Soft Failures, Hard Goals

Accelerating Payments At Scale During the Pandemic

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Overview of Challenges

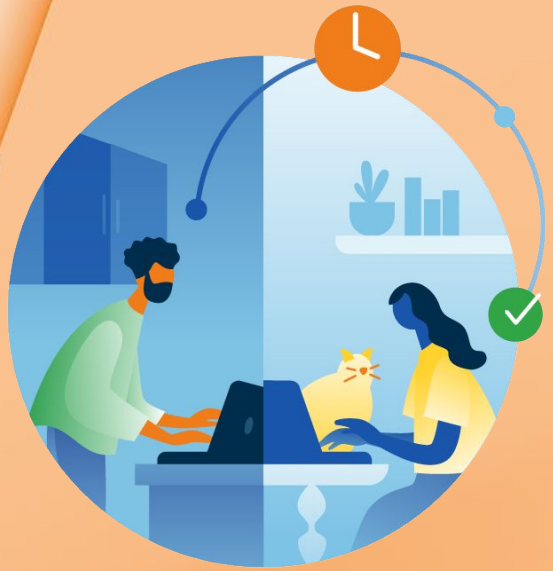
Initial Impact of COVID-19 Pandemic

The use of online platforms for back-office automation increased load on system

Switched immediately to 24/7 remote operations:

- Payment Operations
- Site Operations
- Data Center Operations

Increased reliance on our own internal cloud vendors



Batch Processing Payments

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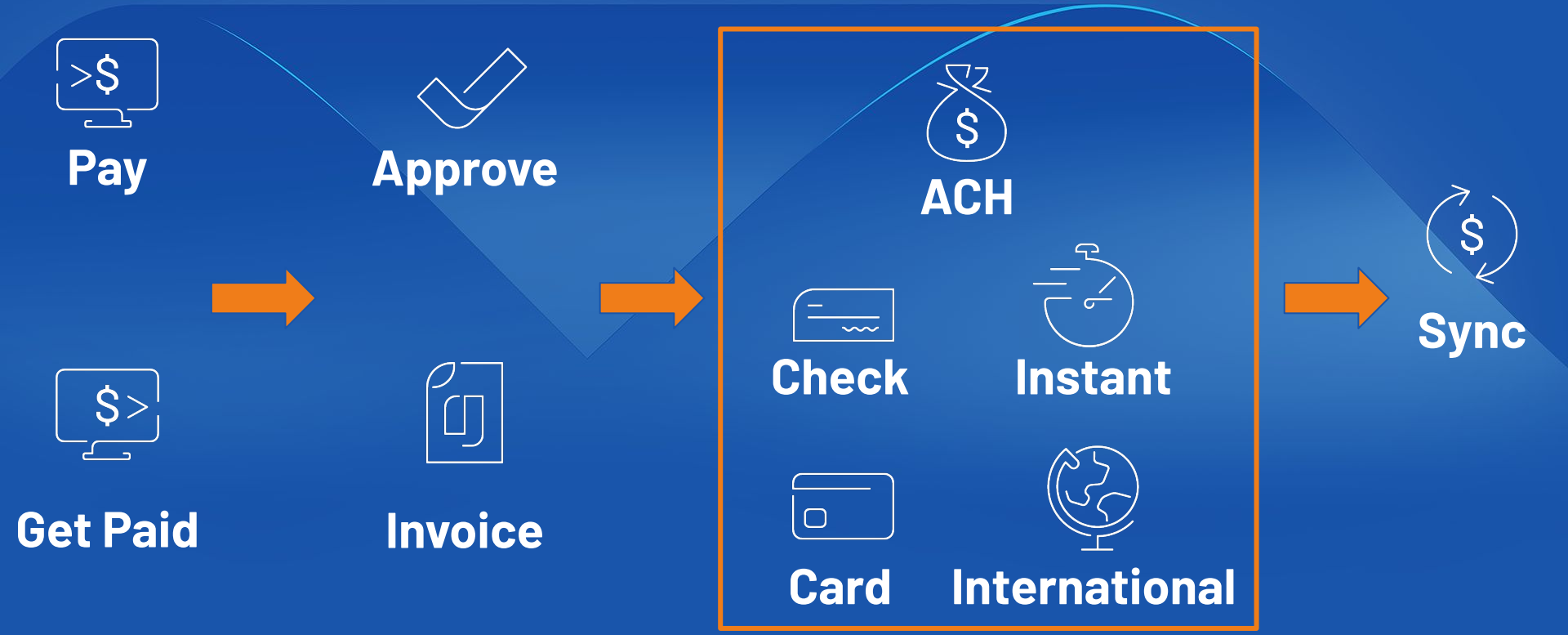


Challenges

Can't slow down to deliver new features and innovate

Saw a notable increase in incidents

Customer-facing issues

Tribal knowledge vs. documentation & clear procedures

Straining of third-parties

Why focus on batch processing?

More than $96 billion moved annually through our platform

Every $ of revenue goes through the Payment Engine

Several incidents were non-code related

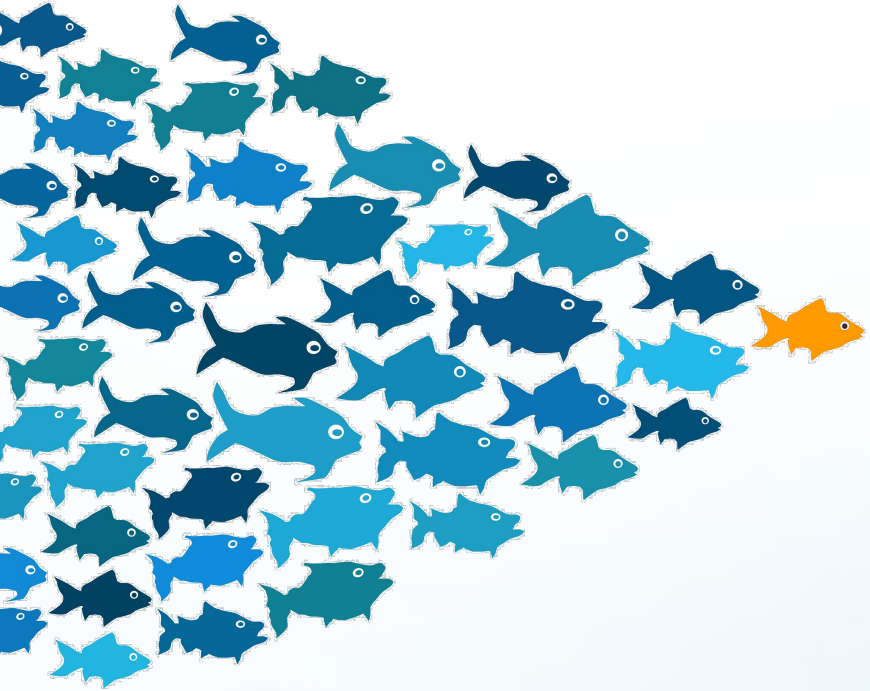
Emerging Payments and new technologies add complexity to the system

Scale - Need to onboard more engineers *successfully*

Extreme Ownership Culture

Extreme Ownership

Leaders Practice Extreme Ownership



- Set a target
- Focus the team
- Remove obstacles
- **Believe**
- **Commit**
- Change mindsets
- Empower the team

“No bad teams, only bad leaders” – Jocko Willink and Leif Babin

Building Resilience

Resilience as a project

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Driver	Designate a champion
Mission	Explain why is it important
Principles	Set guidelines, philosophy
Strategy	Align on priorities
Timelines	Timebox, then iterate
Target	Hard Goals, RAISE the BAR

Payments Resilience Strategy

Ops Efficiency - Automate Tasks

Move **repeated manual tasks** to automated jobs

Alerts & Metrics - Be Proactive

Track both **success and failures** via dashboards and push notifications

Antifragile Design - Be Defensive

From “assume this will pass” to “**assume this will fail**”

Reconciliation - Know Sooner

We should **know within 24 hours of recon mismatch**.

Education - Onboard Smarter

Training in Payments (our code, design principles, jobs etc) for new members

Test Automation - Catch Bugs Sooner

80% Payments QA automation

Target: **40** days without customer impact
Timeline: Mar - May (**90 days**)

Alerts & Metrics

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Workstream	Deliverables
Catalog	1. Full Catalog of all (~70 daily) payment files and severities
Systematic Alerts	1. Enabled >2x paging process alerts in prod 2. 100% coverage of critical positive log-based alerts 3. Self serve Operations Tool to add job alerts (v1)
Dashboards	1. Enhanced existing dashboard 2. Created additional operational dashboards a. 60 reporting and analytics charts b. 20 log-based charts
Process/Collaboration	1. Game Day 2. Training on alert handling

Cross-Functional Game Days

Why - If a scenario happened, would we know how to remediate?

Who - Cross-functional engagement is key

What - Documentation of process/playbooks

Where - in Production

When - Exercise crisis response without an actual crisis

Quality & Automation

Built new extendable payments automation framework

Conducted Unit test training sessions

Improved Unit Test Process - Unit test required for check-in

Enhanced Developer Tools - Gitlab migration

Antifragile Design - Assume Failure

Design principle	Old way	New way
Allow for "soft failures" (partial success) in critical batch processing	All records are rolled back. “all or nothing”	Partial Success allowed with minor intervention
Prevent human error	Scramble to create the exact query during an incident	Create script templates for each likely scenario
Focus on performance critical path	Combine primary and secondary processes in one job	Secondary tasks separated in their own jobs in non-blocking asynchronous queue
Reduce "central" choke-points like database	Pray and wait till the DB spike passes	Balance load across different time windows. Commit smaller batches.

Accomplishments

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Alerts
Positive and negative alerts.
Operational dashboards

Ops efficiency
Operations Tool enhancements
and self-serve alerts management

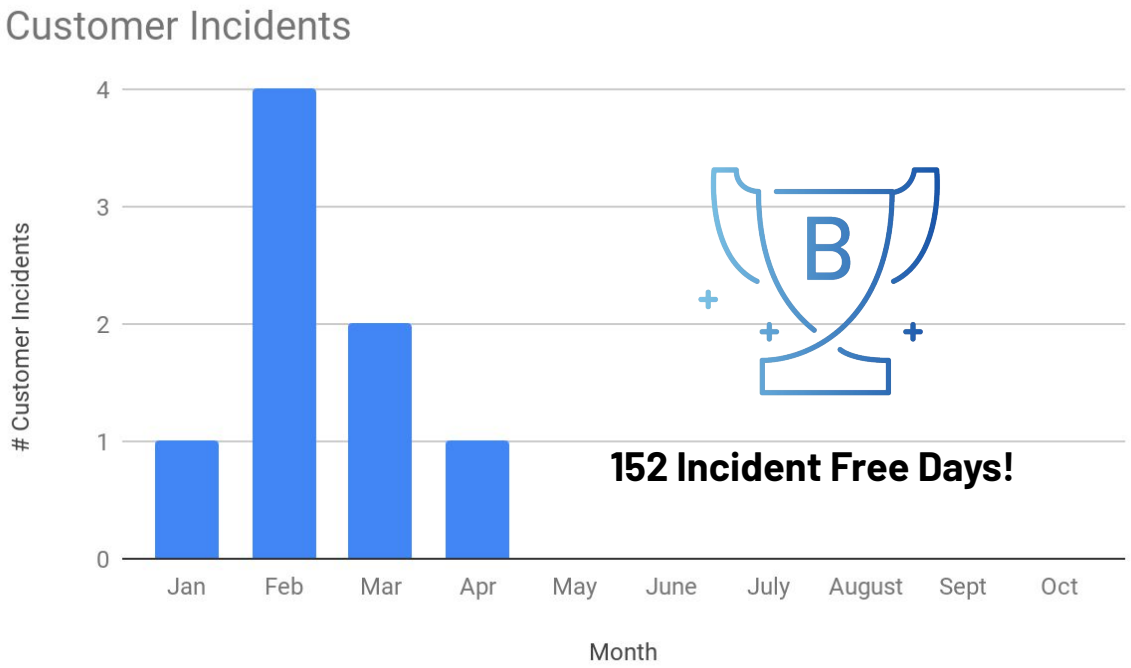
Reconciliation
System and Cash Recon tools.

Defense
Partial success for batches
DB scaling, and batch replay

Automation
75% QA automation in card
and domestic payments

Education
Revamped Payments Wiki including
payments101 and new HLD guidelines

Goal exceeded!



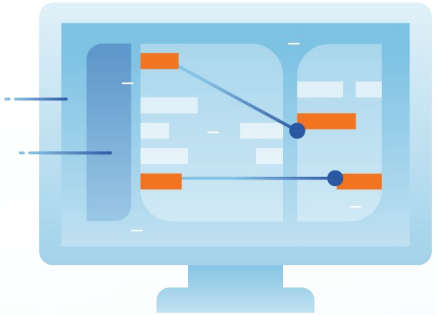
Third-Party Management & Business Process

How we approach RCAs

- Have a standard template
- Complete within three days of an incident
- Understand the timeline
- Categorize the remediation items:
  - Process
  - Monitoring
  - Code
- Ask the "Five Whys"
- Capture metrics
  - Not just SLI/SLO/SLAs, don't forget the MTTD/MTTR/MTBF

"The cost of failure is education" - Devin Carraway

Operational Readiness



Common dashboarding tools: TechOps, Payment Ops, Engineering

Systematic Alerts: Everyone can see, but clear ownership on failure for "calling the ball"

Alert Catalog: Complex systems require documentation

Standard Operating Procedures (SOPs): Define early and centrally manage

Process/Collaboration: Over-communicate, hop on video if no immediate clarity on resolution

Business Continuity Plan (BCP)

Clear understanding of Disaster Recovery plan (people and technology)

Establish another kind of "Game Day" - annual table-top exercises

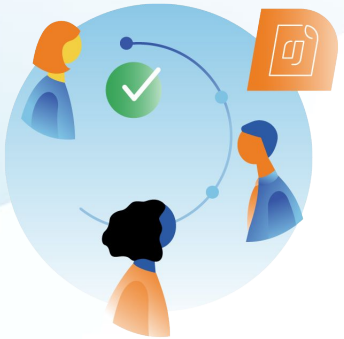
Emergency Response Team (ERT) - identify stakeholders

Crisis Communication Plan - call trees and notification patterns

Ask for help - look externally for best practices, especially if new

Business Impact Analysis (BIA) - including alternative providers

- First-Party - What if X breaks?
- Third-Party - What if Y goes down?



Vendor Management

Even if an issue is caused by a vendor, it is still your issue

Identify clear ownership of relationship

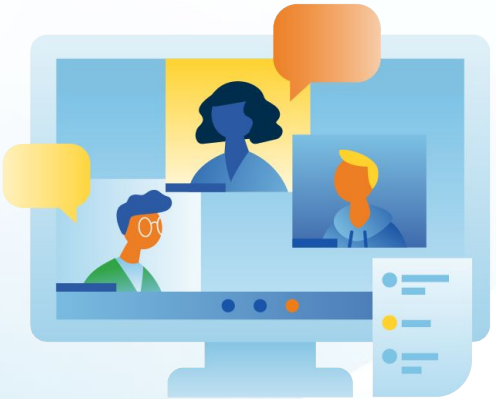
Add to Business Impact Analysis and consider redundant providers

Share BIA with executive team

Security reviews (initial and ongoing)

Financial review

Document integration



Next Steps & Capability Model

What would it take to build an extreme ownership culture?

Are deployments fully automated?

Code checkin only permitted if code coverage improves?

Automation testing completes in a timely manner?

Do engineers have time to address tech debt (target 20%)?

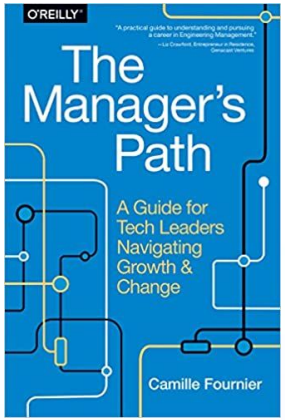
Do you practice Continuous Integration?

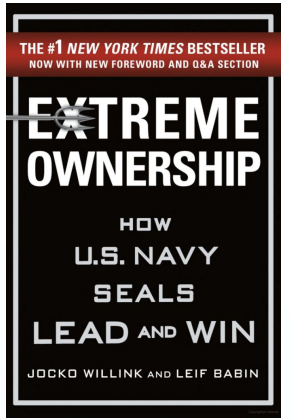
Is code review mandatory and efficiently delivered?

Following modern branching model process?

If a critical fix required, can you get it to prod safely in <1 hour?

Do you have "Top 3" metrics per team (ops & engineering)?





Thank You

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