “split” traffic between existing and new code
- Impact analysis was by hand only (and took ~2 weeks), so nobody did it :-)

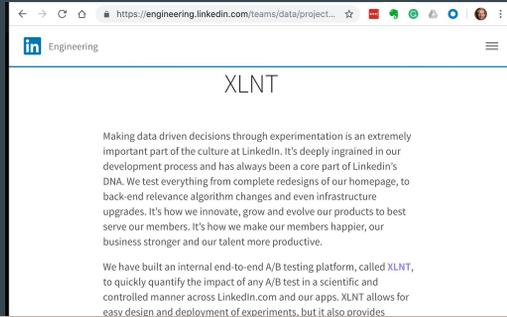
Essentially just feature flags without automated feedback

# LinkedIn XLNT Today

A controlled release (with built-in observability) every 5 minutes

100 releases per day

6000 metrics that can be “followed” by any stakeholder: “What releases are moving the numbers I care about?”

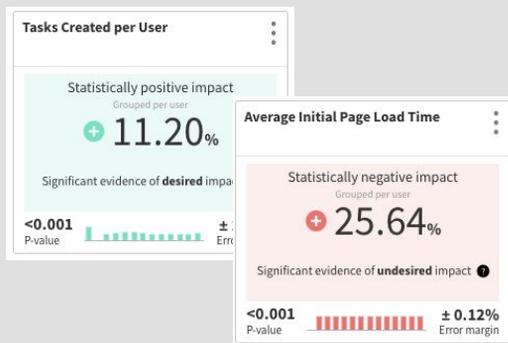


Site-Wide Impact	Test Key	Test Description	Owner(s)	Actions
+5.50%	xlnt.dummy.5050	Dummy A/A test for Project XLNT to test out end-to-end pipeline	afemand, amantri, asmyczek, bhsueh, ...	📧 ⬆

Site-Wide	%Delta	Ramp	Segment	Treatment	Baseline
+5.50%	+10.50%	10%	00	treatment	control

# Guardrail metrics



## Lessons learned at LinkedIn

- Build for scale: no more coordinating over email
- Make it trustworthy: targeting and analysis must be rock solid
- Design for diverse teams, not just data scientists

Ya Xu

Head of Data Science, LinkedIn  
Decisions Conference 10/2/2018



**Why does balancing centralization (consistency) and local team control (autonomy) matter?**

**It increases the odds of achieving results you can trust and observations your teams will act upon.**

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# Booking.com

## Booking.com

- EVERY change is treated as an experiment
- 1000 “experiments” running every day
- Observability through two sets of lenses:
  - As a safety net: Circuit Breaker
  - To validate ideas: Controlled Experiments

# Moving fast, breaking things, and fixing them as quickly as possible

How we use online controlled experiments at Booking.com to release new features faster and more safely



Lukas Vermeer

Feb 21 · 7 min read

*Written by Iskra and Lukas Vermeer.*

<https://medium.com/booking-com-development/moving-fast-breaking-things-and-fixing-them-as-quickly-as-possible-a6c16c5a1185>

## Booking.com

### Experimentation for asynchronous feature release

Firstly, using experimentation allows us to deploy new code faster. Each new feature is initially wrapped in an experiment. New experiments are disabled by default.

```
if et.track_experiment("exp_name"):  
    self.run_new_feature()  
else:  
    self.run_old_feature()
```

## Booking.com: Experimentation for **asynchronous feature release**

- Deploying has no impact on **user experience**
- Deploy **more frequently** with **less risk** to business and users
- The big win is **Agility**

## Booking.com: Experimentation as a **safety net**

- Each new feature is wrapped in its own experiment
- Allows: monitoring and stopping of individual changes
- The **developer or team responsible for the feature** can enable and disable it..
- ...regardless of who deployed the new code that contained it.

## Booking.com: The **circuit breaker**

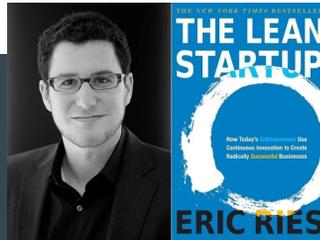
- Active for the first three minutes of feature release
- Severe degradation → automatic abort of **that feature**
- Acceptable divergence from core value of local ownership and responsibility where it's a “no brainer” that users are being negatively impacted

## Booking.com: Experimentation as a way to **validate ideas**

- Measure (in a controlled manner) the impact changes have on user behaviour
- Every change has a clear objective (explicitly stated hypothesis on how it will improve user experience)
- Measuring allows validation that desired outcome is achieved

## Booking.com: Experimentation to learn faster

*Instead of making complex plans that are based on a lot of assumptions, you can make constant adjustments with a steering wheel called the Build-Measure-Learn feedback loop.*



The **quicker** we manage to validate new ideas the **less time is wasted** on things that don't work and the **more time is left to work on things that make a difference.**

In this way, **experiments also help us decide what we should ask, test and build next.**

# Lukas Vermeer's tale of humility



### Search for hotels

#### Top Destinations

Korea	Rome
France	Hong Kong
Athens	Japan
Italy	Switzerland
Thailand	Canada
Greece	

#### Destinations

Kyoto	From \$
*****	
*****	
****	
***	
*****	
Osaka	From \$
*****	
*****	
*****	
*****	
****	
Tokyo	From \$
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Hiroshima	From \$
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#### Destinations

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Tokyo	
Hiroshima	

# Facebook Gatekeeper

Taming Complexity

States

Interdependencies

Uncertainty

Irreversibility



Taming Complexity with Reversibility

 KENT BECK - MONDAY, JULY 27, 2015

<https://www.facebook.com/notes/1000330413333156/>

## Taming Complexity

States

Interdependencies

Uncertainty

Irreversibility

- **Internal usage.** Engineers can make a change, get feedback from thousands of employees using the change, and **roll it back in an hour.**
- **Staged rollout.** We can begin deploying a change to a billion people and, **if the metrics tank, take it back before problems affect most people using Facebook.**
- **Dynamic configuration.** If an engineer has planned for it in the code, we can turn off an offending feature in production in seconds. Alternatively, **we can dial features up and down in tiny increments (i.e. only 0.1% of people see the feature) to discover and avoid non-linear effects.**
- **Correlation.** Our correlation tools let us easily see the unexpected consequences of features so we know to turn them off even when those consequences aren't obvious.

Taming Complexity with Reversibility

KENT BECK: JULY 27, 2015

<https://www.facebook.com/notes/1000330413333156/>

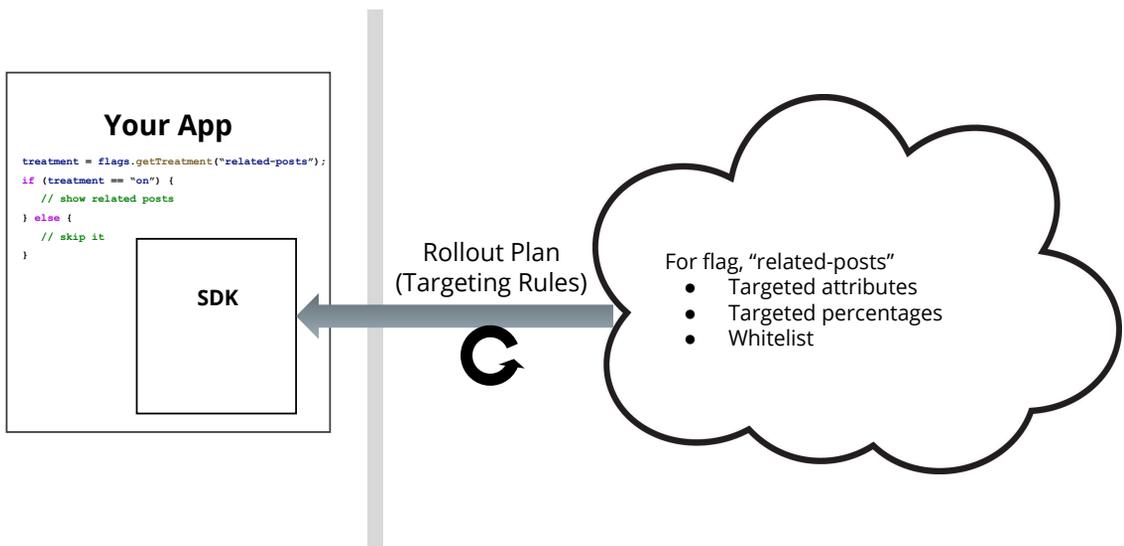
# Summary Checklist: Three Foundational Pillars & Two Key Use Cases

# Foundational Pillar #1

**Decouple deploy (moving code into production) from release (exposing code to users)**

- ❑ Allow changes of exposure w/o new deploy or rollback
- ❑ Support targeting by UserID, attribute (population), random hash

## Pillar #1: Sample Architecture and Data Flow

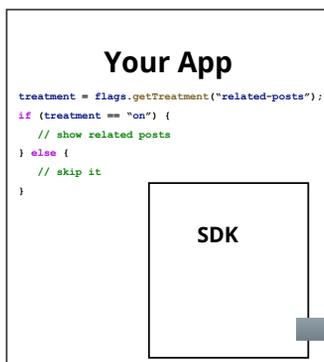


## Foundational Pillar #2

Automate a reliable and consistent way to answer, “Who have we exposed this code to so far?”

- ❑ Record who hit a flag, which way they were sent, and why.
- ❑ Confirm that targeting is working as intended
- ❑ Confirm that expected traffic levels are reached

### Pillar #2: Sample Architecture and Data Flow



Impression  
Events

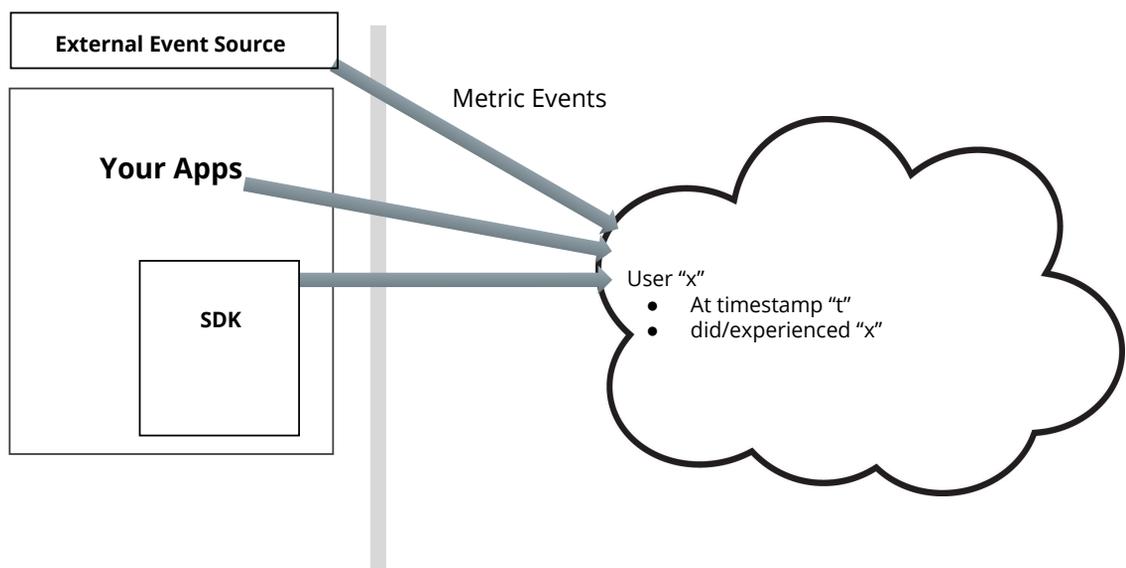
- For flag, “related-posts”
- At timestamp “t”
  - User “x”
  - Saw treatment “y”
  - Per targeting rule “z”
-

## Foundational Pillar #3

Automate a reliable and consistent way to answer, “How is it going for them (and us)?”

- ❑ Automate comparison of system health (errors, latency, etc...)
- ❑ Automate comparison of user behavior (business outcomes)
- ❑ Make it easy to include “Guardrail Metrics” in comparisons to avoid the local optimization trap

### Pillar #3: Sample Architecture and Data Flow



## Use Case #1: Release Faster With Less Risk

Limit the blast radius of unexpected consequences so you can replace the “big bang” release night with more frequent, less stressful rollouts.

Build on the three pillars to:

- ❑ Ramp in stages, starting with dev team, then dogfooding, then % of public
- ❑ Monitor at feature rollout level, not just globally (vivid facts vs faint signals)
- ❑ Alert at the team level (build it/own it)
- ❑ Kill if severe degradation detected (stop the pain now, triage later)
- ❑ Continue to ramp up healthy features while “sick” are ramped down or killed

## Use Case #2: Engineer for Impact (Not Output)

Focus precious engineering cycles on “what works” with experimentation, making statistically rigorous observations about what moves KPIs (and what doesn’t).

Build on the three pillars to:

- ❑ Target an experiment to a specific segment of users
- ❑ Ensure random, deterministic, persistent allocation to A/B/n variants
- ❑ Ingest metrics chosen before the experiment starts (not cherry-picked after)
- ❑ Compute statistical significance before proclaiming winners
- ❑ Design for diverse audiences, not just data scientists (buy-in needed to stick)

**Whatever you are, try to  
be a good one.**

**William Makepeace Thackeray**

 [@davekarow](https://twitter.com/davekarow)