Process With Purpose

How, Why & When Software Teams Add Structure



Founding engineer at Enhance Labs

Software Development Engineer at Amazon in Brisbane

Government, robotics

Graduated UQ mid 2020



Today

How I think about software processes

War stories when processed helped (or didn't)

A deep dive into what a few processes look like

When to use certain processes and when not to

Jump in any time with questions

All these opinions are my own

What is software process?

Process is everything a software team does from idea to maintaining in production.

What are some examples?



Why is it important to talk about?

There's no one-size-fits-all process

Very few standards

Processes should be thought of as building blocks

That means you'll be a part of shaping these processes on the teams you join

Which is a **beautiful** and **dangerous** thing

Software process from first principles

Survival - you can fix it when it's broken

Quality - it breaks less often

Velocity - you can build/improve it faster

Alignment - everyone is building towards the same goal

Resilience - fixing itself when it breaks













Survival

Know the moment something's broken





[2022-05-20T10:24:05.123Z] DEBUG: Fetching user data for user 'john.doe@example.com'... We found and fixed our bug, but [2022-05-20T10:24:10.123Z] DEBUG: User data fetched successfully. [2022-05-20T10:24:40.123Z] DEBUG: Loading deck 043298 that's not really the point... [2022-05-20T10:25:20.123Z] DEBUG: Viewing flashcard 4 of 18... [2022-05-20T10:24:15.123Z] DEBUG: Loading image file '/path/to/other-image.jpg'... [2022-05-20T10:24:25.123Z] INFO: Deck 043298 loaded These logs are hard to read [2022-05-20T10:24:20.123Z] DEBUG: Image file loaded successfully. [2022-05-20T10:24:25.123Z] INFO: User 'jane.doe@example.com' logged in. [2022-05-20T10:24:30.123Z] DEBUG: Fetching user data for user 'jane.doe@example.com'... Logs from different users and [2022-05-20T10:25:20.123Z] DEBUG: Viewing flashcard 9 of 84... [2022-05-20T10:24:35.123Z] DEBUG: User data fetched successfully. interspersed [2022-05-20T10:24:40.123Z] DEBUG: Loading deck 02863 [2022-05-20T10:24:45.123Z] ERROR: An error occurred while loading image file '/path/to/another-image.jpg': Error: Failed to load resource: the server responded with a status of 404 (Not Found) Logs have no context at loadImage (/path/to/app.ts:123:45) at initializeApp (/path/to/app.ts:42:10) at /path/to/app.ts:20:5 at Module._compile (node:internal/modules/cjs/loader:1108:14) at Object.Module._extensions..js (node:internal/modules/cjs/loader:1137:10) at Module.load (node:internal/modules/cjs/loader:973:32) at Function.Module. load (node:internal/modules/cjs/loader:813:14) at Function.executeUserEntryPoint [as runMain] (node:internal/modules/run_main:76:12) at node:internal/main/run_main_module:17:47 [2022-05-20T10:25:00.123Z] DEBUG: Fetching flashcard deck for user 'john.doe@example.com'... [2022-05-20T10:25:05.123Z] DEBUG: Flashcard deck fetched successfully. [2022-05-20T10:25:10.123Z] DEBUG: Viewing flashcard 1 of 10...









How we improved (still not good)

		John addeedan togged in
[2022-05-20T10:24:05.123Z] DEBUG:	ddfb5a57-4d5f-4c89-87f8-7cb564215c5d User A: I	Fetching user data for user 'john.doe@example.com'
[2022-05-20T10:24:10.123Z] DEBUG:	ddfb5a57-4d5f-4c89-87f8-7cb564215c5d_User A: l	User data fetched successfully.
[2022-05-20T10:24:40.123Z] DEBUG:	c5724dea-0a0d-4368-b72e-abc625c4a4f6	Loading deck 043298
[2022-05-20T10:25:20.123Z] DEBUG:	еат8bс9т-а5а4-43се-8т0т-терторзаб51/ User C: \	Viewing flashcard 4 of 18
[2022-05-20T10:24:15.123Z] DEBUG:	8e714e19-9f3a-434b-8344-ac98ec2ecd3c User A: 1	Loading image file '/path/to/other-image.jpg'
[2022-05-20T10:24:25.123Z] INFO:	с5724dea-0a0d-4368-b72e-abc625c4a4f6 user в: [Deck 043298 loaded
[2022-05-20T10:24:20.123Z] DEBUG:	8e714e19-9f3a-434b-8344-ac98ec2ecd3c User A: 1	Image file loaded successfully.
[2022-05-20T10:24:25.123Z] INFO:	18acf3ff-17e5-478e-88da-b31f98a4a658 User D: l	User 'jane.doe@example.com' logged in.
[2022-05-20T10:24:30.123Z] DEBUG:	18acf3ff-17e5-478e-88da-b31f98a4a658 User D: I	Fetching user data for user 'jane.doe@example.com'
[2022-05-20T10:25:20.123Z] DEBUG:	7c314c3b-be61-4c4f-8691-5df4e99e23e2 User E: \	Viewing flashcard 9 of 84
[2022-05-20T10:24:35.123Z] DEBUG:	18acf3ff-17e5-478e-88da-b31f98a4a658 User D: l	User data fetched successfully.
[2022-05-20T10:24:40.123Z] DEBUG:	57746f33-f9d9-43b6-9913-acea562f4a72 User F: l	Loading deck 02863
[2022-05-20T10:24:45.123Z] ERROR:	57746f33-f9d9-43b6-9913-acea562f4a72 User F: /	An error occurred while loading image file '/path/to/
another-image.jpg': Error: Failed	to load resource: the server responded with a st	tatus of 404 (Not Found)
<pre>at loadImage (/path/to/app.ts:</pre>	123:45)	
at initializeApp (/path/to/app	o.ts:42:10)	
at /path/to/app.ts:20:5		This is good but we still had to
at Modulecompile (node:inter	nal/modules/cjs/loader:1108:14)	This is good, but we still had to
<pre>at Object.Moduleextensions</pre>	<pre>js (node:internal/modules/cjs/loader:1137:10)</pre>	log in to production
at Module.load (node:internal/	/modules/cjs/loader:973:32)	
at Function.Moduleload (node	e:internal/modules/cjs/loader:813:14)	
at Function.executeUserEntryPo	oint [as runMain] (node:internal/modules/run_main	n:76:12)
at node:internal/main/run_main	n_module:17:47	
[2022-05-20T10:25:00.123Z] DEBUG:	af16fd79-ea04-4308-83a4-4ce11db95674 User A: I	Fetching flashcard deck for user
'john.doe@example.com'		
[2022-05-20T10:25:05.123Z] DEBUG:	af16fd79-ea04-4308-83a4-4ce11db95674 User A: I	Flashcard deck fetched successfully.
[2022-05-20T10:25:10.123Z] DEBUG:	4d8ada85-81d7-459f-abba-b0498ee5f562 User A: \	Viewing flashcard 1 of 10
	Anoshit days does only catholic are used to	Annung flacheand 1 of 10













2019-06-21T00:33:14.737+01:00 2019-06-20T23:33:14.680Z 64a17a19-d17c-421c-a530-09555c6dea8f {"message":"loading index.html...","awsRegion":"us-east... • 3 2019-06-21T00:24:20.044+01:00 2019-06-20T23:24:20.025Z 0eac3bc8-abcc-4f32-9c14-d3d9771926d6 {"message":"loading index.html...","awsRegion":"us-east... 2019-06-20T23:20:19.692Z dc482536-b47f-4964-8b53-1be38a10a9d6 {"message":"loading index.html...","awsRegion":"us-east... • 4 2019-06-21T00:20:19.693+01:00 ▶ 5 2019-06-20T23:08:15.510+01:00 2019-06-20T22:08:15.471Z 1bb5e198-4a8e-4b52-8803-fa40e4e7b9ac {"message":"loading index.html...","awsRegion":"us-east... 2019-06-20T22:08:05.791Z 1a21fab2-77ed-4bf4-aeb0-4f9712255e8c {"message":"loading index.html...","awsRegion":"us-east... 6 2019-06-20T23:08:05.850+01:00 2019-06-20T22: 452-9186-12793e3 {"message":"looping index.html...","awsRegion":"us-east... ▶ 7 2019-06-20T23:04:45.563+01:0 2019-06-20T23:04:41.004+01: 19-06-20T22 · ··· ▶ 8 040d7174 'message":"1 2019-06-20T22:52:50.613+01: -06-20T21: ▶ 9 2019-06-20T21:50:36.066Z 3dc77c1f-f50b-41ad-a23b-4bf9d4512992 {"message":"loading index.html...","awsRegion":"us-east... ▶ 10 2019-06-20T22:50:36.143+01:00

Building Blocks for Survival

Process Building Block	When is it important?
Structured logs/metrics/OTEL***	As soon as you have paying users
On call rotations & handoff meetings	10,000+ users, or multiple geographies, or mission critical software
Runbook	5+ engineers
Knowledge base	5+ engineers

*** These aren't really processes, but they're table stakes









Deep dive: Runbooks

A place where you document steps to troubleshoot and resolve software issues seen in the past.

Your software will outgrow the RAM in your head, you'll get new hires, software will change ownership

Any engineer that operates your software should be able to execute them

Every incident that hasn't happened before merits a new entry in a runbook



Deep dive: An example runbook entry

Application Randomly Freezes/Hangs

1. Go to

https://ap-southeast-2.console.aws.amazon.com/cloudwatch/home?region=ap-southeast-2

- 2. Get the userId for the user reporting the issue
- 3. Paste the following query

•••

fields @timestamp, @message | sort @timestamp desc | limit 100 | filter @message like /{userId}/



Industry trends for Survival Processes

We are converging towards Open Telemetry as a standard for observability

On call rotations are totally random in larger companies - follow the sun, total team ownership, separate SRE/DevOps teams

Runbook & knowledge base maintenance is getting easier with LLMs

AI being adopted for initial triage and simple mitigation steps for On call/SRE/DevOps





Quality

Ship beautiful stuff, stop defects early



What do we do?

2000 ms 4000 ms	60	00 ms	8000 ms	10000 ms	120	00 ms	14000 ms
lame	Status •	Туре	Initiator	Size	Time	Waterfall	
session	302	text/html	Other	623 B	2.03 s		
lessons	301	x-www-f	session	307 B	2.02 s		
lessons	200	document	/lessons	17.4 KB	2.34 s		
9032df89-df34-4822-9191-17fd1814	200	webp	lazysizes.min.js:2	4.1 KB	2.16 s		
/ 135d1eaa-aa07-4e82-a827-517b6ad	200	webp	lazysizes.min.js:2	7.3 KB	2.22 s		
c929fa27-e80b-41fd-9329-7e1f2c40	200	webp	lazysizes.min.js:2	4.3 KB	2.26 s		
a6c563d1-4a6d-4ea4-852c-25f9fbc5	200	webp	lazysizes.min.js:2	8.2 KB	2.35 s		
0df57e1e-2859-4787-87e5-cf98e9d3	200	webp	lazysizes.min.js:2	3.6 KB	2.20 s		
?id=T2OFwcvtpNVBl6HyalEq&pid=V	200	gif	tracker.js:1	372 B	2.04 s		
7e1acbbf-3d1d-471f-aa10-9a39c84e	200	webp	lazysizes.min.js:2	13.8 KB	2.32 s		
tracker.js	200	script	lessons:1474	(from dis	2 ms		
I?primer=7cdcb44be4a7db8877ffa5c	200	font	lessons	(from me	0 ms		
?primer=7cdcb44be4a7db8877ffa5c	200	font	lessons	(from me	0 ms		
l?primer=7cdcb44be4a7db8877ffa5c	200	font	lessons	(from me	0 ms		
l?primer=7cdcb44be4a7db8877ffa5c 4 requests 59.9 KB transferred 495 KB	200	font sh: 8.49 s I [le paded:	(fm	0 ms	45.60	- C

Yep, it's slow, what now?











Building Blocks for Quality

Process Building Block	When is it important?
Code reviews	Multiple skill levels in team or multi-ownership of code or mission critical software
Automated testing	As soon as you have paying users. There's multiple levels to testing.
Design reviews	5+ engineers
Security reviews, SOC2, ISO27001	If your customers require it. Do the right thing.
QA	This is an interesting one
Post mortems	When something goes really wrong

Example: Denial of Service Post Mortem

What?

The backend received 1,800,000 requests from User A in the span of 5 minutes. 40,000 genuine customer requests were dropped because of this. Customer impact was mitigated by deleting User A's account.

Why did this happen?

User A's account had been compromised and was used by a bad actor.

Why did User A's account need to be deleted?

The engineers did not have a way to block incoming requests from a particular user, revoke permissions or reset an account.

Why didn't the engineers have a way to block incoming requests?

The engineers hadn't thought of this yet as a possible incident

Denial of Service Post Mortem cont.

Lessons Learned

- User account behaviour is unpredictable.
- A single user is capable of taking down the entire backend.

Next Steps

- Implement a way to revoke a user's credentials
- Implement a way to reset a user's password
- Globally rate limit all individual users to 10 TPS
- Implement a way to block certain users if we suspect their account has been compromised.

Industry Trends for Quality Processes

Al as a code reviewer

Al powered

QA testing \rightarrow QA engineering

Static analysis, linters, other little things all very table stakes





Velocity

Ship as fast and as much as possible





Building Blocks for Velocity

Process Building Block	When is it important?
Continuous deployment	Day 1
Feature flags	1000+ users
Microservices	30+ engineers. Hold out as long as you can.



Deep dive: Continuous Deployment



Code deploys automatically on commit

Run some tests

Monitor our metrics

If it goes into alarm, rollback to the previous version

Safer, more reliable deployments

Don't need to deploy 100% at once





Not a deep dive: Microservices



https://www.youtube.com/watch?v=y8OnoxKotPQ











Industry Trends for Velocity Processes

Feature flags and trunk-based development seem to be taking over as normal now

Microservices aren't cool anymore, but still necessary at scale

Fully autonomous AI agents submitting code reviews for simple things. Human in the loop code writing for complex stuff.

In general code is getting cheaper to write





Alignment

Many people, one direction





Building Blocks for Alignment

Process Building Block	When is it important?
Team standups	Remote work or 5+ engineers
Design reviews	5+ engineers
User stories/Requirements gathering	Always (in some form). Formally, when you need to have structured conversations with your customers
Sprints/Kanban/Forward planning	When you have more than a week's worth of work before the next milestone









Industry Trends for Alignment

Async communication seems to be the way to go even for teams that work in person

Design reviews are getting cheaper to make with Al. Micro-design reviews, more asynchronous, Al as a creator and a reviewer

Agile frameworks are the industry standard in non-tech companies. Tech companies are Agile but tend not to follow a specific framework





Resilience

Recover and scale gracefully (software AND people)







Building Blocks for Resilience

Process Building Block	When is it important?
Load testing	1000+ users or when you anticipate growth or unpredictable traffic
Game days	Very, very high scale or upcoming events
Dynamic configuration	10000+ users, or an outage where it would have been useful
(People) Team retrospectives	More than 1 engineer
(People) Team days	If your company says yes 😊









Industry Trends for Resilience

It used to be that most of industry didn't need/use these things, that's changing

Open source tooling exists but internal tooling is still much better (this will probably change)



Summary: Process Thinking

Think from first principles

Treat processes as building blocks, not frameworks

Don't be afraid to throw process away

Make sure your process serves you and your team.

Lack of process and too much process **equally** can cause problems.















Thanks for listening! Get in touch with me here.

Resumes, interview prep questions, etc

Happy to help if I can