SRE at a Startup: Lessons From LinkedIn

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Matterport

usenix LISA16

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Who Am I?

- Scientist (computational chemistry)
- Sysadmin
- Developer (Perl, Java, C)
- Systems Engineer/SRE/Infrastructure Engineer/…
- Big Companies: Kodak, Kraft General Foods, NetApp, LinkedIn
- Small: 4info, Skyfire, Matterport
- Chef (real chef, not the software)

Does SRE work at a startup?

Outline

- What is SRE?
- LinkedIn
  - Early Times
  - SRE
- Matterport
  - Early Times
  - Changes
  - Lessons

What is “SRE”?

- Site Reliability Engineer (Engineering)
  - Started at Google ca. 2003.
- “SRE is what happens when you ask a software engineer to design an operations team.” [sre]
- Member of team focused on build, deployment, monitoring, etc.
  - But, entire team is still responsible.
- Each dev team is self-reliant.
- Still need someone to support the “core infrastructure”.

DevOps

Caution: These are my opinions!

- NO DEVOPS TEAM!
- DevOps is a paradigm not a job title.
  - “Everyone is a devops engineer.”
- “If you build it, you run it.” [in production]
  - Werner Vogels, Amazon CTO [vogels]
- SRE is an implementation of the DevOps paradigm.

LinkedIn

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LinkedIn: The Early Times

- Joined in (late) 2010
- Single AppOps team for everything
- Central NOC, only 24/5
  - “Pager” passed around AppOps (SRE)
- Other ops teams: sysadmin, network, DBAs

LinkedIn: Early Releases

- Large releases, every other week
- Complex dependencies
- Done after work hours and took many hours to complete
- Complicated “release” branches
- “Release team” for changes
- Centralized (REST) service with configuration details

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LinkedIn: SRE Changes

- Changed name; aka “rebranded” (AppOps -> SRE)
- SRE broken up into dev specific teams
  - Eventually, moved to sit with dev team
  - Worked much closer with subset of devs
- Implemented Salt
- More coding
- Eventually, SRE teams for internal products

LinkedIn: DevOps

- Simplified “trunk” model*
  - No more feature branches
- Devs had access to configuration data
- Richer testing platform
- Devs were able to deploy to production
  - First to a canary, then entire cluster
- “A/B tests” for new features (aka “feature flags”)
- Devs involved in oncall (varied by team)

LinkedIn: Dev Self Service

- Automated code metrics
  - Dev would annotate code to produce metrics
  - No limits on number of metrics sent*
- inGraphs
  - Dashboards in YAML
- Self service alerts

Why is this important?

- Implementing a new paradigm is hard.
  - Need management support.
- LinkedIn changed a LOT of things allowing it grow.
- Self service is important.
- If LinkedIn can do it, so can your startup.

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- **Matterport**
  - Early Times
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matterport®

aka “The Startup”

Who/What Is Matterport?

- 3D visualization of spaces.
  - Current focus: residential real estate
- Over 150 employees
- Based in Silicon Valley. (Offices in Chicago and UK.)

Matterport Technology

- Camera w/firmware
- Client (javascript, Unity)
- C++
- Python (DJango)
- Salt
- AWS
- Tons of third parties (“startup micro-economy”)

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“Ops” Work

- Single dev doing “operations” work
- He was the only one that knew entire stack
- Wrote tooling as needed
- Not all tools checked-in
- Several snowflake servers
- No Metrics
- Minimal monitoring

Releases

- All deploys by one person
- “Blue - Green” deployments (2 environments: active and dormant)
  - Lagging writes manually copied to new DB
- Little or no communication
- Hour+ downtime
  - Scheduled for late at night
- Hand-edits made to code in prod for hotfix

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EVERYTHING IS BROKEN
FIX ALL THE THINGS!
memegenerator.net

OVERWHELMED?

When you're waist-deep in tribbles, it's a bit difficult to remember that your original objective was to guard the quadrotriticale.

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Does this sound familiar?

SNAFU - Situation Normal …

- Startups start with “dev”
  - Engineers want to code, not deploy
- Start getting “real customers”…
- “Ops” work happens organically
- Just the challenge I was looking for!

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First Things First

- Prioritize fixing things
- Simplify
- File lots of Jira tickets
- Communication is important
- Get management buy-in
- All hands meeting: “We all own the site.”

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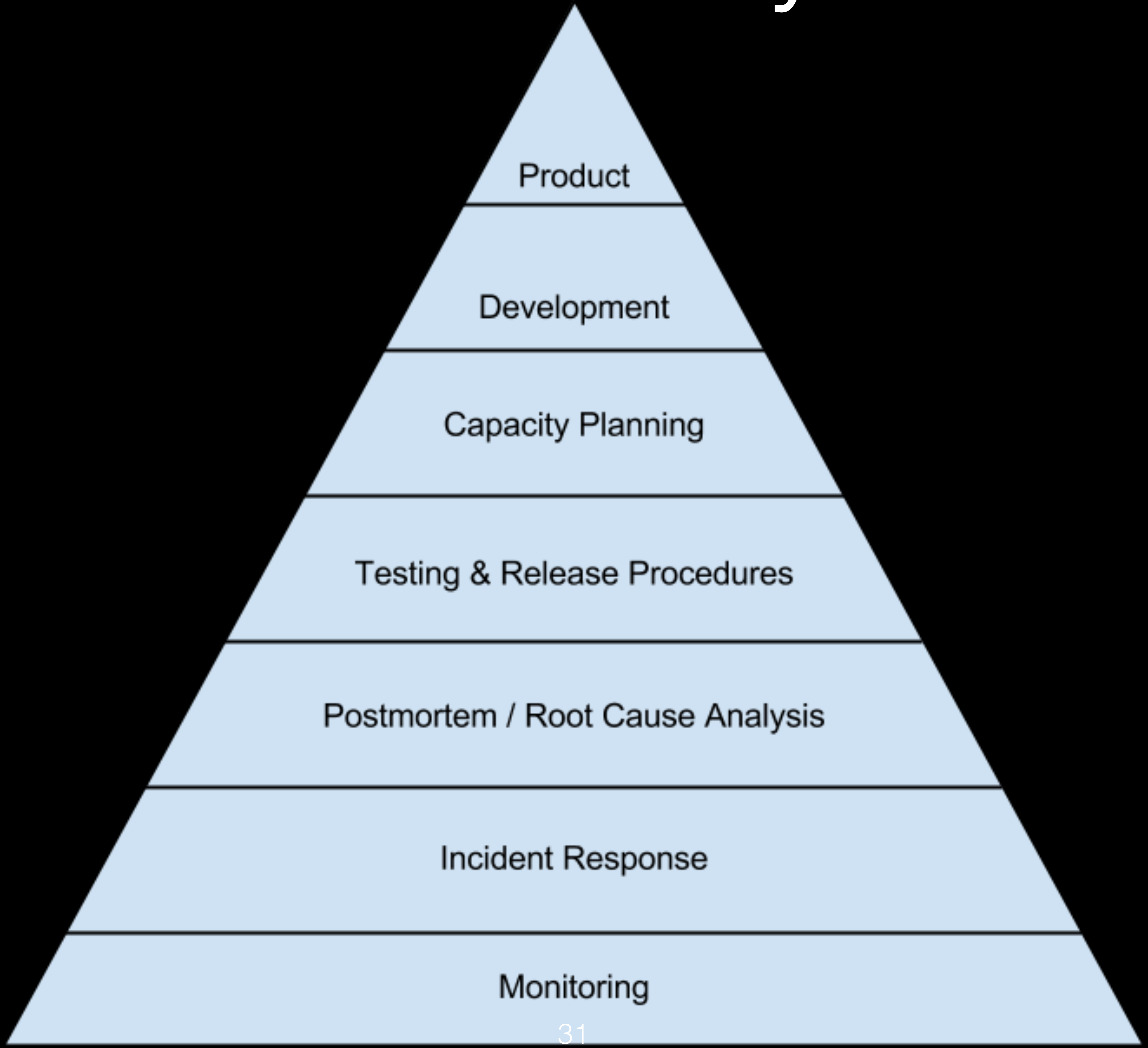
Dickerson's Hierarchy of Reliability



My Hierarchy of Needs

- Metrics and Monitoring
- Reproducible Builds (required SCM commit)
- Stable/Predictable Release Schedule
- More Communication (and documentation)
- Dev Ownership (includes testing)
- Build a Team

Metrics and Monitoring

Metrics and Monitoring

- Datadog (statsd under the hood)
- Grassroots effort.
    - Show lead dev statsd and its docs
    - Create a few sample dashboards
    - *Everyone* has access (login)
- Expand access to monitoring system
- Simplify by removing unused systems (third parties)

SCM and Builds

- Simplify: everyone uses git
  - Github Enterprise
- Buildbot
  - Reproducible builds of C++ code
- Python code deployed directly from git
  - Not ideal… bigger fish to fry
- Automated tests with CircleCI
  - Eventually; automated builds its CircleCI
  - Self-support!

SCM For Infra

- All salt changes are committed to git
- Simple unit tests run on salt changes
- Testing hosts for every member of infra
- Simplify salt code
  - Remove conditionals where possible
  - Implement data structures

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Release Improvements

- All non-production environments are free-game
  - Devs do “trip over each other” once in a while
  - They figured it out and adapted
- Prod releases are during business hours
  - If something goes wrong, dev needs to be available

More Release

- Backwards compatible
    - Devs updated the process for schema changes
- Release tickets in Jira
- Release plans in wiki
- Release planning meetings

Release Got Better

- Moved to every week
- Has become routine
  - “Smooth” release is the norm
  - Senior management has complete confidence in the process

Then Even More Betterer

- No more planning meeting
  - Everything in Jira and the wiki
- Slack channel and bots
- Feature flags
- Dev deploy directly to production
  - On their own schedule

Communication

- Slack everywhere
    - Release channel
    - “Outage” channel
    - Bots integrated with automation
    - Even the recruiters and marketing are using slack
- Docs on wiki
- Lots of Jira tickets

Dev Ownership

- Self service: Github and Circle
- Root access to all dev hosts
- Most have root to staging hosts
- Many have root on production
- Access to datadog, loggly, sentry, etc

Team

- Hired 2 more people
- Daily Standups
  - They also attend (some) product standups
- Weekly meetings
  - Ticket triage: all new, all “blockers”
- Kanban

Lots Left To Do

- Only some products have devs that can deploy to prod.
- Some developers submitting PRs to salt code
  - But, not enough.
- More *automation*, but only 1 <u>**autonomous**</u> system
- The rest would fill a dozen slides…

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Lessons

- Patience: culture shifts take a long time
  - Devs *have* to be involved
- Don't be afraid of failure
- Respect your ancestors
- Start small and iterate

More Lessons

- Shared experience with failure is better than “preaching”
- Hiring is hard at all sizes
- Make decisions with data
- Demonstrate effectiveness to management
- Support of senior dev(s) necessary
- SRE is an implementation of DevOps
- Constant teaching/learning

Questions?

One more thing…

We’re hiring!

https://matterport.com/careers/

Related Talk

Closing Plenary: “SRE in the Small and in the Large”
Niall Murphy and Todd Underwood, Google
Constitution Ballroom

Q & A
(For real this time…)

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- https://matterport.com/careers/

Notes

- [vogels] “A Conversation with Werner Vogels
  http://queue.acm.org/detail.cfm?id=1142065

- [sre] “Site Reliability Engineering”
  Betsy Beyer, Chris Jones, Jennifer Petoff, Niall Richard Murphy
  http://shop.oreilly.com/product/0636920041528.do

Additional Resources

- Infrastructure as Code (Kief Morris)
  - http://shop.oreilly.com/product/0636920039297.do
- The Phoenix Project (Gene Kim, Kevin Behr, George Spafford)
  - https://www.amazon.com/Phoenix-Project-DevOps-Helping-Business/dp/0988262509
- The DevOps Handbook (Gene Kim, Patrick Debois, John Willis, Jez Humble)
  - https://www.amazon.com/DevOps-Handbook-World-Class-Reliability-Organizations/dp/1942788002
- Continuous Delivery (Jez Humble, David Farley)
  - https://www.amazon.com/Continuous-Delivery-Deployment-Automation-Addison-Wesley/dp/0321601912