The Importance of Culture

Building and Sustaining Effective Engineering Organizations

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Background

CTO at KIXEYE

- *Real-time strategy games for web and mobile*

Director of Engineering for Google App Engine

- *World’s largest Platform-as-a-Service*

Chief Engineer at eBay

- *Multiple generations of eBay’s real-time search infrastructure*

Building Blocks of Culture

Hiring and Retention

Ownership and Collaboration

Quality and Discipline

Learning and Experimentation

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Hire and Retain the Best

Hire ‘A’ Players

- *In creative disciplines, top performers are 10x more productive (!)*

Confidence

- *A players bring A players*
- *B players bring C players*

Google Hiring

Goal: Only hire top talent

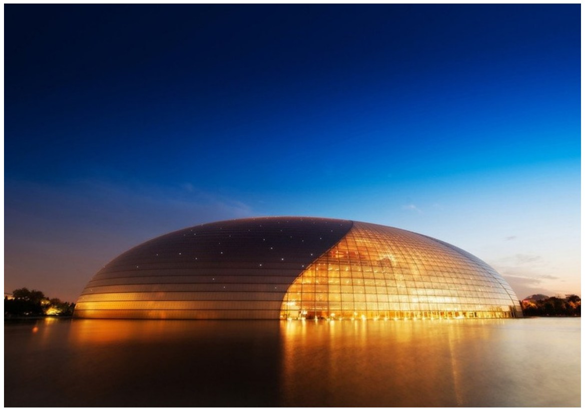
- *False negatives are OK; false positives are not*

Hiring Process

- *Famously challenging interviews*
- *Very detailed interviewer feedback*
- *Hiring committee decides whether to hire*
- *Separately assign new Googler to group*

➔ Highly talented and engaged employees

Respect People



People are not interchangeable

- *Different skills, interests, capabilities*
- *Create a Symphony, not a Factory*

Most valuable and irreplaceable asset

- *Treat people with care and respect*
- *If the company values its people, people will provide value to the company*

eBay “Train Seats”

eBay’s development process (circa 2006)

- *Design and estimate project*
  (“Train Seat” == 2 engineer-weeks)
- *Assign engineers from common pool to implement tasks*
- *Designer does not implement; implementers do not design*

➔ Dysfunctional engineering culture

- *(-) Engineers treated as interchangeable “cogs”*
- *(-) No regard for skill, interest, experience*
- *(-) No pride of ownership in task implementation*
- *(-) No long-term ownership of codebase*

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Service Teams

- Small, focused teams
  - *Single service or set of related services*
  - *Minimal, well-defined “interface”*
  - *Vendor – Customer relationships*

- Clear “contract” between teams
  - *Functionality: agreed-upon scope of responsibility*
  - *Service levels and performance*

Google Services

- All engineering groups organized into "services"
  - *Gmail, App Engine, Bigtable, etc.*
- Self-sufficient and autonomous
- Layered on one another

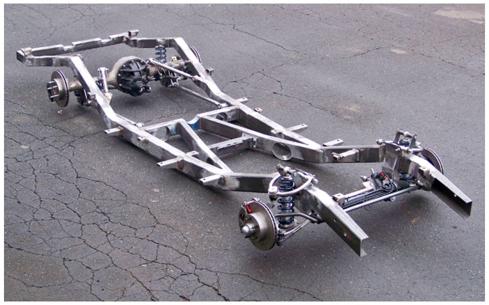
→ Very small teams achieve great things

Autonomy and Accountability

- **Give teams autonomy**
  - ***Freedom to choose technology, methodology, working environment***
  - ***Responsibility for the results of those choices***

- **Hold team accountable for *results***
  - ***Give a team a goal, not a solution***
  - ***Let team own the best way to achieve the goal***

KIXEYE Service Chassis



- Goal: Produce a “chassis” for building scalable game services
- Minimal resources, minimal direction
  - *3 people x 1 month*
  - *Consider building on open source projects*

➔ Team exceeded expectations

  - *Co-developed chassis, transport layer, service template, build pipeline, red-black deployment, etc.*
  - *Heavy use of Netflix open source projects*
  - *15 minutes from no code to running service in AWS (!)*
  - *Plan to open-source several parts of this work*

Google and DevOps

Ops Support is a privilege, not a right

- *Developers carry pager for first 6+ months*
- *Service "graduates" to SRE after intensive review of monitoring, reliability, resilience, etc.*
- *SRE collaborates with service to move forward*

Everyone's incentives are aligned

- *Everyone is responsible for production*
- *Everyone strongly motivated to have solid instrumentation and monitoring*

Collaboration

- Act as one team across engineering, product, operations, etc.
- Solve problems instead of blaming and pointing fingers
- Leave politics to the politicians
- Bureaucratic games are not as fun as real games ☺

Google App Engine Co-Location

Multiple Organizations

- *Engineering*
- *Product*
- *Operations ("SRE")*
- *Developer Relations*
- *Different reporting structures to different VPs*

Virtual Team with Single Goal

- *All work to make Google App Engine successful*
- *Coworkers are "Us", not "Them"*
- *When asked which teams we need to sit next to, it never occurred to us that other organizations were not "our team"*

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Quality over Quantity

Whole user / player experience

- *Think holistically about the full end-to-end experience of the user*
- *The user experience is more than UX (!)*
- *Also product functionality, performance, bugs, etc.*

Less is more

- *Solve 100% of one problem rather than 50% of two*
- *Users prefer one great feature instead of two partially-completed features*

Institutionalize Quality

Development Practices

- *Code reviews*
- *Continuous Testing*
- *Continuous Integration*

Quality Automation

- *Automated testing frameworks*
- *Canary releases to production*

“Make it easy to do the right thing, and hard to do the wrong thing”

Google Engineering Discipline

Solid Development Practices

- *Code reviews before submission*
- *Automated tests for everything*
- *Single logical source code repository*

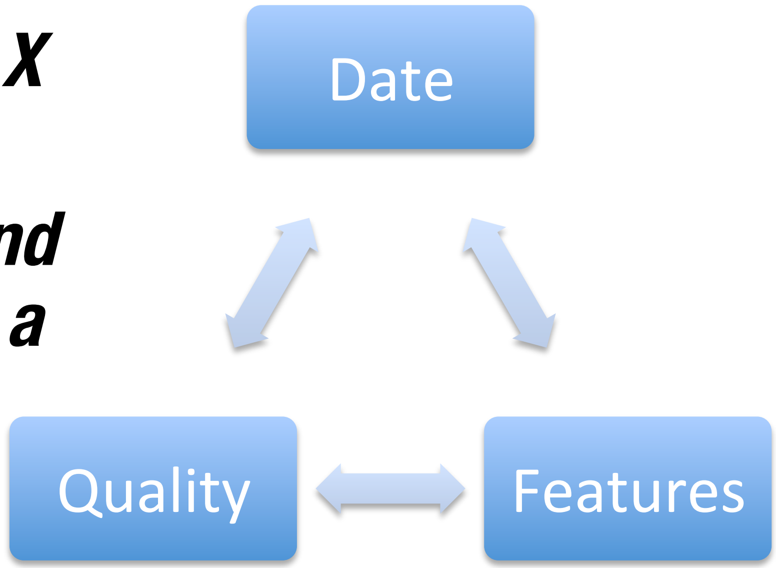
➔ Internal Open Source Model

- *Not “here is a bug report”*
- *Instead “here is the bug; here is the code fix; here is the test that verifies the fix”* ☺

Technical Tradeoffs

Make Tradeoffs Explicit

- *Every decision is a tradeoff: X or Y or Z*
- *When you choose features and a date, you implicitly choose a level of quality*



Date

Quality

Features

→ **Be honest with yourself and your team when you are doing this (!)**

Technical Tradeoffs

Manage Technical Debt

- *Plan for how and when you will pay it off*
- *Maintain sustainable and well-understood level of debt*

"Don't have time to do it right" ?

- *WRONG – Don't have time to do it <u>twice</u> (!)*

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Constant Learning

Any process, organization, or product can always be improved

Mistakes are a learning opportunity

- *What did you do -> What did you *learn**
- *Take emotion and personalization out of it*

Encourage iteration and velocity

- *“Failure is not falling down but refusing to get back up” – Theodore Roosevelt*

Google Blame-Free Post-Mortems

Post-mortem After Every Incident

- *Document exactly what happened*
- *What went right*
- *What went wrong*

Open and Honest Discussion

- *What contributed to the incident?*
- *What could we have done better?*

➔ *Engineers compete to take personal responsibility (!)*

Google Blame-Free Post-Mortems

Action Items

- *How will we change process, technology, documentation, etc.*
- *How could we have automated the problems away?*
- *How could we have diagnosed more quickly?*
- *How could we have restored service more quickly?*

Follow up (!)

Iteration and Experimentation

***Engineer* successes**

- *Constant iteration*
- *Launch is only the first step*
- *Assume you will not get it perfect on the first try*
- *A / B Testing needs to be a core competence*

Many small experiments sum to big wins

eBay Machine-Learned Ranking

Ranking function for search results

- *Which item should appear 1st, 10th, 100th, 1000th*
- *Before: Small number of hand-tuned factors*
- *Goal: Thousands of factors*

Experimentation Process

- *Predictive models: query->view, view->purchase, etc.*
- *Hundreds of parallel A|B tests*
- *Full year of steady, incremental improvements*

→ 2% increase in eBay revenue (~$120M)

Recap: Building Blocks of Culture

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Thank you!

Slide URL:

- http://www.slideshare.net/RandyShoup/the-importance-of-culture-building-and-sustaining-effective-engineering-organizations

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