What I Wish I Knew Before Going On-call

LISA 2018

Training Materials:

http://bit.ly/lisa18-oncall

WHO WE ARE

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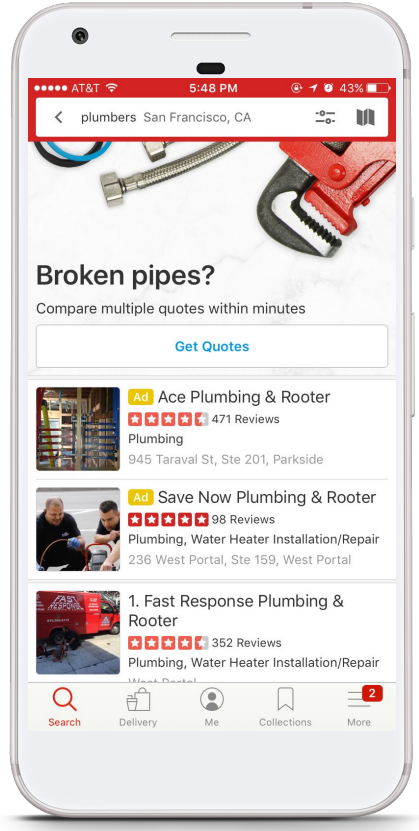
Yelp Local Ads

- Connect people with great local businesses
- Advertiser billing and analytics



Our team's challenges

1. Financially critical systems

~90% of company revenue is from ads

2. Wears many hats 🎩

On-call + Feature + Infra

3. Owns systems with many different tech stacks

Makes being on-call more challenging

4. Majority of the team is new grad hires

Makes onboarding even more important

Our story

- Joined the team as new grad hires
- Learned how to be on-call the hard way...
- Now mentoring other engineers

Newbie on-call struggles

“I didn’t feel prepared”

“I wish there was better documentation”

“I wish I was more experienced”

Agenda

1. **Onboarding strategies**
2. **Documentation for incident response**
3. **Learning from the past**

“I didn’t feel prepared”

4 Common On-call Myths
4 Tips for Effective Onboarding

Why care about good onboarding?

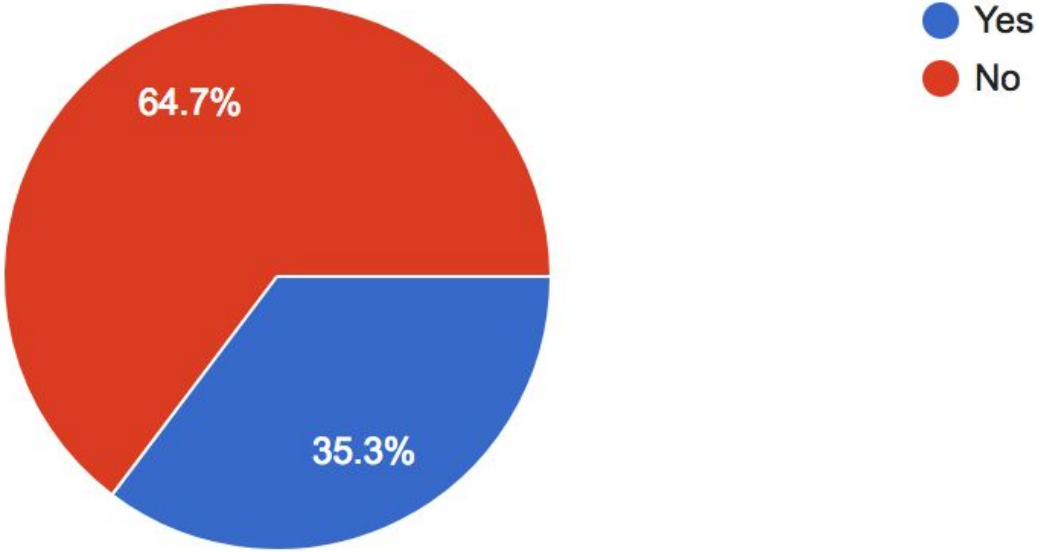
Win 1: Makes your team scalable!

Win 2: Improve incident response

Win 3: Teaching is the best way to learn

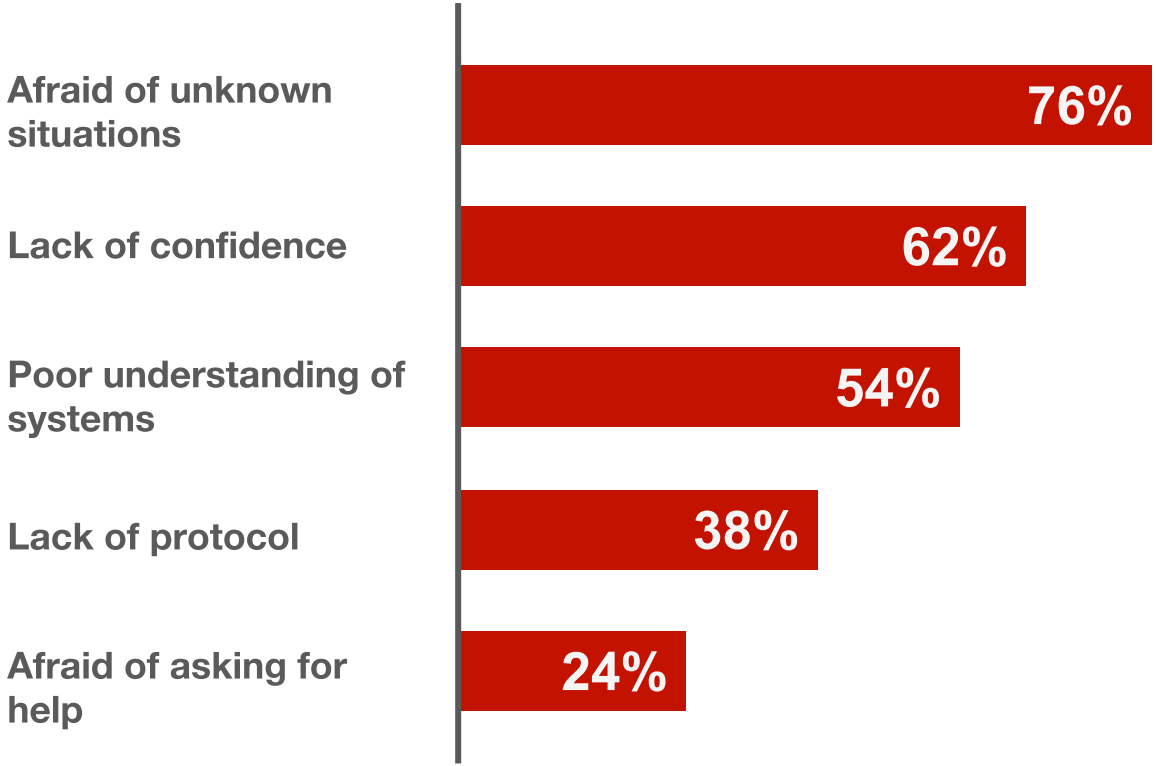
Win 4: Confident new hires

Did you feel ready before going on-call for the first time?



Survey within Yelp Engineering (2018)

Why didn't you feel ready?



Survey within Yelp Engineering (2018)

4 Common Myths About On-calls

Myth #1

“I need to know everything”

You are not supposed to know everything

Myth #2

“I need to solve everything by myself”

You are supposed to ask for help

Myth #3

“I need to find the root cause”

You do not need to find a root cause as part of IR

Myth #4

“I need to make the best/long-term fix”

You are supposed to mitigate the issue

Setting the right expectations

If we are not supposed to know everything, what are we supposed to know?

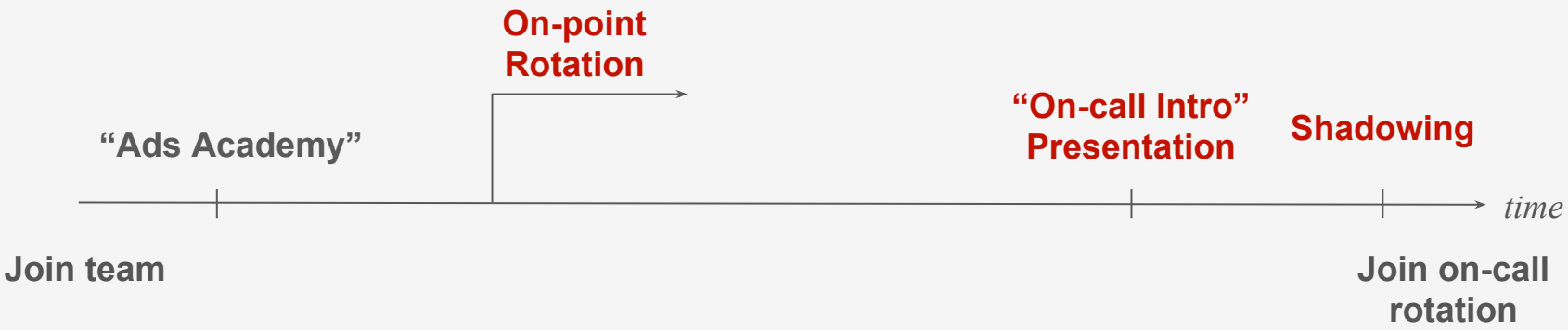
The Basics

Step 1.
Be able to draw a mental picture of your system

Step 2.
Have a high-level understanding of company infrastructure

Step 3.
Know the tools for investigation

My On-call “Training”



What was good about my training?

- It existed
- On-point rotation
- Shadowing

What was difficult about my training?

- Information dump
- No emphasis on connections between systems
- No emphasis on investigation/debugging tools

4 Tips for Effective Onboarding

Tip #1
Avoid information overload

Tip #2

Make it relevant / Provide context

Tip #3
Focus on tools

Tip #4
Keep learning

Some things we do

- “Infratalks”
- Brown bag sessions
- Wargames
- Little day-to-day things

What can you take home?

- Start a new program (yay!)
- Tweak an existing process
- Change how you organize a presentation
- Change the way you mentor

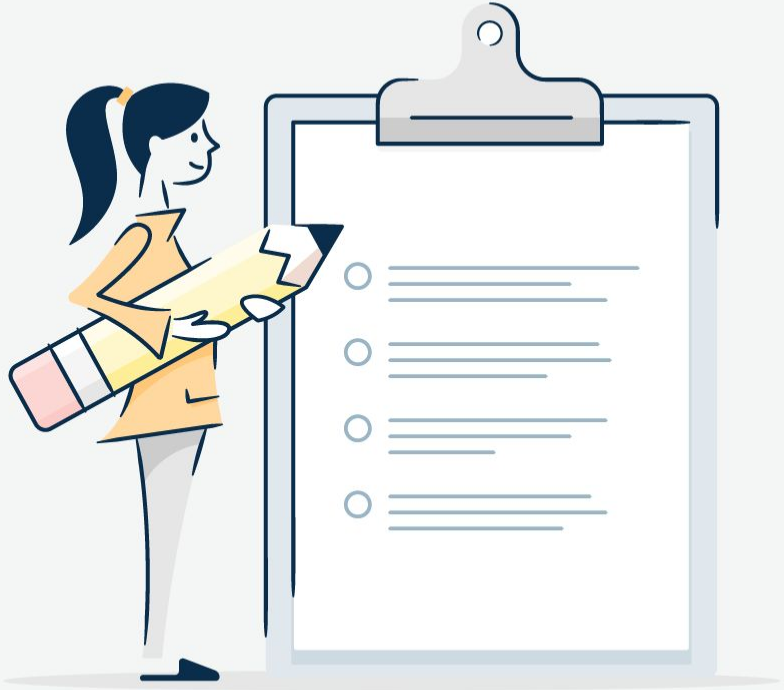
Break

What was your own training like?
How do you train new on-calls?

Training Materials:

http://bit.ly/lisa18-oncall

“I wish there was better documentation”



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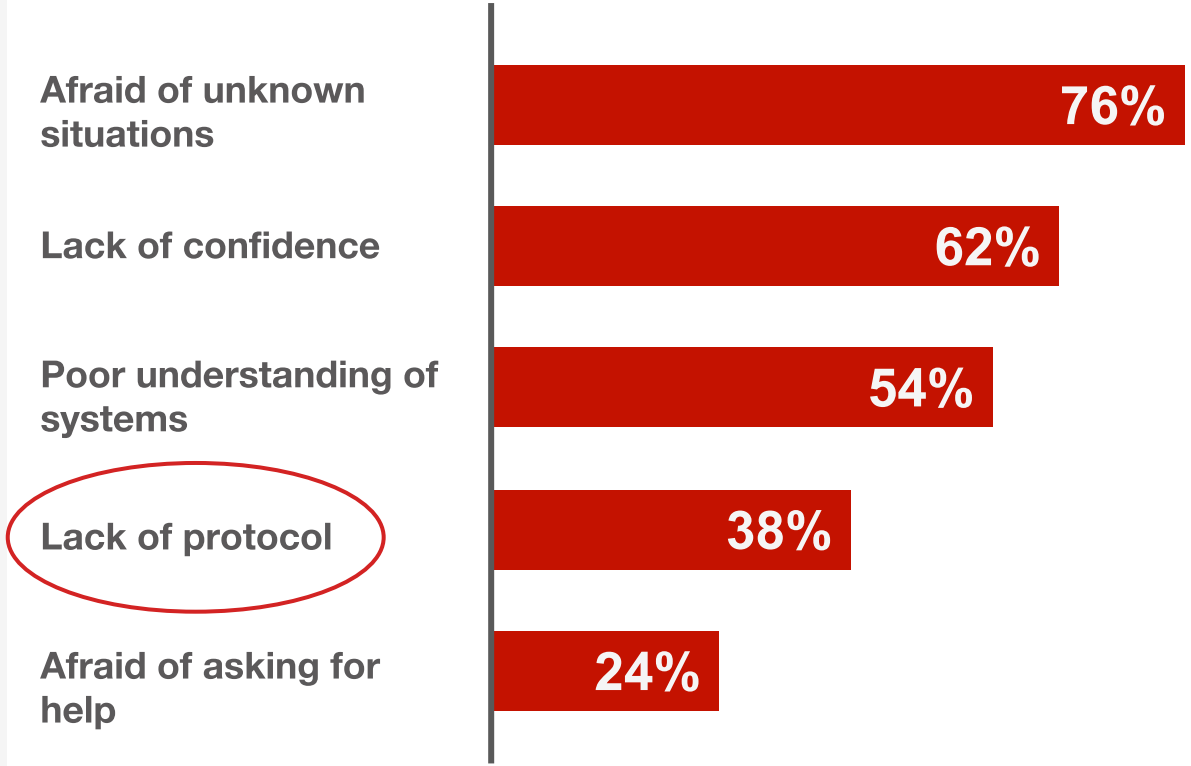


Survey within Yelp Engineering (2018)

SURVEY RESULTS

How would you **improve** the **on-call training** process?

70% Reviewed the team's runbooks before going on-call

"Update and improve documentation and runbooks"

"More documentation"

"Better documentation"

"Clear protocol of pages we can get and how to handle them"

"Runbooks should be obvious to find and execute. At 3 AM you need dummy-proof instructions."

Survey within Yelp Engineering (2018)

What is a runbook?

- **Quick guide in an emergency**
- **Step-by-step protocol for incident response**
- **Updated regularly in tandem with code changes**
- **Good for common cases**

  Know “standard procedures” before being able to improvise

Why care about good runbooks?

Win 1: Increase efficiency

Win 2: Reduce nervousness

Win 3: Stand-in for a mentor or back-up

Win 4: Continuous learning

2 Types of Runbooks

- **Technical**

  Recover a failing system or process

- **Non-technical/Human process**

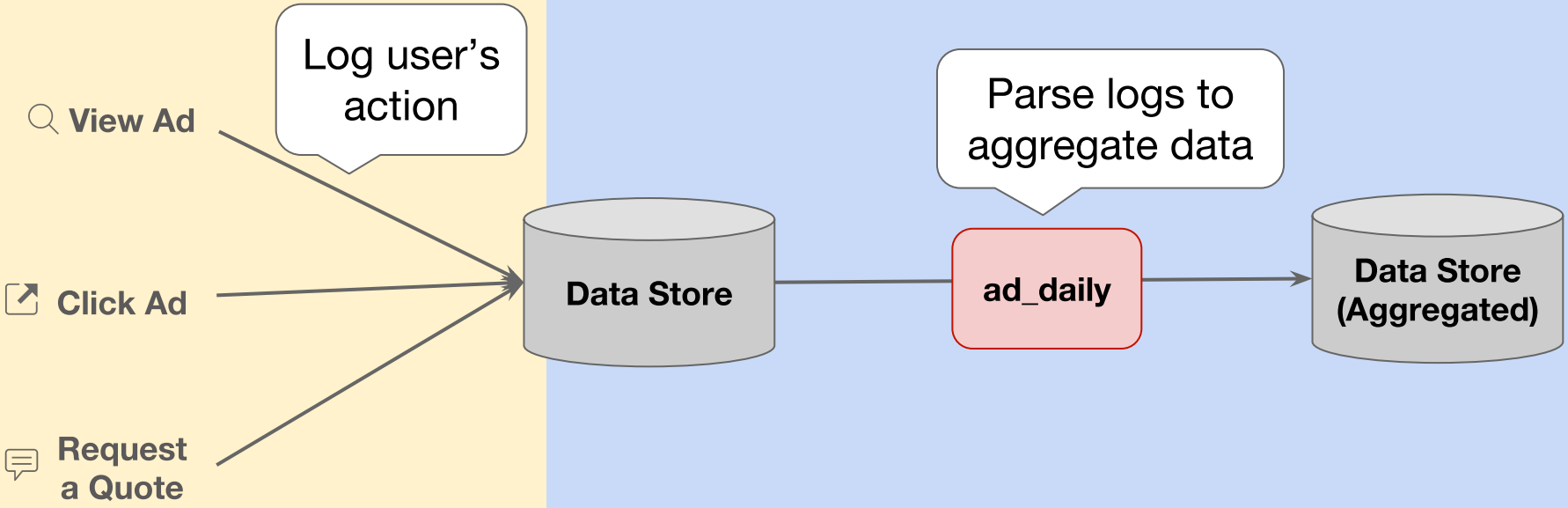
  Communicating with stakeholders, general protocol or guidelines

Technical Runbooks

- **Mitigation steps**
  Step-by-step guide on “what to do when paged for X”
- **Disaster recovery plans**
- **Impact assessment**
- **How to rollback or revert**
- **Links to learn more**

Example:
Technical runbook

STORY TIME: BATCH RECOVERY



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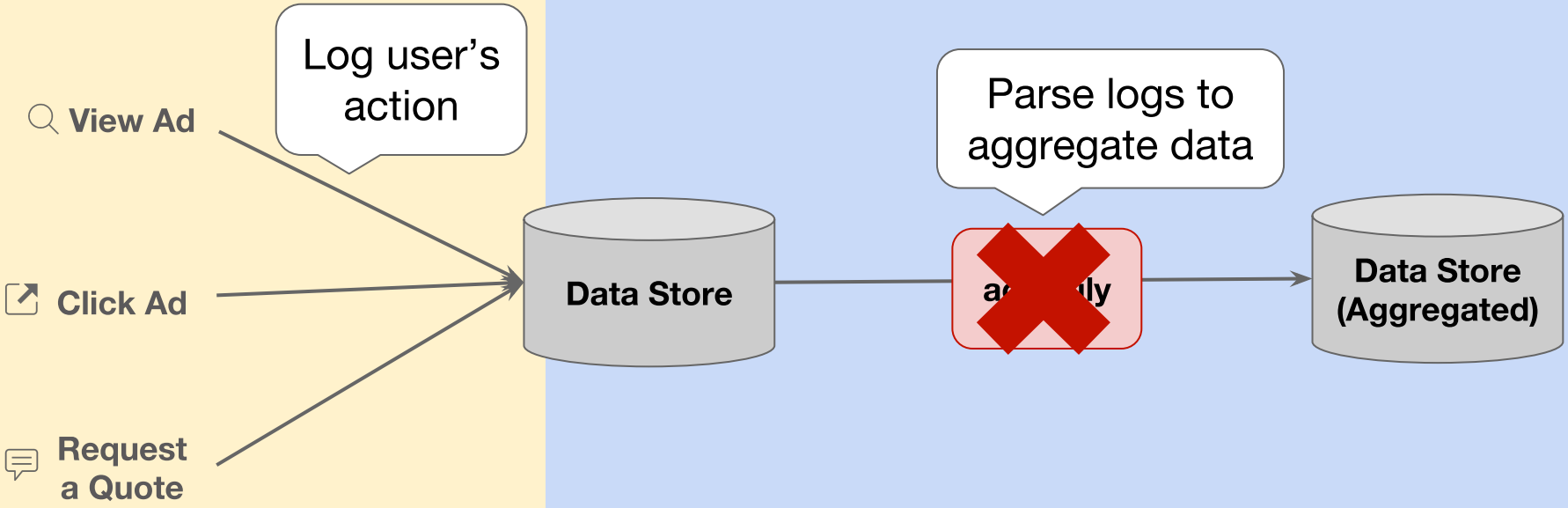
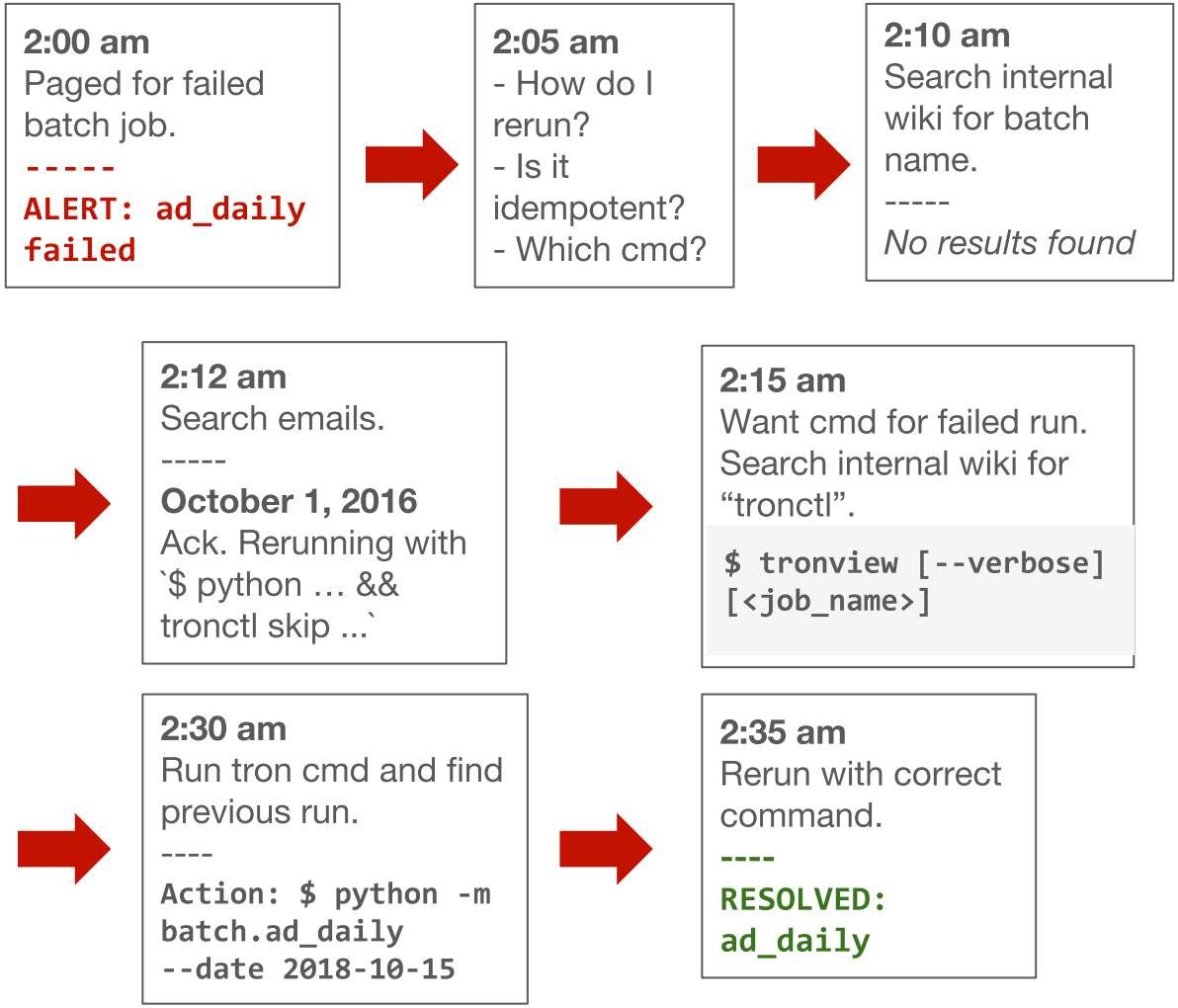


STORY TIME: BATCH RECOVERY

Being on-call **without** a runbook

TTR: 35 min



STORY TIME: BATCH RECOVERY

Being on-call with a runbook

2:00 am
Paged for failed batch job.

ALERT: ad_daily failed

```
Traceback:
File /yelp/...:
     ...
Exception: EMR
Step 1 Failed
```

2:05 am
- How do I rerun?
- Is it idempotent?
- Which cmd?

2:10 am
Search internal wiki for batch name.
---
1 result found
[Ads] Runbooks - Operations

STORY TIME: BATCH RECOVERY

Being on-call with a runbook

Runbooks - Operations

- General recovery tips
  - Campaigns not in ad store
  - Errors in ad templates
- Nagios
  - Background
  - Updating alerts
  - Alerts
- ad_daily (tron job)
  - man tronview and man tronctl to understand how to use tron.
  - 1. Identify which run failed
  - 2. Identify which action failed
  - 3. Fix/retry broken actions
  - Specific Batches
    - calculate_ad_analytics
    - calculate_ad_spend
    - business_ad_control
    - calculate_ad_stats
    - apply_scheduled_budget_changes
- Reports
- Rerunning procedures
  - Identify which days need to be rerun
  - Identify which batches need to be rerun
- Gearman
  - View the logging output of the gearman workers
  - View the number of gearman workers and the number of jobs in the queue
  - Adding and removing gearman workers for particular queues
  - Clearing out a queue

Being on-call with a runbook

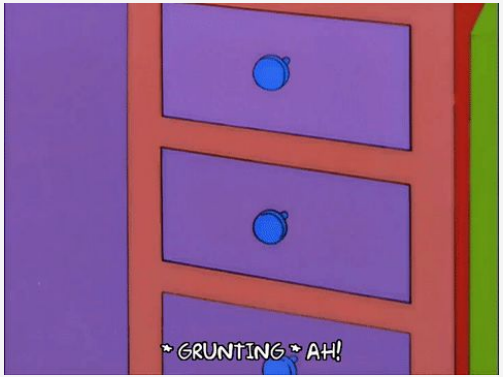
Alerts

When responding to a Nagios alert, make sure you ACKNOWLEDGE the action. Alerts that go through pagerduty can be acknowledged directly within pagerduty.

NOTE: This section would benefit a lot from having our actual alerts listed and detailed here.

STORY TIME: BATCH RECOVERY

Being on-call with a runbook



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Being on-call with a runbook

ad_daily (tron job)

man tronview and man tronctl to understand how to use tron

1. **Identify which run failed.**

```
$ tronview ad_daily
```

2. **Identify which action failed.**

```
$ tronview ad_daily.XX
```

Look for the action with FAIL next to it.

3. **Fix/retry broken actions**

Being on-call with a runbook

3. Fix/retry broken actions

If a batch died due to an EMR, DB, or other intermittent issue, attempt to run the action manually

If a batch died due to a logic error, push a fix and run the action manually

To run manually, read the command line printed in this output. It's between the "!Node:" and "Requirements:" lines. You'll have to execute this as batch yourself.

```
$ tronview ad_daily.XX.the_action_name
```

Once they run successfully manually, resume the rest of the job by skipping the action. `tronctl skip ad_daily.XX.the_action_name`

STORY TIME: BATCH RECOVERY

Being on-call with a runbook

TTR: 20 min

2:00 am
Paged for failed batch job.

ALERT: ad_daily failed

```
Traceback:
File /yelp/...:
     ...
Exception: EMR
Step 1 Failed
```

2:05 am
- How do I rerun?
- Is it idempotent?
- Which cmd?

2:10 am
Search internal wiki for batch name.
---
1 result found
[Ads] Runbooks - Operations

2:15 am
Run tron cmd and find previous run.

```
Action: $ python -m
batch.ad_daily
--date 2018-10-15
```

2:20 am
Rerun with correct command.

RESOLVED: ad_daily

What was good about this runbook?

- Runbook exists
- Able to find runbook
- Contains actual commands to run
- Alert contains traceback

STORY TIME: BATCH RECOVERY

What made this runbook difficult to use?

- Table of contents too long
- Info about 4-5 systems on the same page
- Doesn’t map alert to action item
- Lacking some step-by-step instructions

RUNBOOK EXAMPLES

What could be **better** about this runbook?

Important info should be at the top

Runbooks - Operations

- General recovery tips
  - Campaigns not in ad store
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What could be better about this runbook?

Map alert name to action items

Alerts

When responding to a Nagios alert, make sure you ACKNOWLEDGE the action. Alerts that go through pagerduty can be acknowledged directly within pagerduty.

NOTE: This section would benefit a lot from having our actual alerts listed and detailed here.

What could be better about this runbook?

Don’t keep runbooks in a TODO state

Alerts

When responding to a Nagios alert, make sure you ACKNOWLEDGE the action. Alerts that go through pagerduty can be acknowledged directly within pagerduty.

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What could be better about this runbook?

Add instructions for diagnosis

3. Fix/retry broken actions

If a batch died due to an EMR, DB, or other intermittent issue, attempt to run the action manually

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```
$ tronview ad_daily.XX.the_action_name
```

Once they run successfully manually, resume the rest of the job by skipping the action. **`tronctl skip ad_daily.XX.the_action_name`**

What could be better about this runbook?

Rollback or revert. Link to a deployment guide.

3. Fix/retry broken actions

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What could be better about this runbook?

Include example output to guide the user

3. Fix/retry broken actions

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What could be better about this runbook?

Avoid ambiguous instructions

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Tips for writing good technical runbooks

- Map alert to clear action items
- Inverted pyramid
- Separate critical vs. non-critical
- Examples of actual commands
- Consistent format across runbooks

STORY TIME: BATCH RECOVERY

Being on-call with a better runbook

TTR: 5 min

2:00 am
Paged for failed batch job.

```
-----
ALERT: ad_daily failed

Runbook: https://y/ad_daily
Dashboard: https://signalfx.yelpcorp.com/...
Tip: Try `ssh production` and `sudo -u batch -i
<Actual command>`
Details:
     Last action: ad_daily.29.run_report
     Actual command: python -m batch.ad_daily ...
     Traceback:
     File /.../yelp/batch/ad_daily/report.py:
          ...
     Exception: EMR Step 1 of 1 Failed
```

2:05 am
Rerun with correct command.

```
----
RESOLVED: ad_daily
```

STORY TIME: BATCH RECOVERY

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2:05 am
Rerun with correct command.

```
----
RESOLVED: ad_daily
```

Being on-call with a **better runbook**

Runbook - ad_daily

This is the recovery and backfill runbook for on-calls. See Ads Billing Pipeline on why this batch is important and Development - ad_daily for developer workflow and testing.

- Easy Recovery
- P0 Recovery
  - Triage
  - Backfills
  - Multi-day recovery
- Revenue Impact
- Documentation

Being on-call with
a better runbook

Runbook - ad_daily

Triage

Check logs to get useful traceback information for debugging

```
$ tail batch_ad_daily_log --region prod
```

and look for the line

```
INFO Logs are in s3://yelp-emr-prod/logs/j-xxx/
```

Look through stderr files which can contain errors.

```
$ find . | grep stderr | xargs zcat | less
```

Being on-call with a better runbook

Includes example output to guide the user

Runbook - ad_daily

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Check logs to get useful traceback information for debugging

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A good runbook is easy to find

Make alerts rich

Put actual commands and/or runbook link in the alert

Make runbooks searchable

Portals for easy access to important docs

Example:
Non-technical runbook

Non-technical runbook

Incident Response Checklist

This document is for Ads incident first responders. First assess, escalate until the appropriate team is established, and take on the appropriate role.

Assess

Escalate

Communicate

Investigate and Fix

Clean Up

Non-technical
runbook

Incident Response Checklist

Assess

For example: errors served, % clients impacted, or financial loss to the business.

If it takes more than a few minutes to assess, assume it is very bad and move on to escalation.

- ❑ What is the business-facing impact?
- ❑ What is the consumer-facing impact?

Dashboards to consult:

- ❑ SignalFx - error percentages, latencies
- ❑ Splunk - log lines

Non-technical
runbook

Incident Response Checklist

Escalate

Outages run longer and with worse outcomes when tackled alone. It's better to escalate a false alarm than fail to escalate a serious issue.

Page the following as appropriate:

- ❑ Secondary on-call
- ❑ Manager
- ❑ Database Reliability Team (#dba)
- ❑ AWS Support Liaison

Non-technical
runbook

Incident Response Checklist

Communicate

- ❏ Create a ticket in the ADS project with a brief description of the issue.
  - ❏ Add secondary and manager as watchers
- ❏ Consolidate triage communications to #ads-incident.
- ❏ Send email to ads-incident@ to liaise with financial stakeholders and downstream consumers of data: email templates.

Non-technical
runbook

Incident Response Checklist

Investigate and Fix

- ❏ Ads Runbooks List

Clean Up

- ❏ Send all-clear email to ads-incident@
- ❏ File follow-up ticket for postmortem and set yourself as the assignee

Incident Response Checklist

This document is for Ads incident first responders. First assess, escalate until the appropriate team is established, and take on the appropriate role.

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Escalate

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Page the following as appropriate:

- Secondary on-call
- Manager
- Database Reliability Team (#dba)
- AWS Support Liaison

Communicate

- ❏ Create a ticket in the ADS project with a brief description of the issue.
  - ❏ Add secondary and manager as watchers
  - ❏ Comment on ticket with major updates
- ❏ Consolidate triage communications to #ads-incident.
- ❏ Send email to ads-incident@ to liaise with financial stakeholders and downstream consumers of data.

Investigate and Fix

- ❏ Ads Runbooks List

Clean Up

- ❏ Send all-clear email to ads-incident@
- ❏ File follow-up ticket for postmortem and set yourself as the assignee

Make your own runbook

Step 1:
Start with a template

Alert Name	<exact alert name>
Description	<1 sentence description>
Stakeholder impact	<1 sentence impact>
Mitigation steps	1. Try restarting: <command> 2. Monitor dashboards. 3. Inspect logs to diagnose issue: <link or See steps below> If things do not recover, follow Escalation steps.
Escalation steps	Contact <team>. Massive ingestion delays should be communicated to <upstream and downstream teams>.
Related services	<upstream and downstream dependencies>
Dashboards	<links>
Related links	<other docs or related runbooks>

Step 2:
Customize for your use case

Step 3:
“Commit” it with your code

Step 4:
Update alerts

Keep runbooks useful

Be familiar with it before you need it

- Know where to find
- Use in shadowing/training/wargames

Update runbooks

- When creating a new alert
- Postmortem action item
- While training; new members can help spot issues

Beyond runbooks

- **Good for common cases**
- **What about unexpected situations?**
  - Provide tools to help in decision-making
  - Build context around your systems
  - Pattern match with past incidents
- **Automate as much as possible**

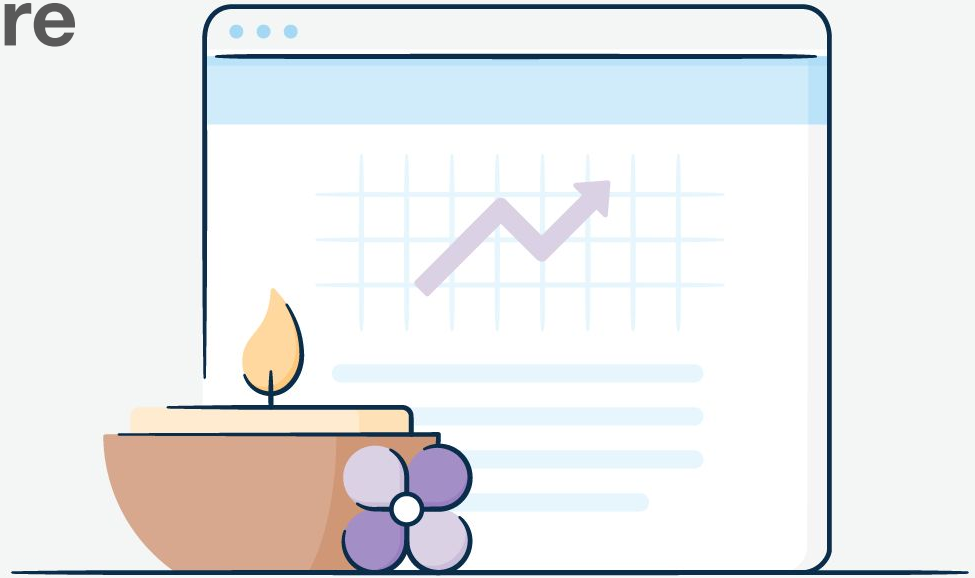
Break

Try it out!

Training Materials:

http://bit.ly/lisa18-oncall

“I wish I was more experienced”



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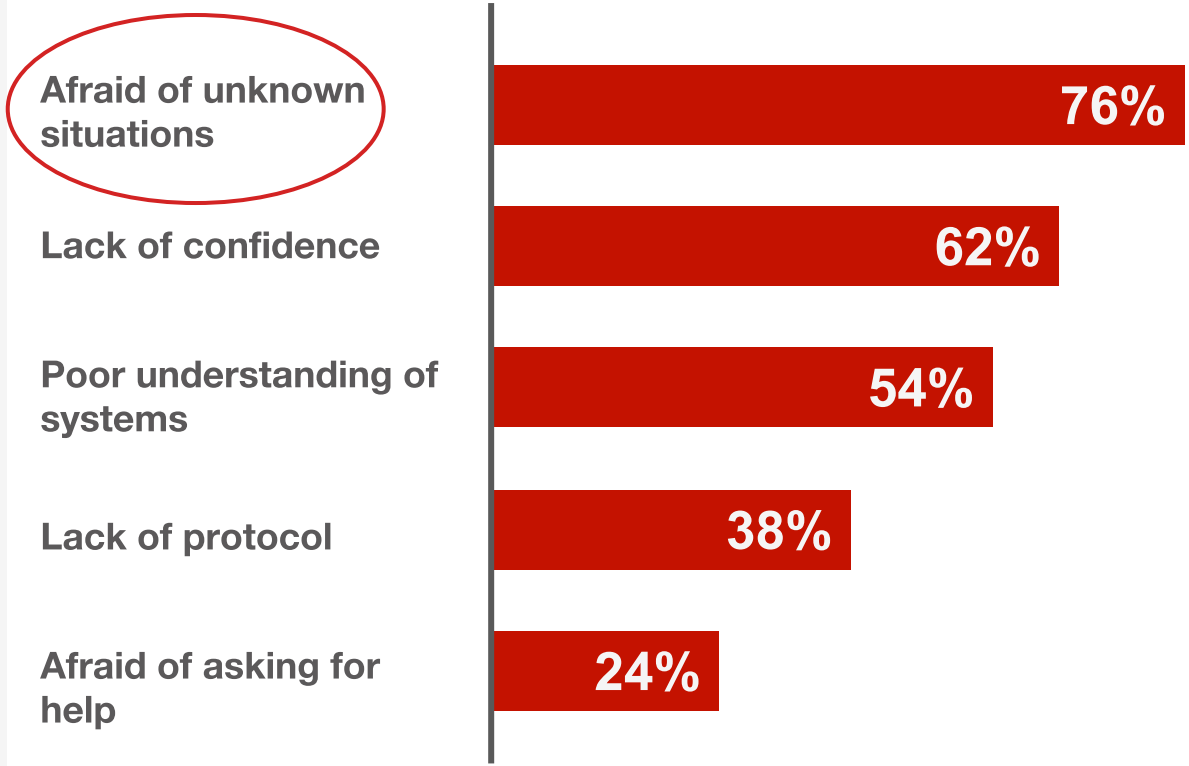
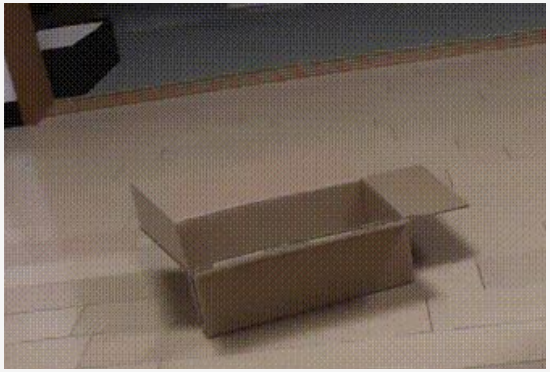
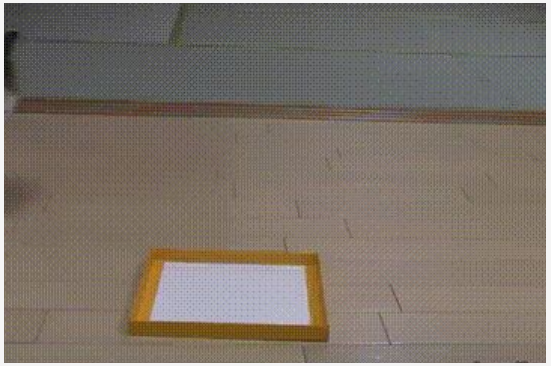


Survey within Yelp Engineering (2018)

Different types of incidents build
experience





Postmortems as a Learning Tool

Learning from Postmortems

>80% Read postmortems from their teams

>86% Learned something new

"Always lessons learned from reading"

"Nice deep dives"

"Make you aware of pain points broadly"

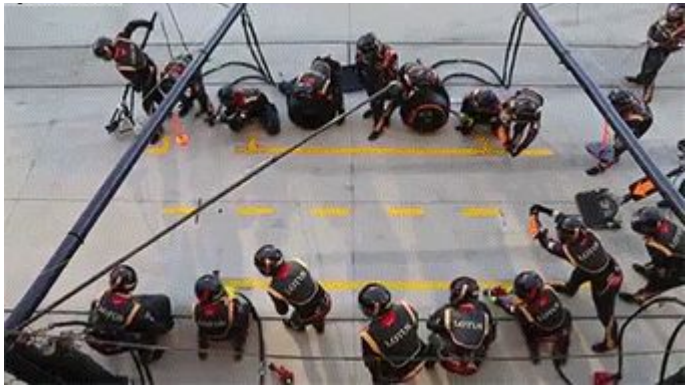
"Give you a better view into systems"

Survey within Yelp Engineering (2018)

Why are **postmortems** **important** for new engineers?

Knowledge Sharing

Collaboration



Be Blameless

Different Ways to Learn

- Read postmortems
- Postmortem debriefing meeting
- Wargames from postmortems
- Review postmortems

Read Postmortems

- **Make postmortems accessible**
  - Mailing list
  - Tag with keywords
  - Newsletter
- **Encourage reading**
  - Reading club
  - Start with your own team’s postmortems
  - Reference in your daily work, e.g. code reviews

Postmortem Debriefing Meeting

- Real-time collaboration
- Goal: Understand the incident from multiple perspectives
- Facilitator, people closest to the event, and general audience

Wargames from Postmortems

- **Multi-person incident simulation game**
- **Create based on past incidents**
  - Uses actual logs/dashboards from the incident
- **Make it realistic and safe**
  - Non-prod or other geo environments
  - Simulate communication protocol

Wargame Roles

- **Game master**
  - Reproduce the scene with a postmortem
  - Drive conversations
  - Ask questions as hints
- **Primary/secondary “on-call”**
  - Investigate and mitigate
  - Apply knowledge and practice using tools

Review Postmortems

Assess postmortem and provide feedback

Encourage them to ask questions

- There are no dumb questions
- Be blameless

Review Postmortems

How people know something is wrong

“The metric seemed off.”	What did you see or hear? What cmd/dashboard did you use? When did you notice?

How things normally work

“After the on-call restarted it, it did not succeed.”	How did you restart it? What usually happens before or after restarting? Have you done/seen this before?

Review
Postmortems

Rationales for choices or decisions

“On-call person decided to...”	What helped you make the decision? Had you done/seen this before?

Alternatives considered

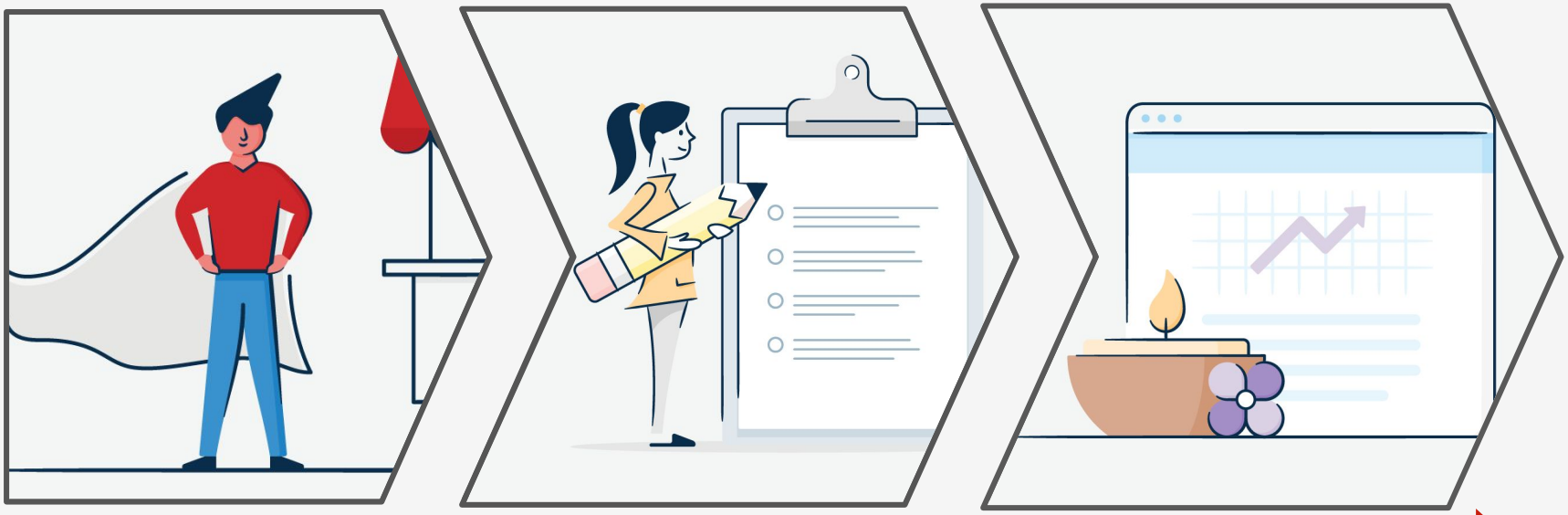
“On-call person decided to...”	What other options did you consider at the time?

Weaknesses in process or protocol

“It was frustrating that...”	What made it difficult to handle this incident? Is this process sustainable?

Postmortems

- Learning tool to boost experience and build on-call mindset
- Blameless culture and knowledge sharing



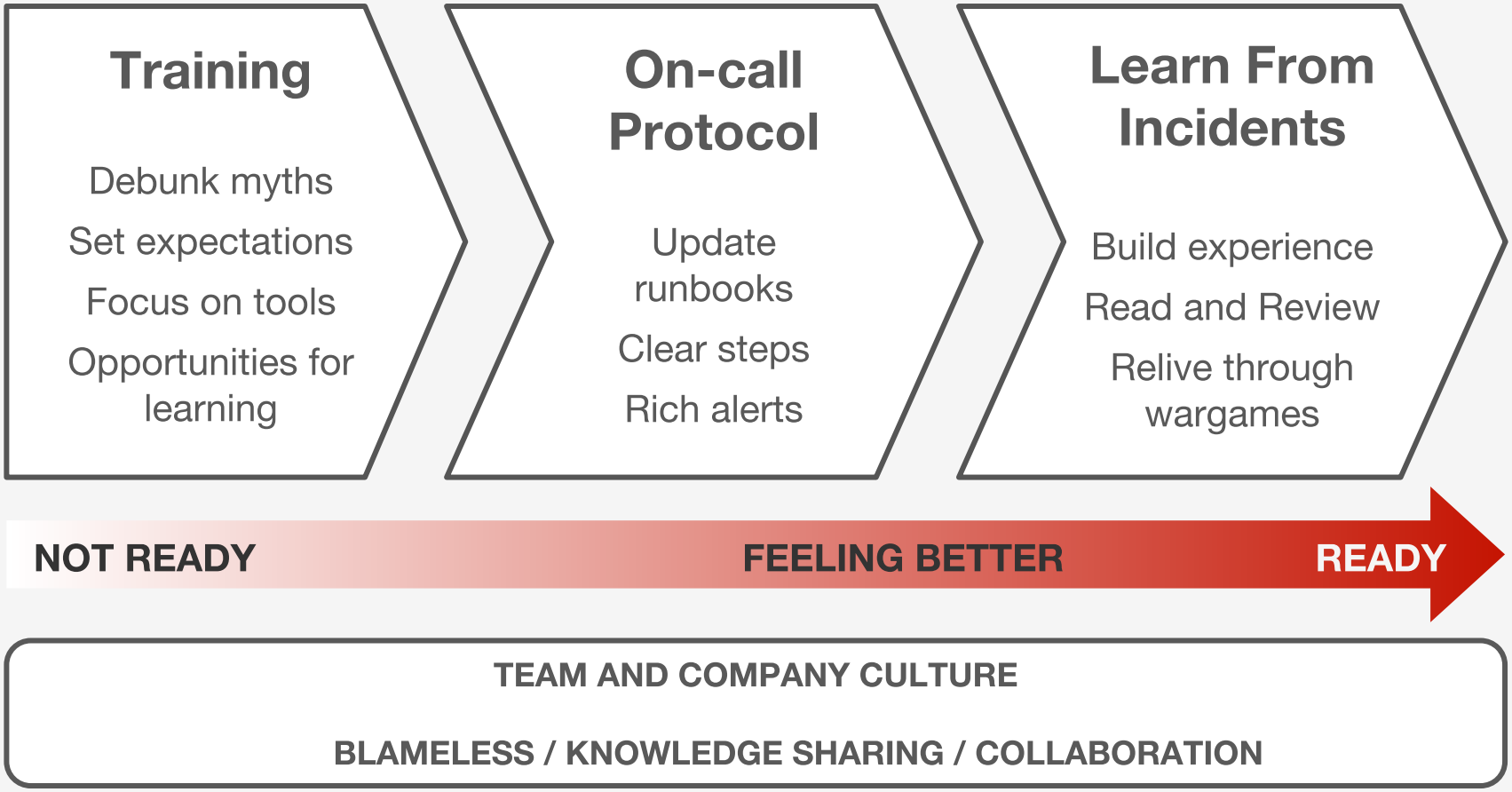
NOT READY

FEELING BETTER

READY

TEAM AND COMPANY CULTURE

BLAMELESS / KNOWLEDGE SHARING / COLLABORATION


Training
Debunk myths
Set expectations
Focus on tools
Opportunities for learning
On-call Protocol
Update runbooks
Clear steps
Rich alerts
Learn From Incidents
Build experience
Read and Review
Relive through wargames
NOT READY
FEELING BETTER
READY
TEAM AND COMPANY CULTURE
BLAMELESS / KNOWLEDGE SHARING / COLLABORATION

Training materials

http://bit.ly/lisa18-oncall

Additional Resources

Training new on-calls

- Accelerating SREs to On-Call and Beyond
- From Zero to Hero: Recommended Practices for Training your Ever-Evolving SRE Teams

Runbooks

- 7 Deadly Sins of Documentation
- Do Docs Better: Practical Tips

Postmortems

- Postmortem culture: learning from failure
- Debriefing facilitation guide

Questions?

Thank you.