

Scaling Scrum

How Scrum Works at the Enterprise Level



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Jeff Sutherland

Scrum is Fractal



- Scales to any size
- In the large it looks similar to the small
- Intentionally designed to deal with:

Conway's Law

The architecture of the code will reflect the architecture of the organization!

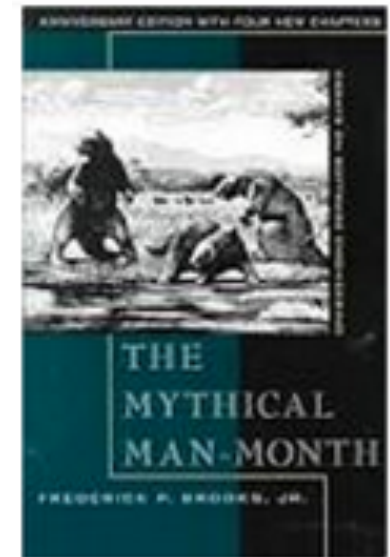
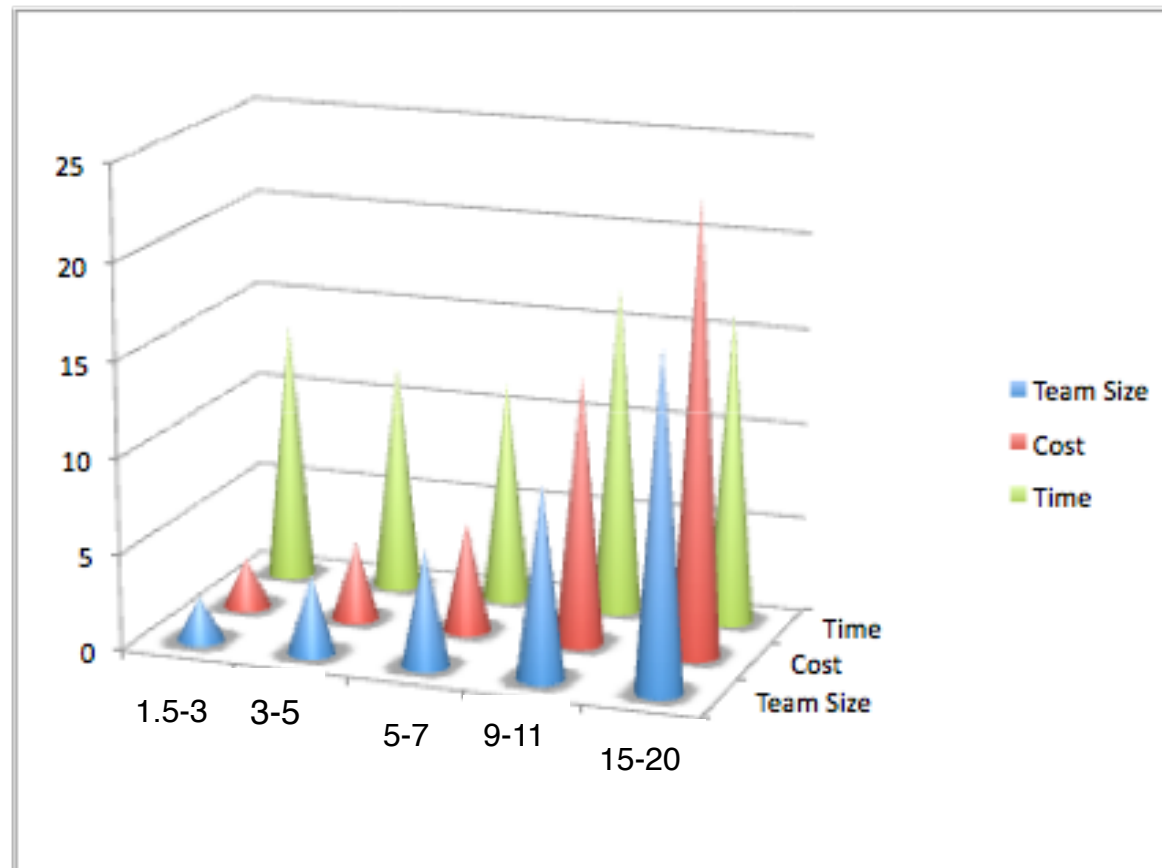
J. Sutherland, A. Viktorov, and J. Blount, **Adaptive Engineering of Large Software Projects with Distributed/Outsourced Teams**, in International Conference on Complex Systems, Boston, MA, USA, 2006.

Organizational Architecture

- Scrum is designed to support an object-oriented component architecture
- Good object design requires:
 - Self organization (ease of refactoring)
 - No single point of control (avoid performance bottlenecks)
 - Interdisciplinary teams (increase cohesion, reduce coupling)
 - Emergent behavior (adaptive design)
 - Outcomes emerge with high dependence on relationship and context
 - Team performance far greater than sum of individual
- Scrum is based on complex adaptive systems which exhibit intelligent goal seeking behavior

Brooks Law:

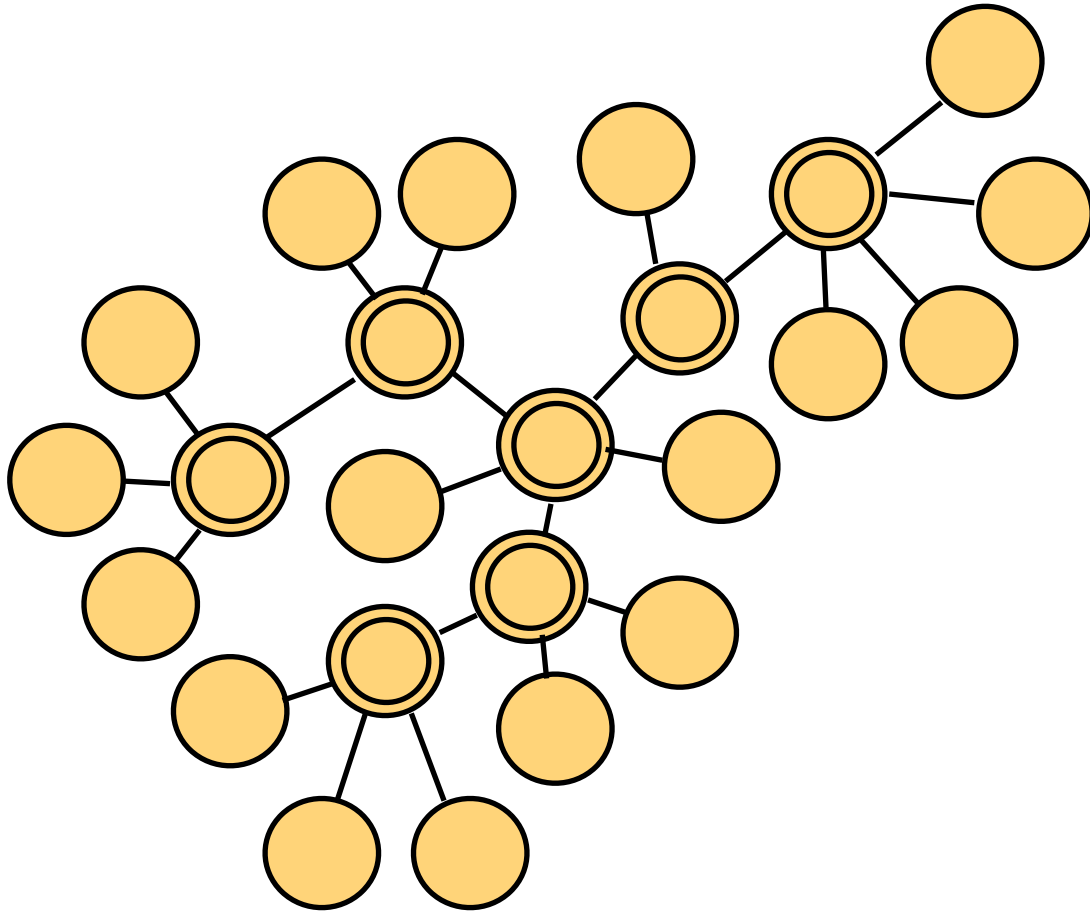
Adding People to a Late Project Makes It Later



- Optimal team size is 4.6 people according to Harvard research.

Information Hiding

- With small teams, Scrum can violate Brooks Law



Managing Product Release

- Many companies have poor Scrum of Scrums implementation
- The Scrum of Scrum must include all capabilities needed for product release at the level of Scrum of Scrums
- Scrum of Scrums Master is held accountable for daily operations, company-wide reporting and Product Release

Manufacturing Scrum of Scrums

First Zero Defect Release

Chris Sullivan: "After failed software releases we adopted a program Scrum-Of-Scrums..."



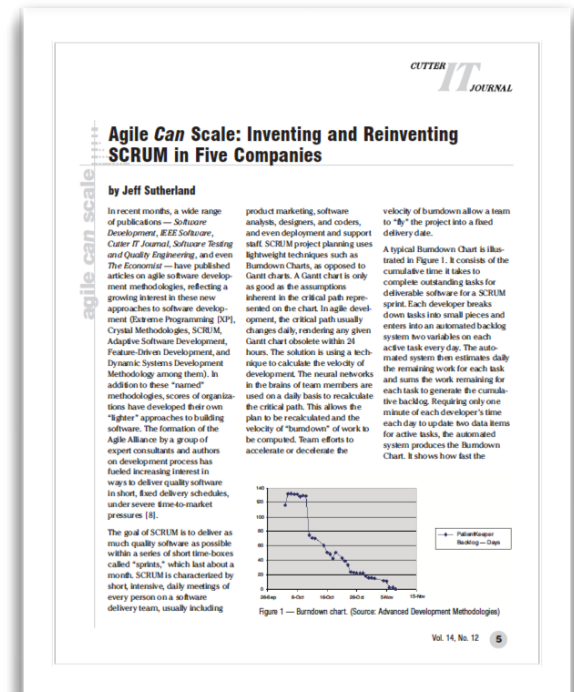
- Very uncomfortable for people in the beginning
- Huge impact on communications and problem resolution

"I was reluctant at first but the Daily Scrum of Scrums was the key reason this is the best launch in our history..."

Manufacturing Manager

The First Scaled Scrum

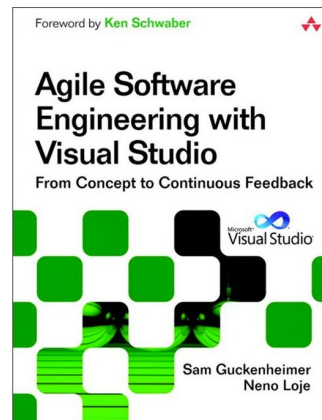
- IDX Systems 1996-2000 (now GE Healthcare)
 - Managers self-organized company into teams
 - Managers became team leaders
 - Directors ran Scrum of Scrums
 - VPs became leaders of sites with multiple Scrum of Scrums
 - Grew to over 600 developers
 - Virtual architecture teams
 - UX team and Integration team
 - External experts verified that production doubled company-wide



Scrum Is Implemented Across Large Organizations



- 3,000 developers working in Scrum Teams
- As of 2011, All new software development done using Scrum
- Wrote book on experience using Scrum at Scale

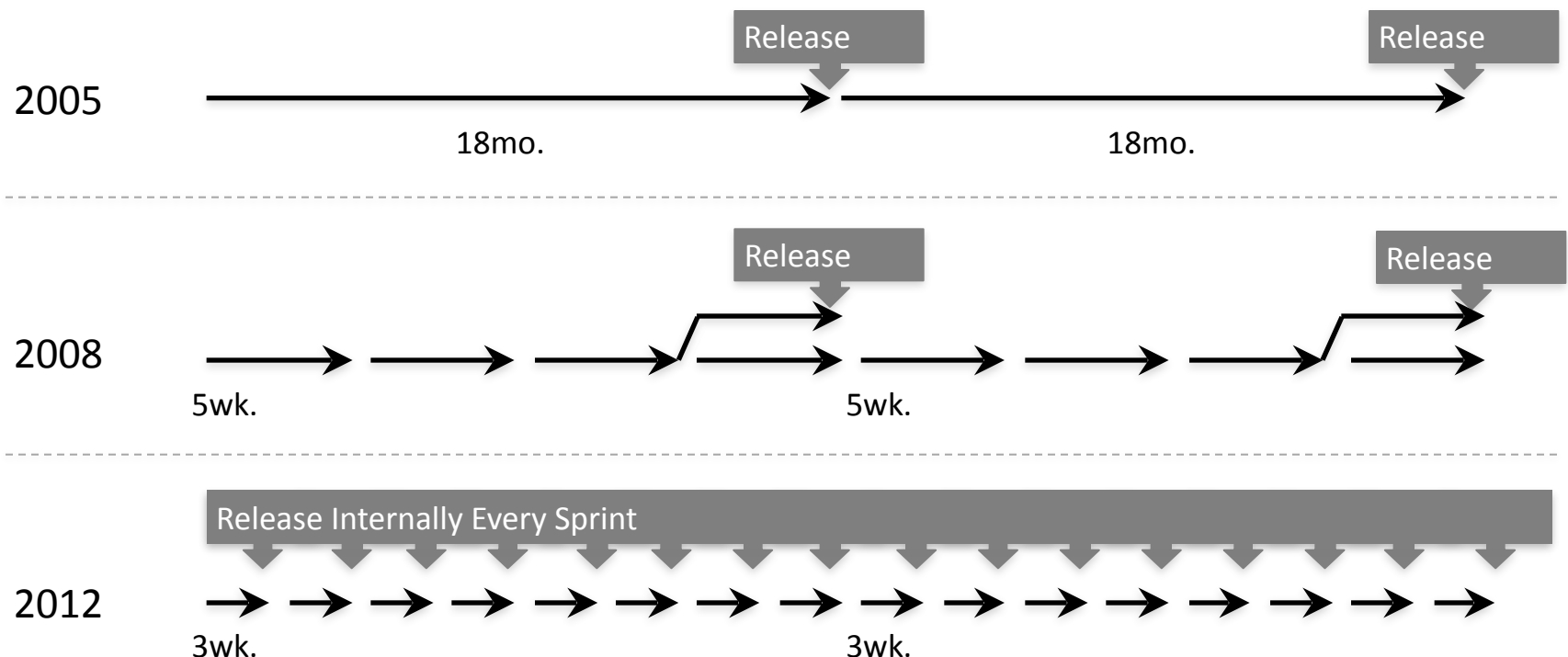
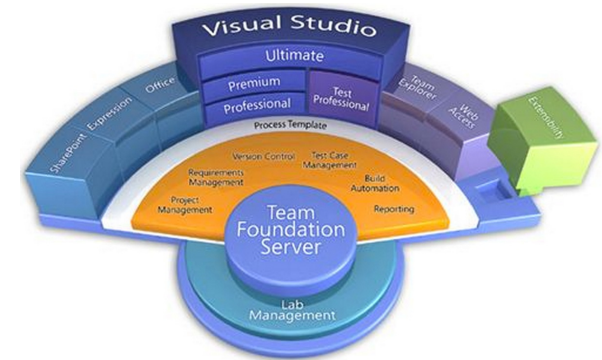


- As of Nov 2012, close to 1,000 Scrum teams
- Line Management role transitioned to facilitating removal of impediments
- Parallel Product Owner management structure now in place as well

Regular Departure Release Planning

Microsoft Case Study

- Prior to 2005, Microsoft released a new version of its Team Foundation Server (TFS) product roughly every 18 months
- Using Scrum, it now deploys a new version internally every 3 weeks

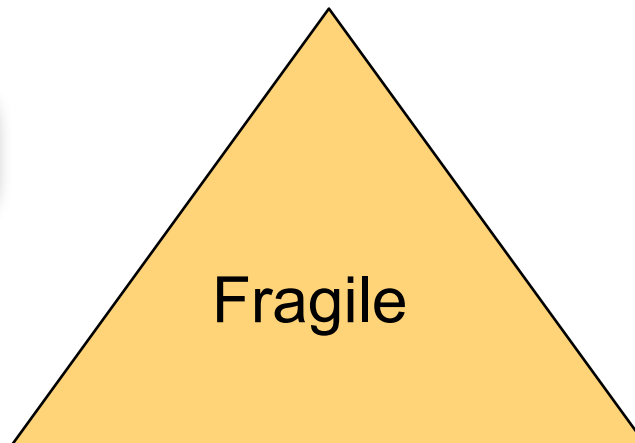


Source: Sam Guckenheimer and Neno Loje. Agile Software Engineering with Visual Studio. Microsoft Press, 2012.

Fragile Agile:

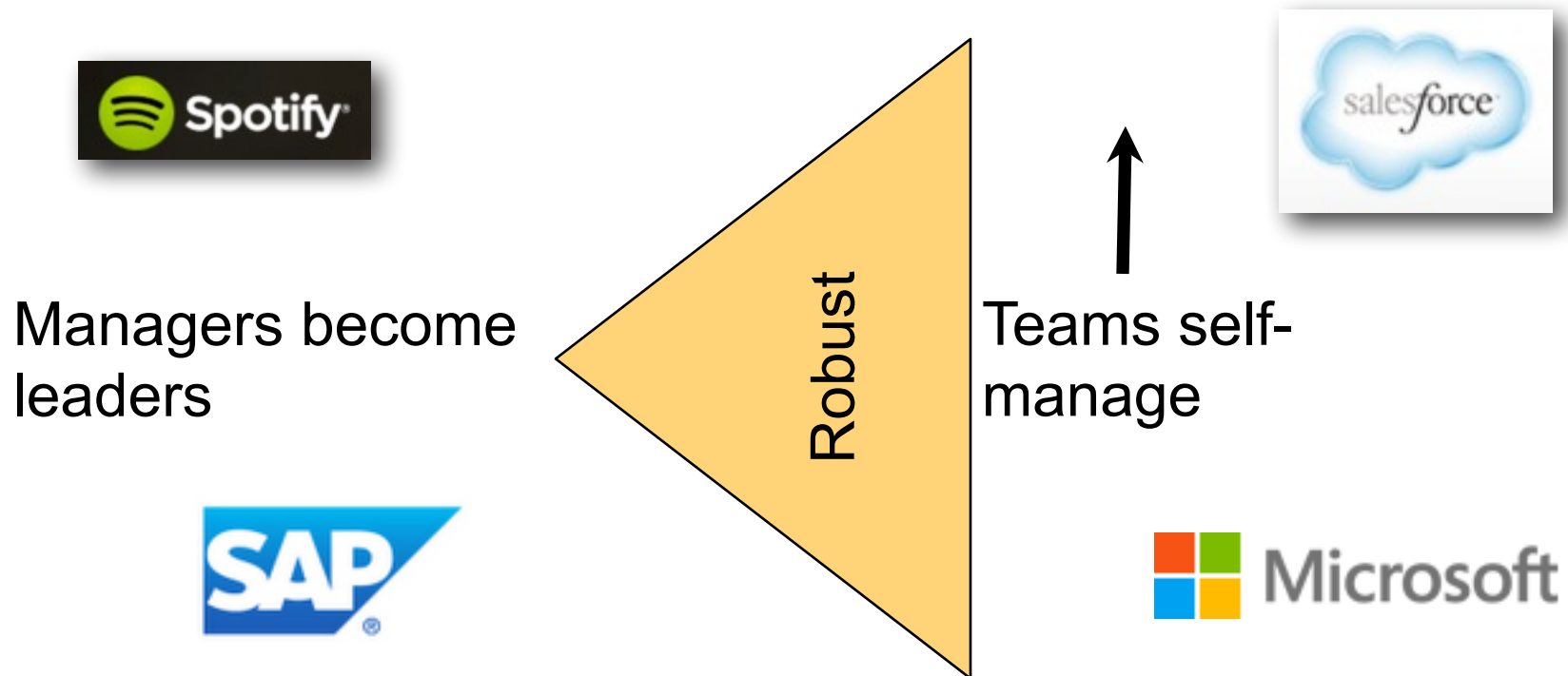
Many Agile Implementations Fail

- Traditional management hierarchy creates project teams
- “Scaling frameworks” are often used to provide scaffolding for the legacy organization until it can evolve
- Bureaucracy or changes in management can cripple and/or destroy agile implementation



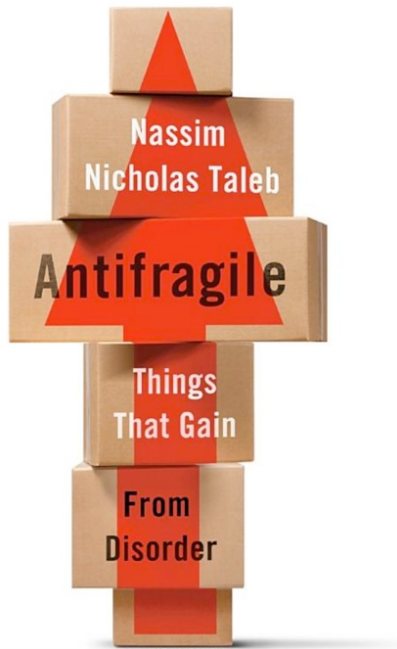
Robust Agile

- Management lets teams self-organize and self-manage. Managers become leaders.
- Leaders create virtual teams that drive communities of practice across company.

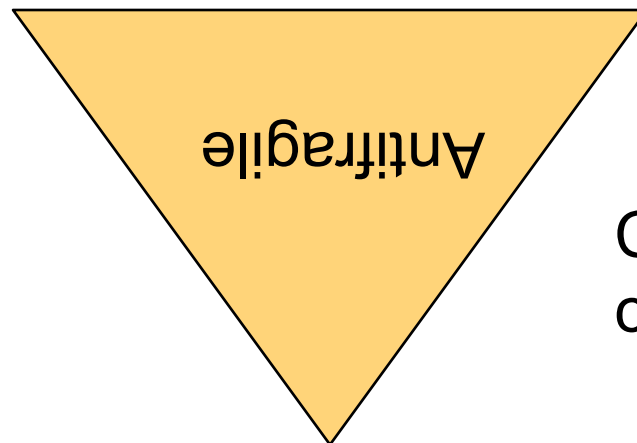


Anti-Fragile Implementation

- Management hierarchy turned upside down.
- Teams self-organize product direction and implementation
- Leadership supports wherever their skills are needed
- Swarming makes organization stronger under stress



Teams drive strategy



Company is customer facing



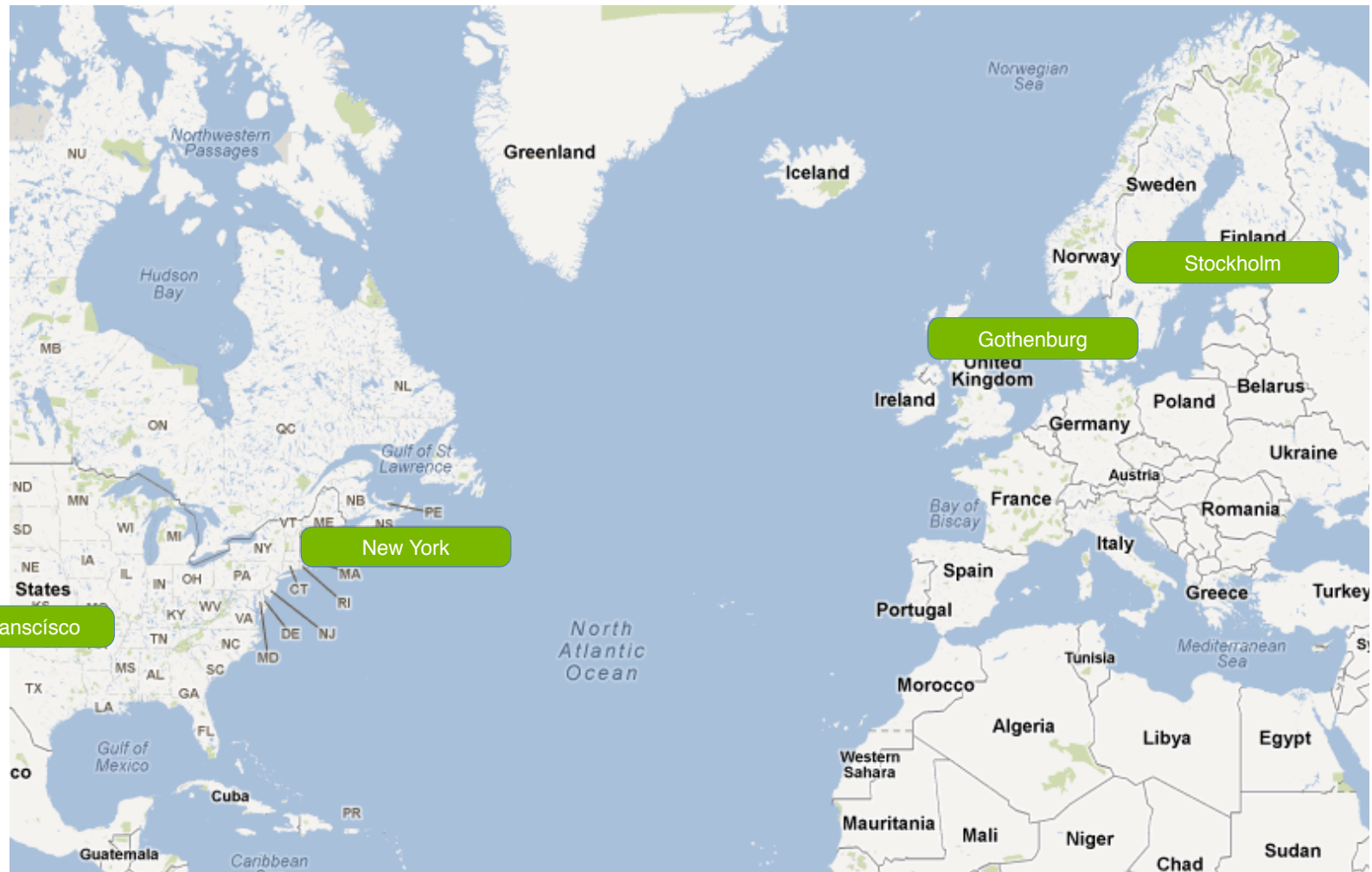
Simple Approach to Scaling

“Small is Beautiful”

- Spotify scaled from 30 to 300 in 3 years
- Every team has a Product Owner and a professional Agile Coach
- Agile Coaches drive process improvement across the company working directly with senior management team

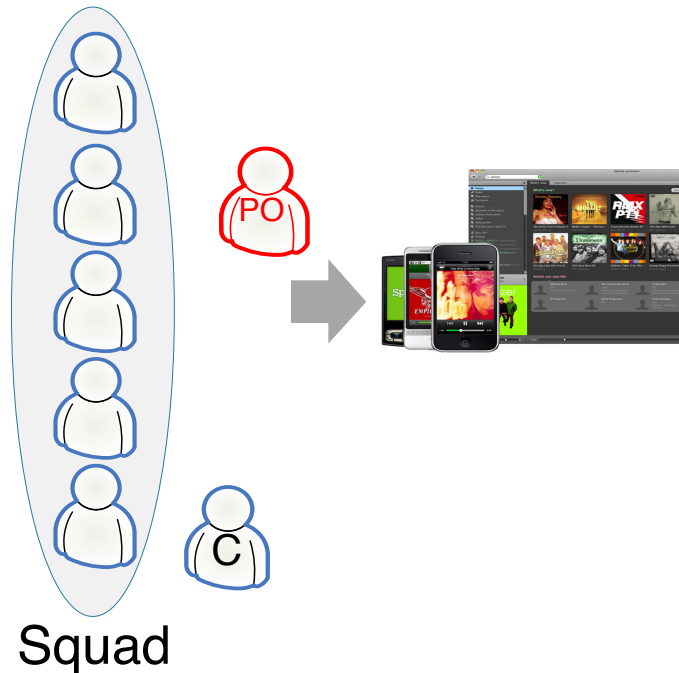


Spotify is Large and Distributed



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Scaling Grows From One Team Done Right

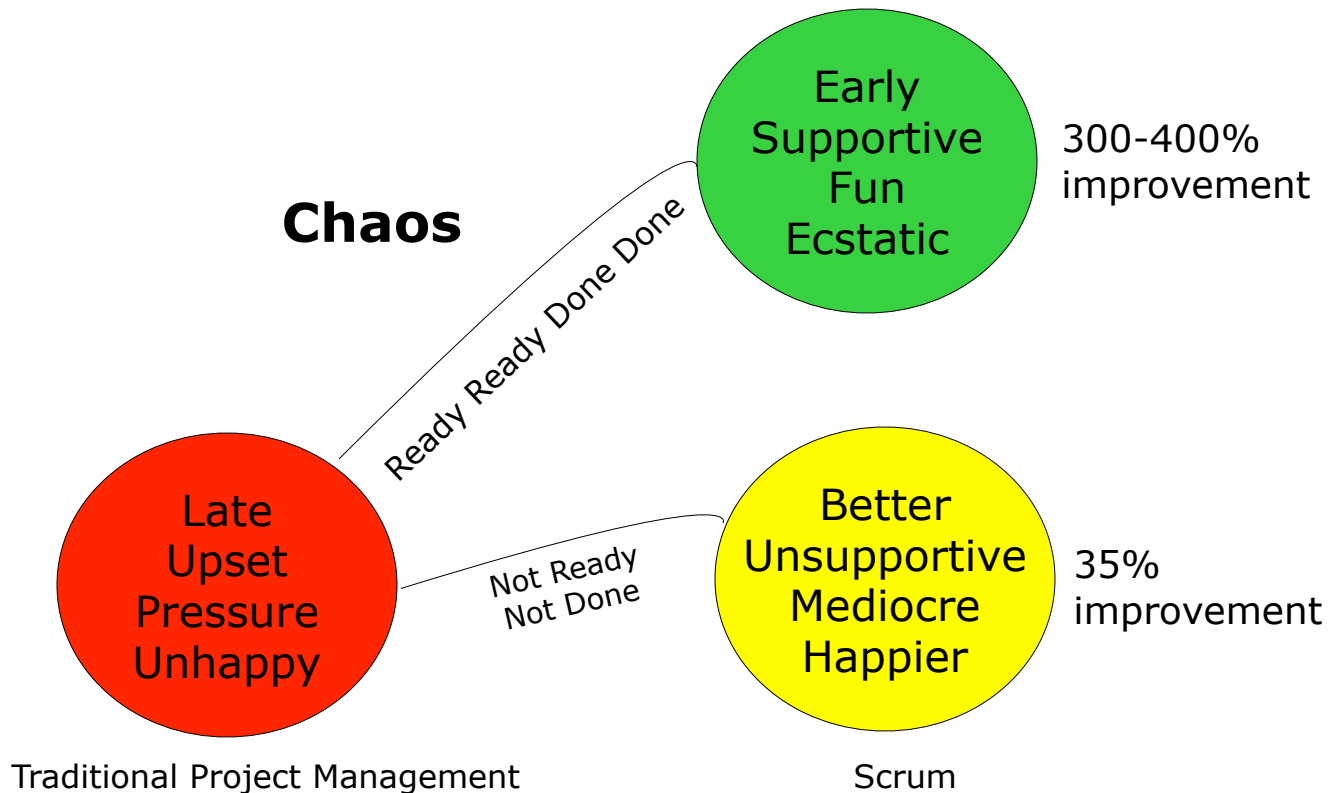


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As a former medical school professor funded for many years by NIH to study the evolution of the human cell, I designed Scrum to scale like a biological organism from a single cell. It is based on evolutionary theory.

100s of Teams at Yahoo

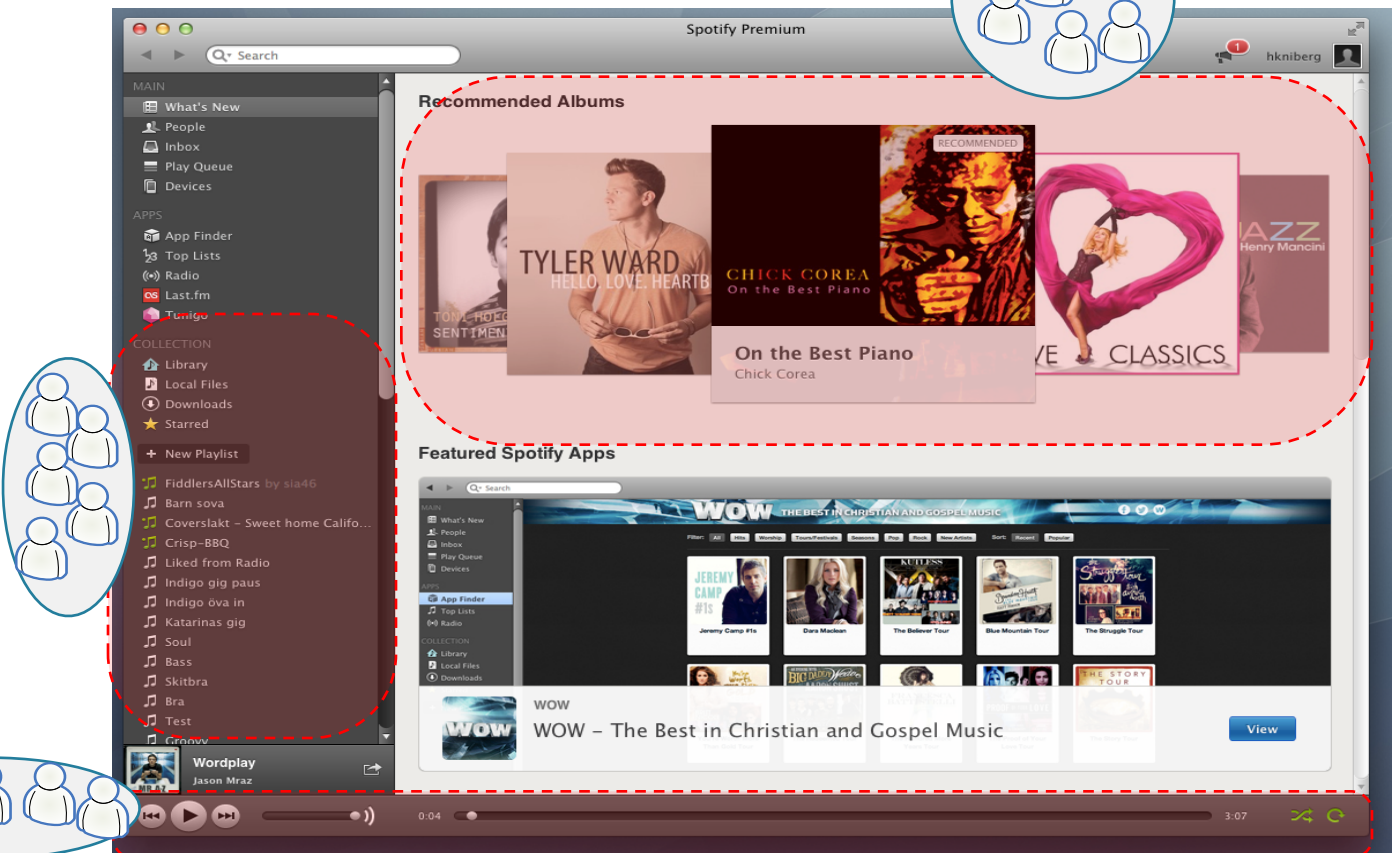
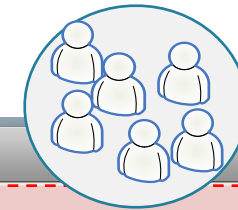
Less Than a Third Done Right



At the team level, I designed Scrum to move an organism through a state space based on systems theory.

Squads Own Customer Visible Piece of Product

The first step to scaling is to form teams focused on features in order to maximize the user experience and speed of iterating on working software.



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Squads Have Agile Space

Colocation doubles productivity. If distributed, make it feel like colocation.



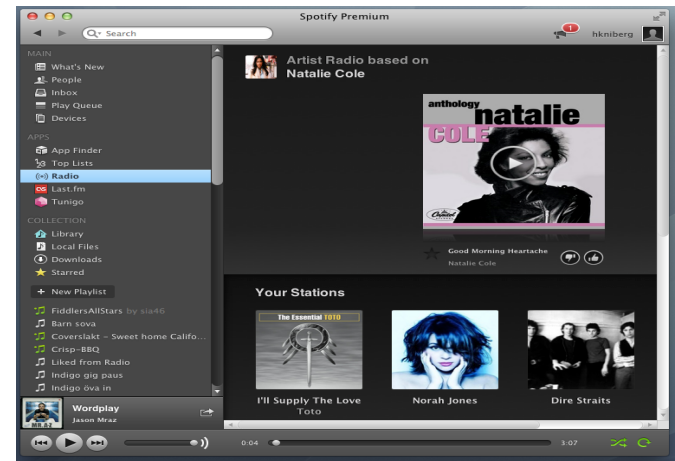
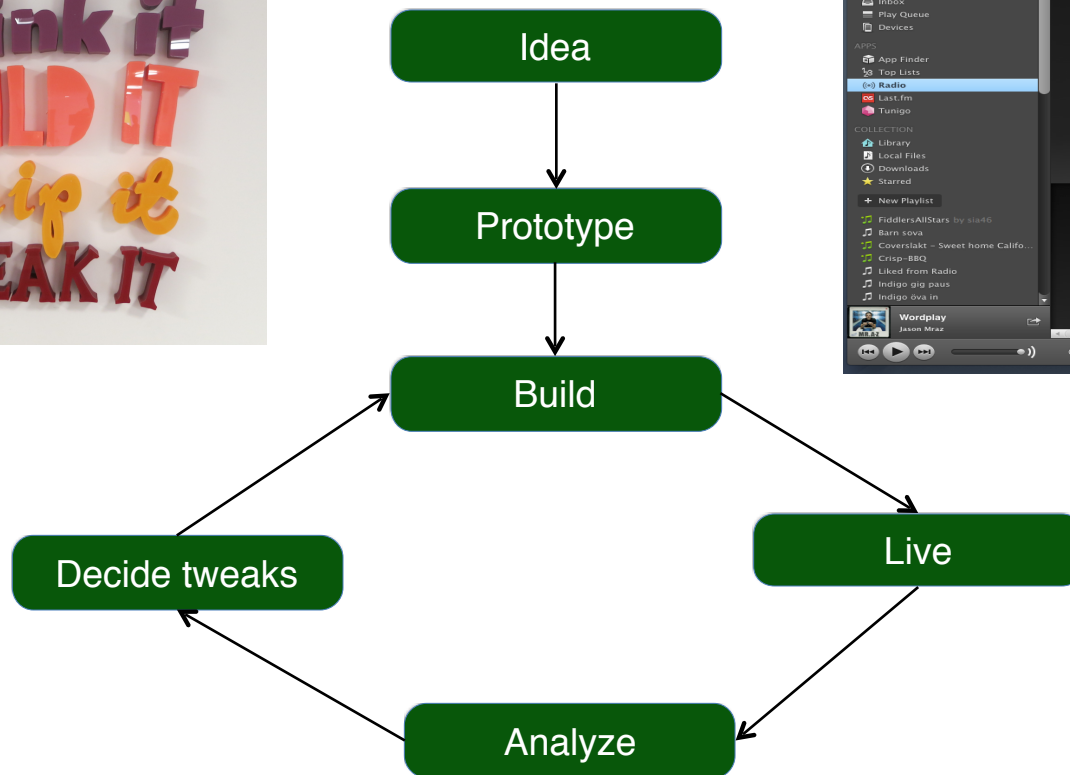
Agile Coaches Capture Squad Performance

Area	Squad 1	Squad 2	Squad 3	Squad 4	Squad 5
Product owner					
Agile coach					
Influencing work					
Easy to release					
Process that fits team					
A mission					
Org. support					

Scrum is continuous process improvement. Scrum Masters need to be measured on process improvement.

Squads Are Autonomous

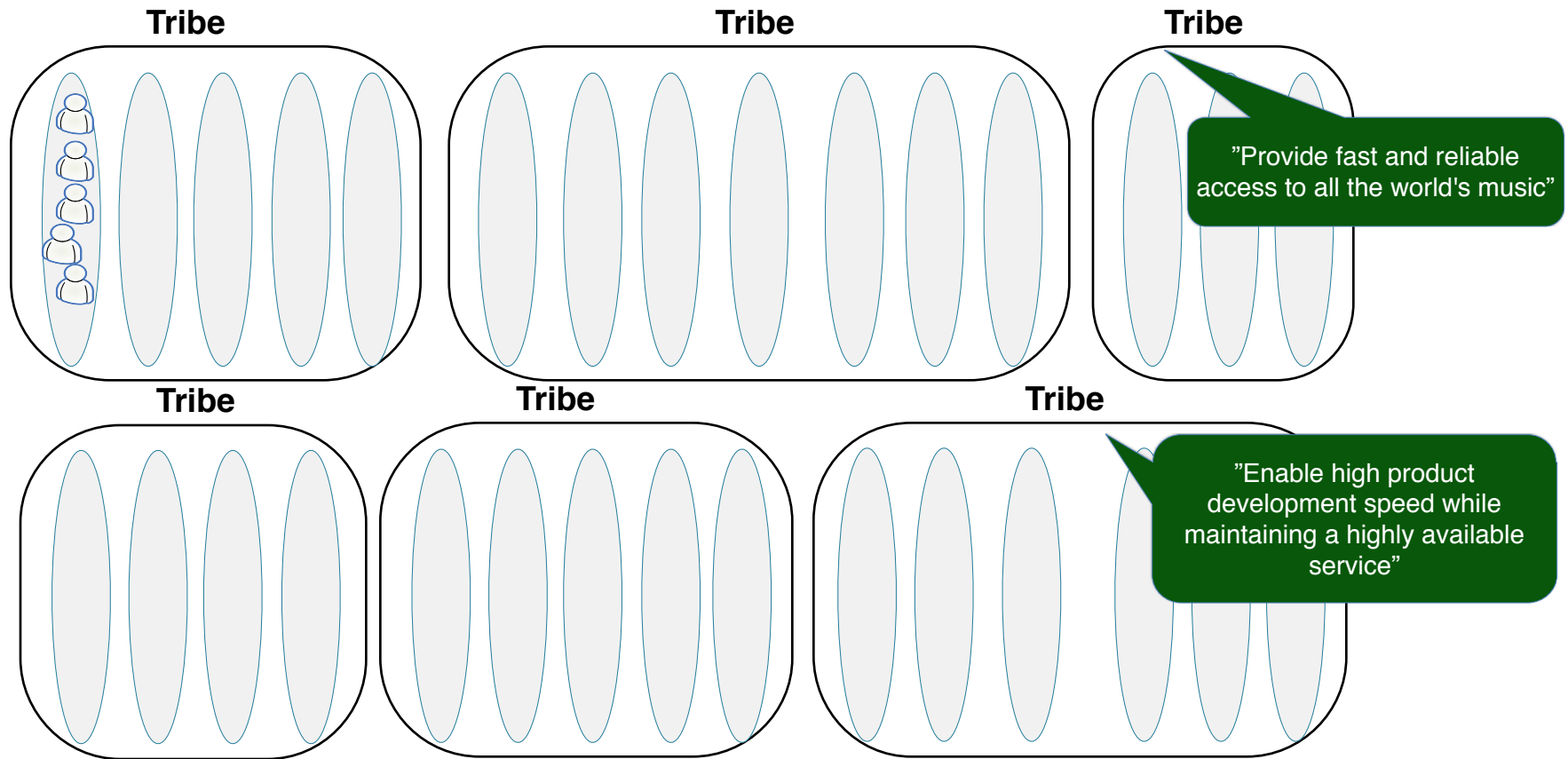
Autonomous teams feel more responsible for building better product. Their work needs to be clearly visible.



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Squads Form Tribes

Tribes have a vision and a mission which requires more than one team.



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Tribes Meet Regularly

The Scrum of Scrums is a Scrum team responsible for epics that drive the vision. Accountability for operational delivery of working software is key.



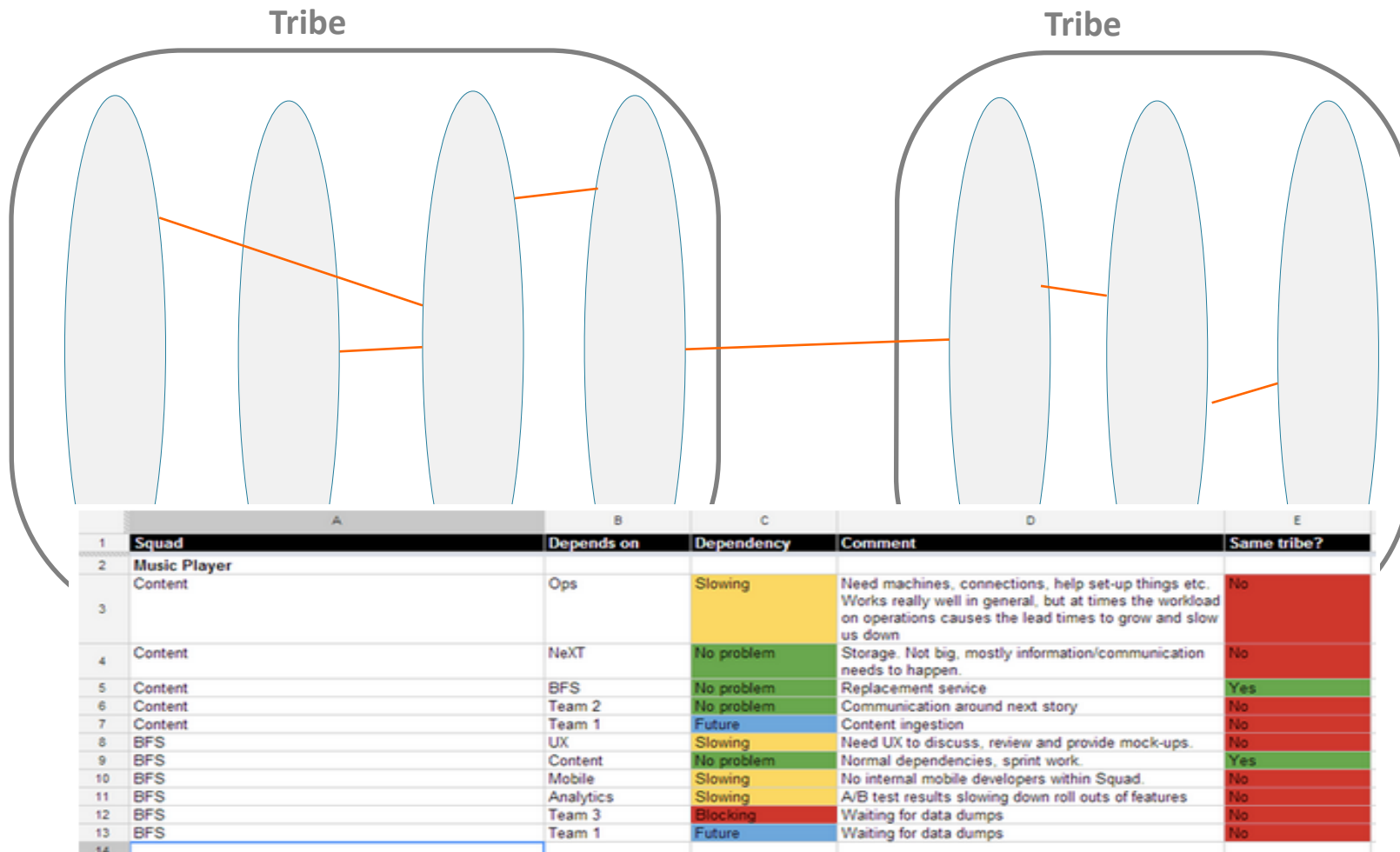
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Communication Between Tribes



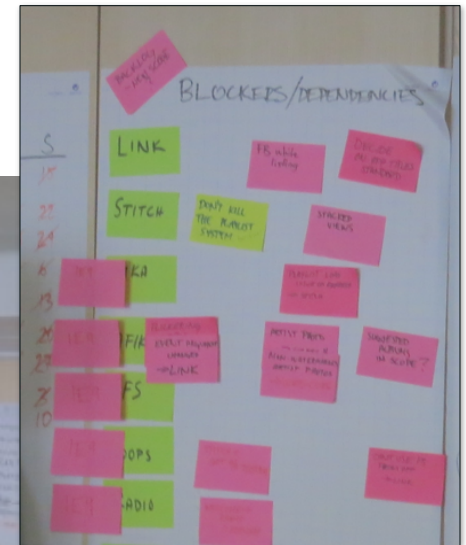
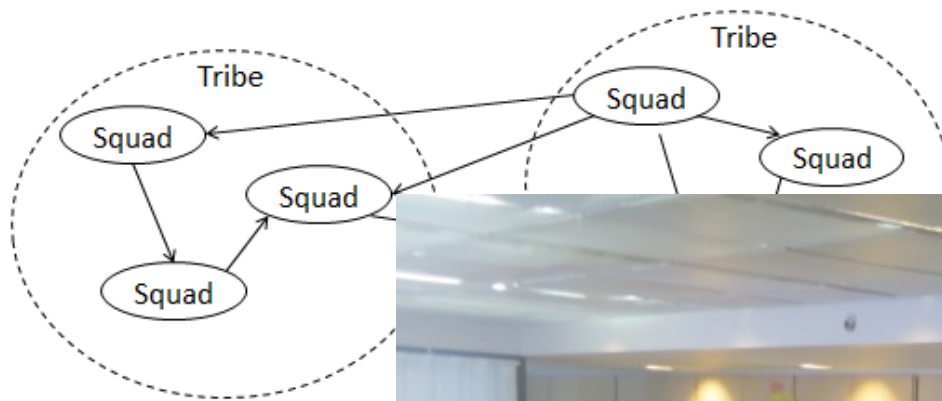
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Dependency Analysis



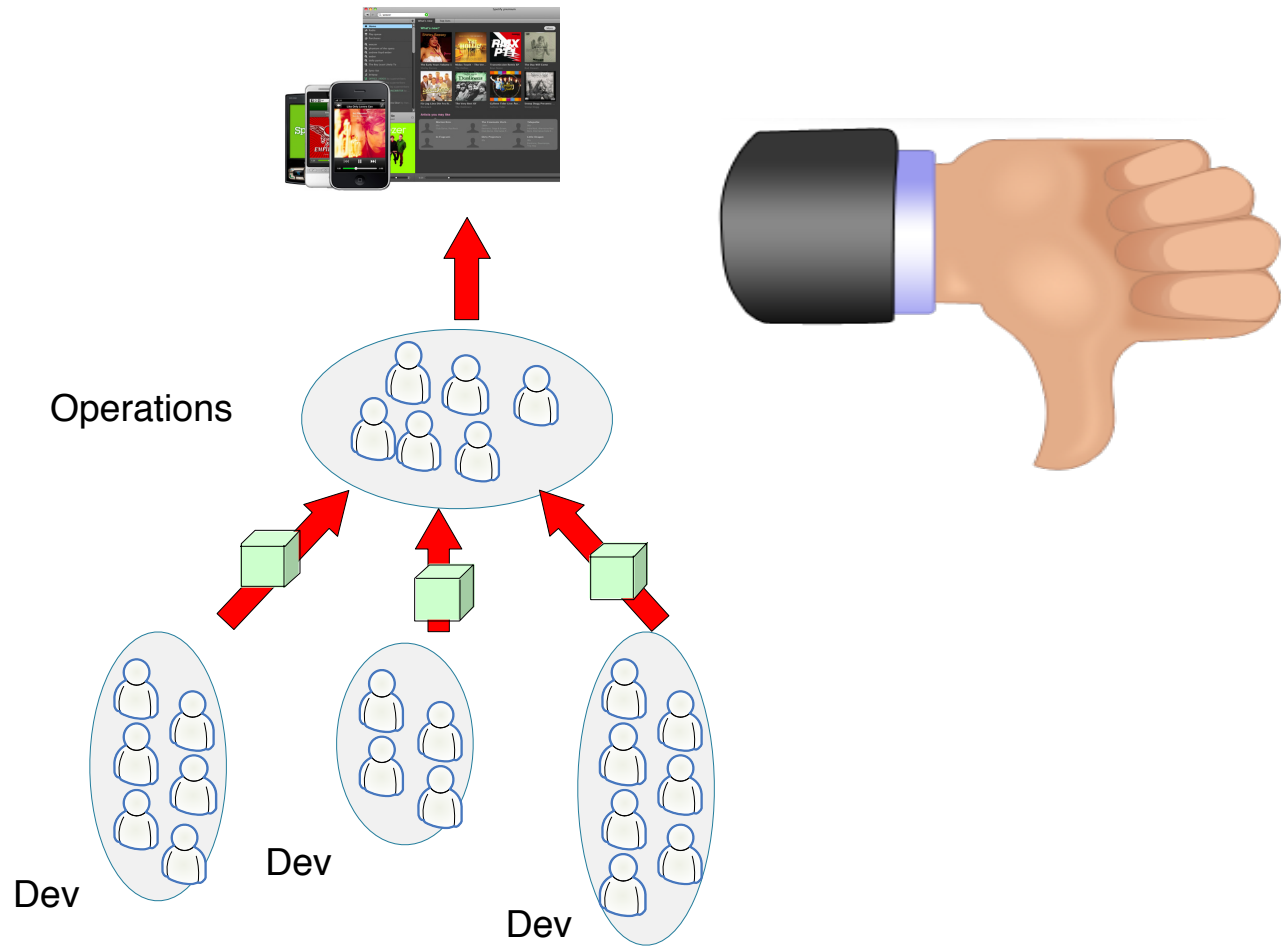
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Resolving Dependencies



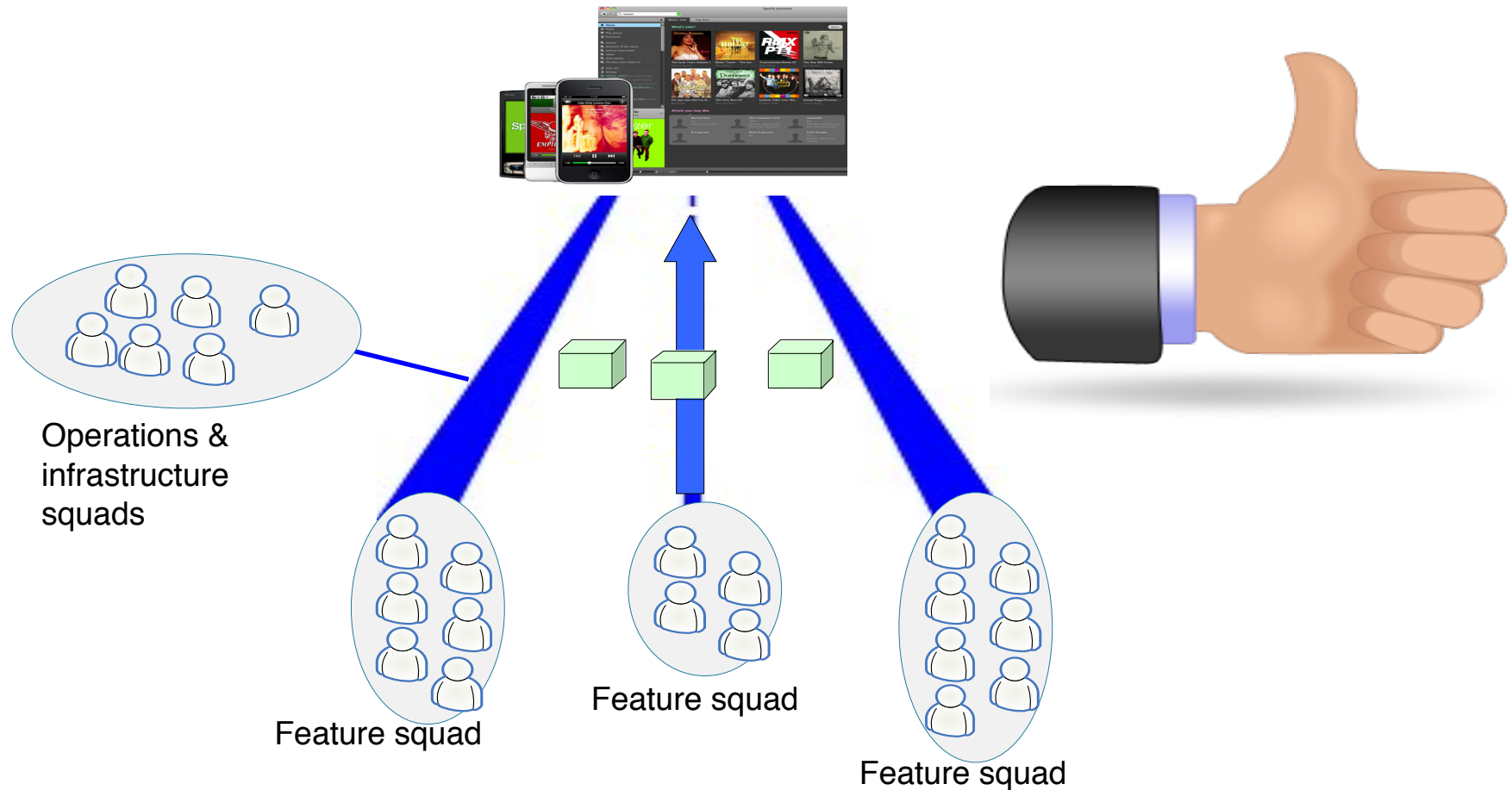
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Get Traditional Bottlenecks Out of the Way



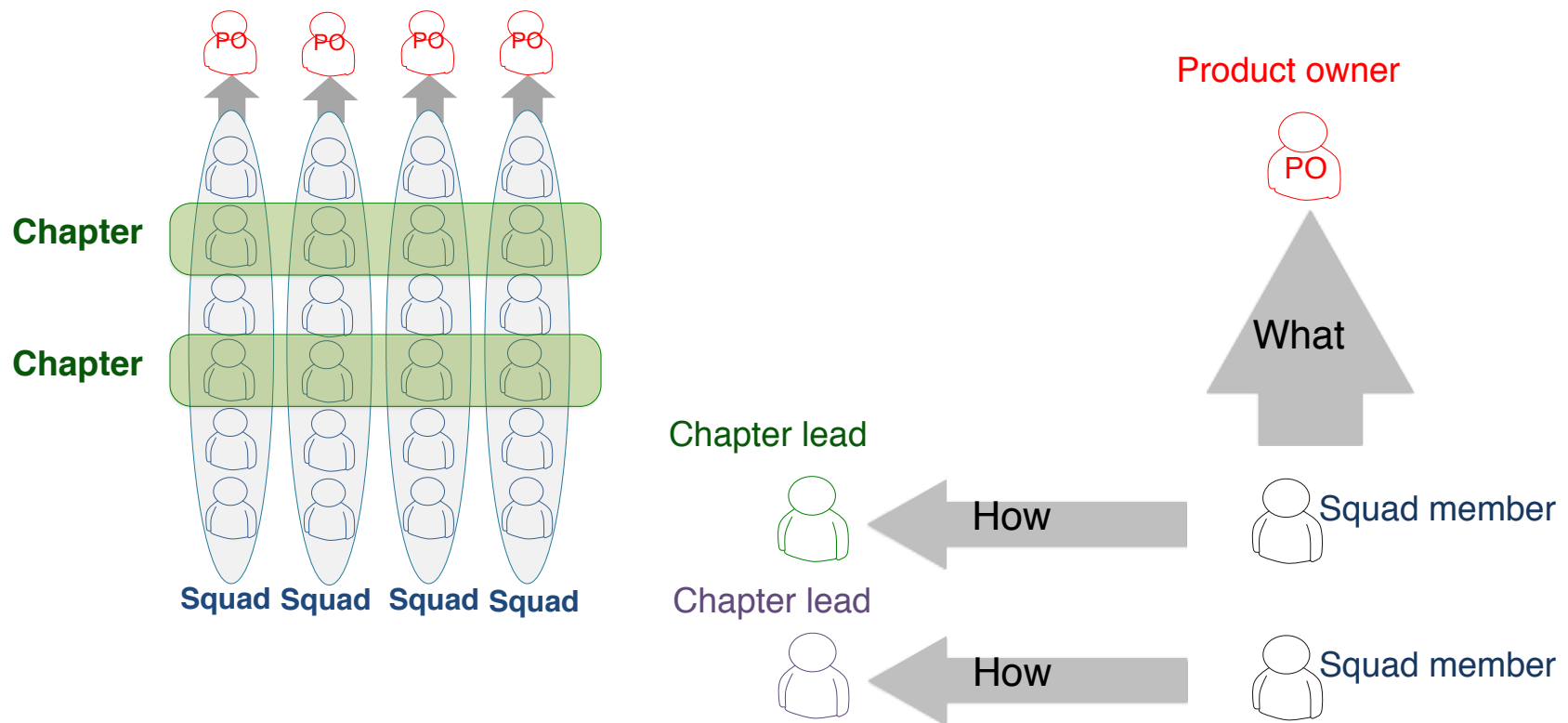
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Clear the Highway



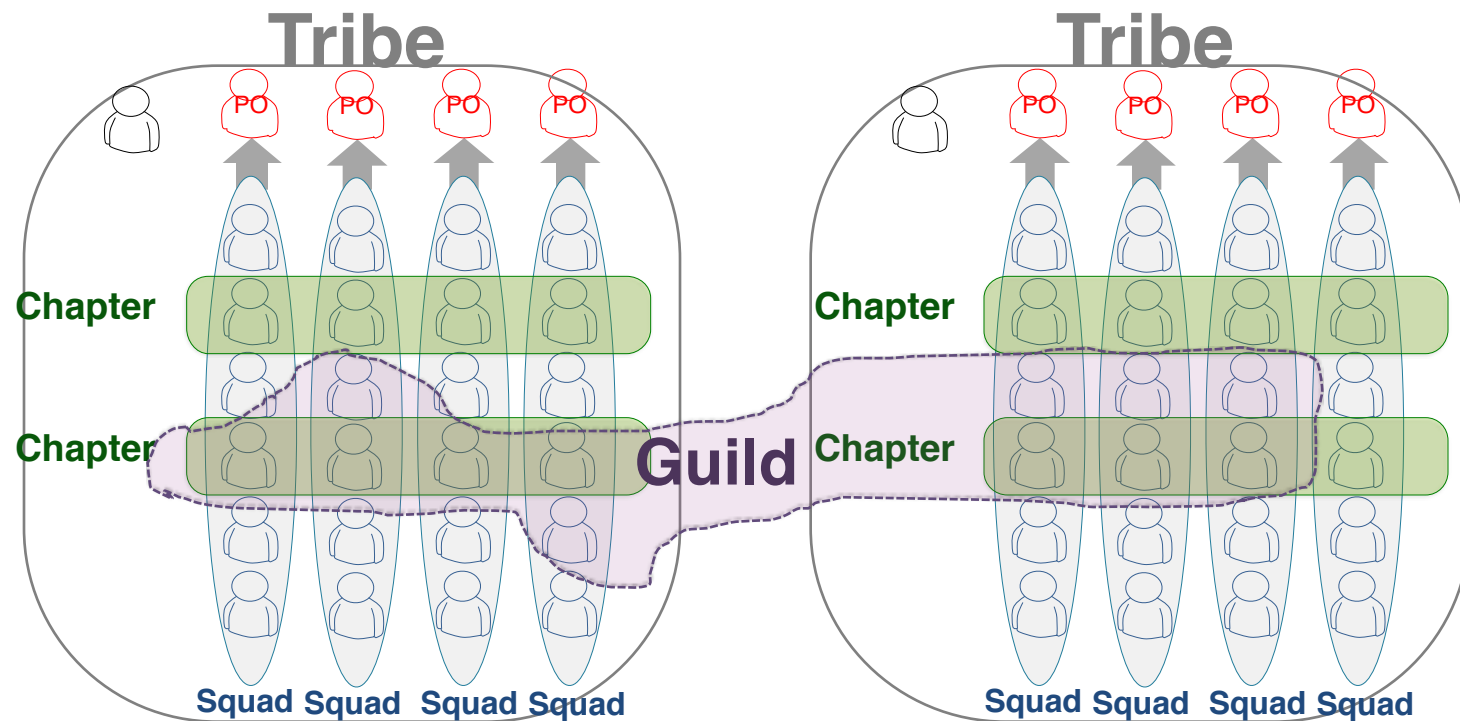
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Chapters Provide Virtual Teams With Critical Expertise



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Guilds Inform Communities of Practice



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Guild Meeting



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Coaches Drive Continuous Improvement

Improvement theme

Squad Autonomy

Definition of Autonomy

- Squads have the right people with the right skills
- Squad dependency doc is empty
- Squads unblock themselves
- no issues in rebo-gathering
- Squads respects & contributes to the ecosystem (no isolation)

2013-02-27 JONAS

FORM TRIBE

AUTONOMOUS SURVEY

PARTNERS (MAGNETS)

WEIR (MAGNET)

WAVE (MAGNET)

DoD: SUMMARY FOR TRI COMMUNICATED

Improvement themes

Next Stories

THEME	Improvement theme	Next Stories
THEME	Improvement theme: Guilds	Guilds: Set up a "guild health check" model
THEME	Improvement theme: Big projects	Figure out Autonomy check for Operations / SRE
THEME	Improvement theme: Squad autonomy	Aligning Missions: Erik talk at the Agile Practice Sharing meeting
THEME	Improvement theme: Demographics	Spotify Culture Deck: Outline deck
THEME	Improvement theme: Transparency	Squad autonomy: Improve squad influence of work
THEME	Improvement theme: Aligning Missions	Squad autonomy: Investigate how to make it easier to release
THEME	Improvement theme: Spotify Culture Deck	Define and clarify Chapter Lead role

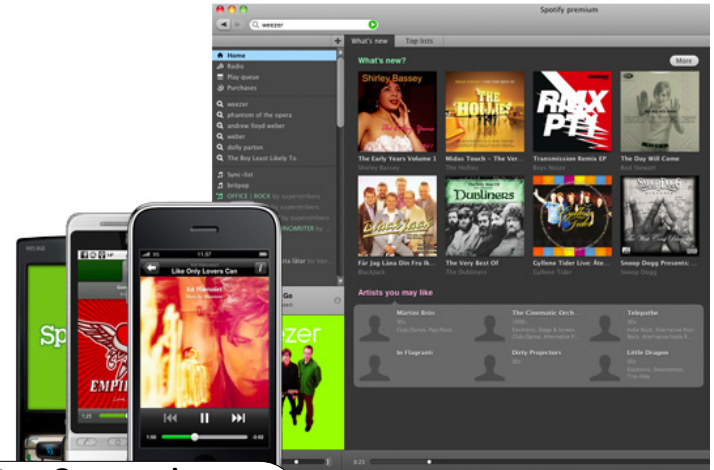
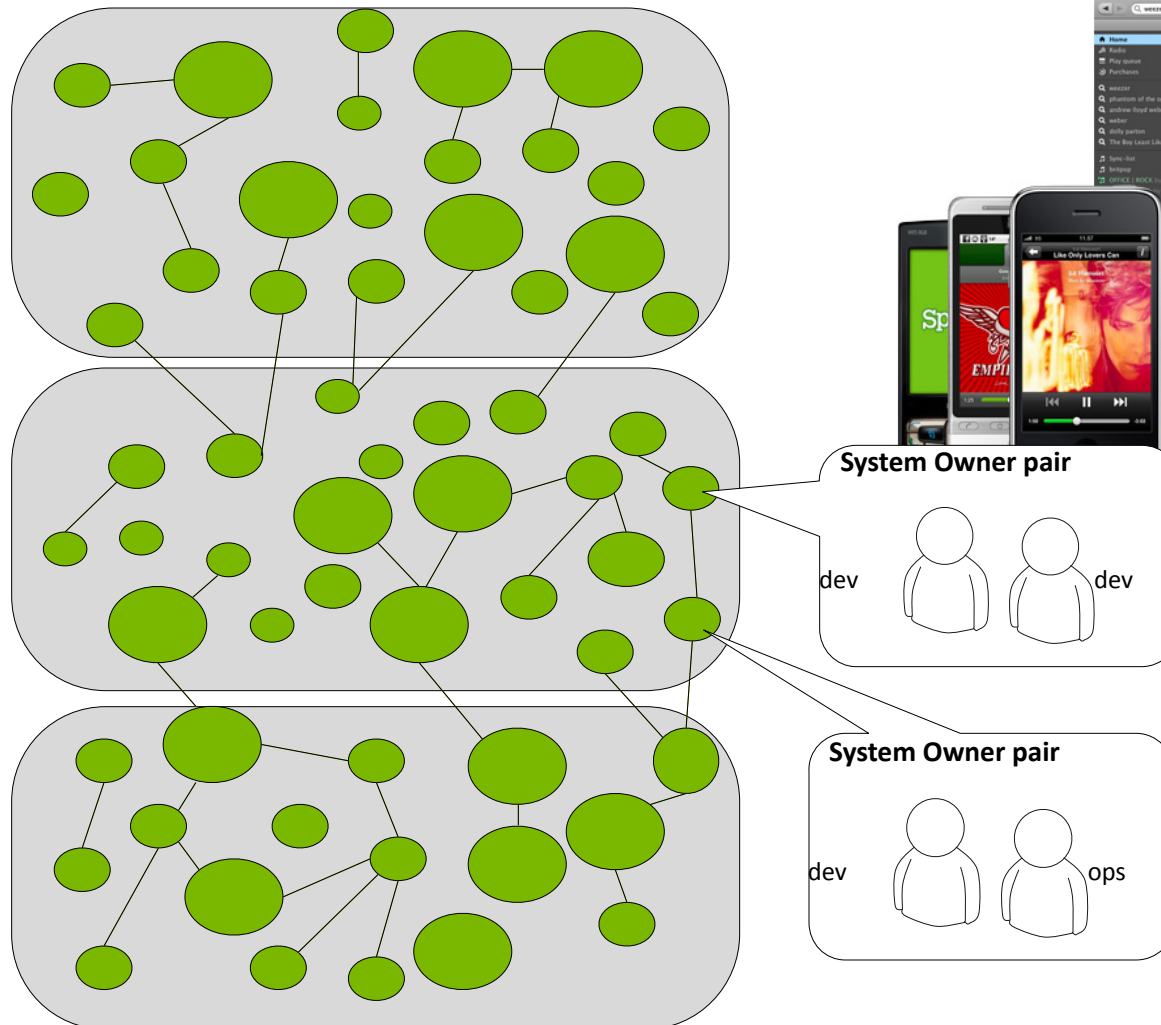
Org Improvement Board

Spotify Org Visible

Improvement themes	Upcoming stories	In progress stories	Done stories
Guilds 0/7	Guilds: Set up a "guild health check" model	Agile event	Big projects: Tech/UX - how to improve collaboration
Big projects 0/6	Figure out Autonomy check for Operations / SRE	Reboot retro mystery: Why aren't devs and designers more involved in the Think It phase?	MTMNY Autonomy check
Squad autonomy 0/4	Aligning Missions: Erik talk at the Agile Practice Sharing meeting	Big Projects: Reboot Retrospective on Jan 9	Big Projects: Collect practices for Big Projects
Demographics 0/6	Spotify Culture Deck: Outline deck	Reboot retro mystery: How do we improve test automation?	Demographics: Krakow trip
Transparency 0/5	Squad autonomy: Improve squad influence of work	Reboot retro mystery: How can we improve our infrastructure so that it's easy to deploy small A/B tests and get results quickly?	Guilds: QA/TA guild unconference (Nov 12)
Aligning Missions 1/4	Squad autonomy: Investigate how to make it easier to release	Reboot retro mystery: Is there	Guilds: Spread the word that guilds are now open communities
Spotify Culture Deck 0/7	Define and clarify Chapter Lead role		Guidelines for running meetings

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System Owners



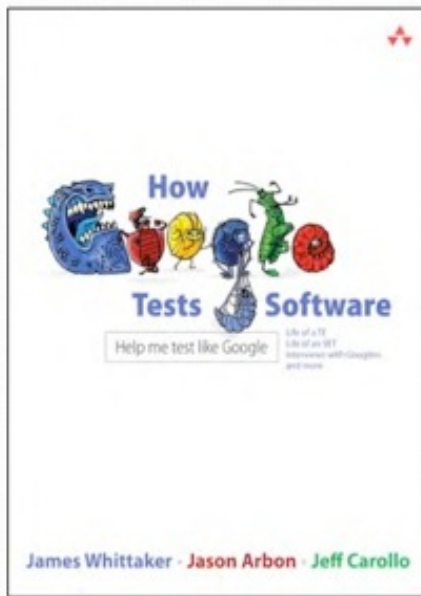
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Spotify Had a Operations Bottleneck

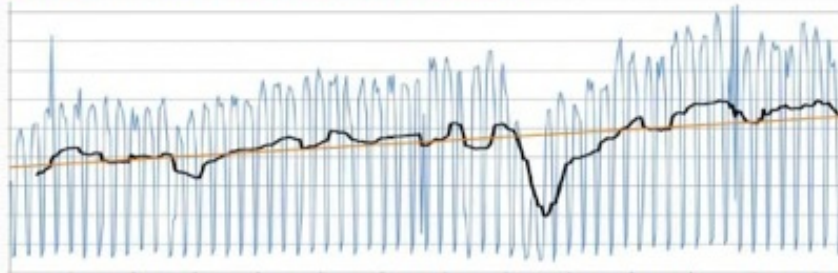
Google Had a Testing Bottleneck

How Google Tests Software

- ❑ Google early adopter of agile methods and Scrum
- ❑ Google also uses agile testing at enterprise scale
- ❑ 15,000 developers run 75+ million tests per day



- 15,000+ developers in 40+ offices
- 4,000+ projects under active development
- 5,500+ submissions per day on average
- Single monolithic code tree with mixed language code
- Development on one branch - submissions at head
- All builds from source
- 20+ sustained code changes per minute with 60+ peaks
- 50% of code changes monthly
- 75+ million test cases run per day



Micco, J. (2013). *Continuous integration at google scale*. Eclipse Con, Boston, MA.
Whittaker, J., Arbon, J., & Carollo, J. (2012). *How google tests software*. Upper Saddle River, NJ: Pearson Education.

Spotify Elegantly Handles Scaling Issues

- Supports autonomous feature teams
- Manages dependencies across teams
- Manages communications across groups of teams
- Provides consistent leadership across teams using virtual teams
- Deals with architecture, testing, and operations by removing bottlenecks and avoiding layered bureaucracy
- Allows for ongoing flexibility of organizational evolution as it scales by another order of magnitude

Conclusions

- Scrum scales to any size
- Recommendations
 - Examine real deployments of Scrum with hundreds of teams and thousands of people
 - Avoid inexperienced opinions and one-way-fits-all
- Scrum uses continuous improvement and self-organization for one team or 1000 teams.
- An object-oriented component architecture for the organization will generate a good component architecture for the software (Conway's Law).
- Scrum provides for incremental refactoring of the organization to improve flexibility and performance with rapid response to competitive pressures.

Questions?



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