

MASTERING  
THE  
ART OF JUGGLING  
BETWEEN  
APPLICATION DEVELOPMENT  
AND  
PRODUCTION SUPPORT

# About Me



## Sheela Shankar

Executive Director, JPMorgan Asset Management

Passionate about building applications as well as keeping them running with no downtime.

Full stack Developer, Architect and AWS/CKAD certified

Good morning, Sheila.

# Ready to start a new analysis?

Analyze new portfolio

Use existing portfolio

## Smarter insights. Better outcomes.

- Run instant, on-demand analytics 24/7
- Access a database of 50,000+ investments
- Tailor results and reports to each client

Run a no-cost analysis

JPMorgan Asset Management is a global leader in Investment Management. Our clients trust us to manage \$2.5 trillion to secure, protect and strengthen and enjoy hard earned returns.

Selected funds to help you build a sustainable portfolio



JPM Climate Change Solutions Fund      JPMorgan Funds - Europe Sustainable Equity Fund      JPMorgan Funds - Global Bond Opportunities Sustainable Fund

[Find out more >](#)      [Find out more >](#)      [Find out more >](#)

Insights to build stronger portfolios



Timely commentary, strategic perspectives and in-depth analysis from our investment teams to help guide your portfolio decisions.

Quick links

- Monthly Strategy Report
- Asset Class Views
- Strategic Investment Advisory Group

Most popular Insights



Long-Term Capital Market Assumptions      Monthly Strategy Report      Global Alternatives Outlook      Getting real about rates

Highlights key developments in...      Explore the most revealing...      The most up-to-date information on...



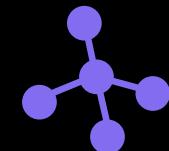
Top 5 in Fortune 500



50,000 developers



11 BN TECHNOLOGY BUDGET



3 LOBs - AWM, CIB, CCB

# Some of our Applications that we build and operate

## Trailing performance as of 8/31/23

		Returns and rankings in %		YTD		1 year		3 year		5 year	
Ticker and investment name (grouped by Morningstar category)		Total return	% cat rank	Total return	% cat rank	Total return	% cat rank	Total Return	% cat rank	Total return	% cat rank
Large Blend	Funds ranked	1447		1416		1277		1178			
AFNAX - AAM/Bahl & Gaynor Income Growth A		2.96	96	6.44	95	8.39	79	7.66	89		
JMUEX - JPMorgan US Equity L		19.20	17	15.50	37	10.67	27	12.31	4		
JUEAX - JPMorgan US Equity A		18.86	20	15.04	45	10.24	40	11.86	8		
JICAX - JPMorgan US Sustainable Leaders A		17.03	46	14.92	47	9.12	70	9.87	55		
JLPSX - JPMorgan US Large Cap Core Plus I		21.16	9	20.85	5	11.27	20	12.16	5		
S&P 500 TR USD *		18.73	-	15.94	-	10.52	-	11.12	-		

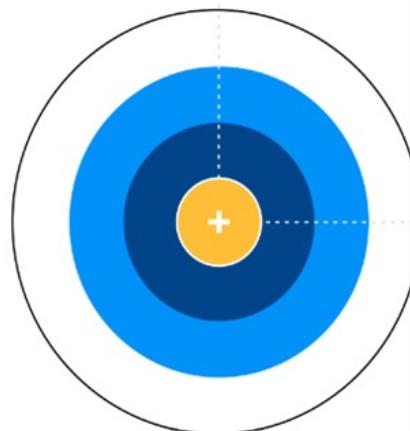
## Target Date Analysis

4Q 2022

PREPARED FOR  
Sheela

PREPARED BY  
John Advisor  
Ameriprise

TARGET DATE FUNDS  
■ Great-West Lifetime  
■ Guidestone Funds MyDestination  
■ John Hancock Multi-Index Lifetime  
■ JPMorgan SmartRetirement  
■ JPMorgan SmartRetirement Blend



The fund companies displayed in this report appear based upon advisor request. References to specific individual and commingled funds in this report are for illustrative purposes only and are not intended to be, and should not be interpreted as, recommendations. This report should not be relied on to make investment decisions. Please see additional disclosures on the last page of the document.

The performance data quoted represents past performance and is not a guarantee or prediction of future results. Investment value and principal value of an investment will fluctuate so that shares or units when sold may be worth less than when purchased. Past performance does not guarantee future results. For more information about JPMorgan Asset Management products and services, please call 1-800-420-4800. For more information about the JPMorgan Retirement Blend, please contact your financial representative.

© 2020 Morningstar, Inc. All Rights Reserved. The information contained herein: (1) is proprietary to Morningstar; (2) may not be copied or distributed; and (3) is not warranted to be accurate, complete or timely. Morningstar and its third party partners are responsible for any damages or losses arising from any use of this information. Performance information related to JPMorgan SmartRetirement Blend is provided by JPMorgan Asset Management.

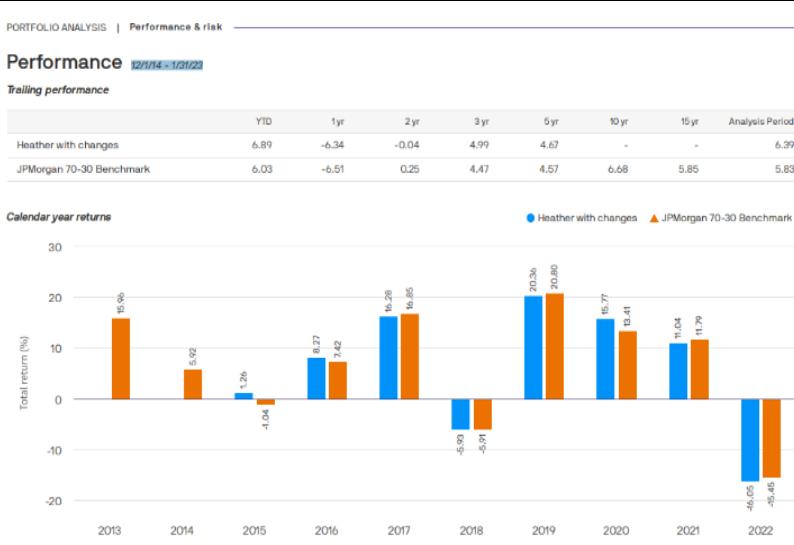
## JPMorgan Multi-Asset Income 35-65 Model

### Analyze & view details



U.S. Equity	19.84%
Non-U.S. Equity	14.92%
U.S. Bond	53.35%
Non-U.S. Bond	5.58%
Cash	5.71%
Other	0.6%

Income-focused approach in a global portfolio comprised of mutual funds and ETFs



### PORTFOLIO ANALYSIS | Stress tests

## Scenarios

### Market Insights scenarios

	Heather with changes	JPMorgan 70-30 Benchmark	Relative*
Soft-landing	+1.25%	+10.32%	+0.93%
Mild recession	-5.7%	-4.53%	-1.18%
Severe recession	-11.45%	-10.95%	-1.50%
Persistent inflation	-5.35%	-5.4%	+0.14%
International recession	-7.37%	-8.37%	+1.00%
International outperformance	-0.01%	+2.25%	-2.37%

## Growth of \$10,000

Common beginning 1/1/13-1/31/23

Funds

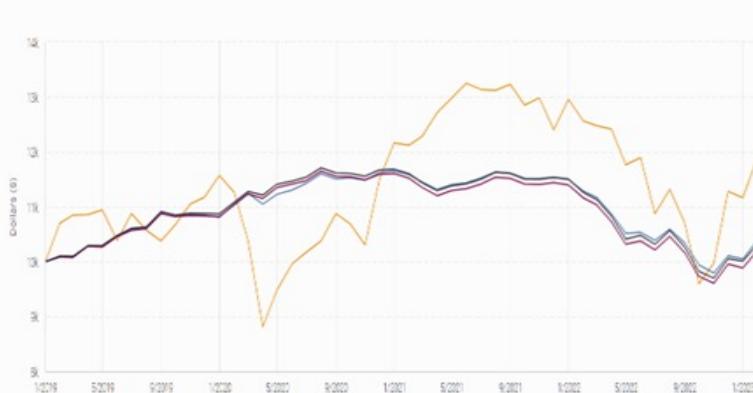
JPMorgan Diversified Return Fund ETF

JPMorgan Core Bond A

JPMorgan StableValue US Agg Bond ETF

Benchmark

Bloomberg US Agg Bond TR USD

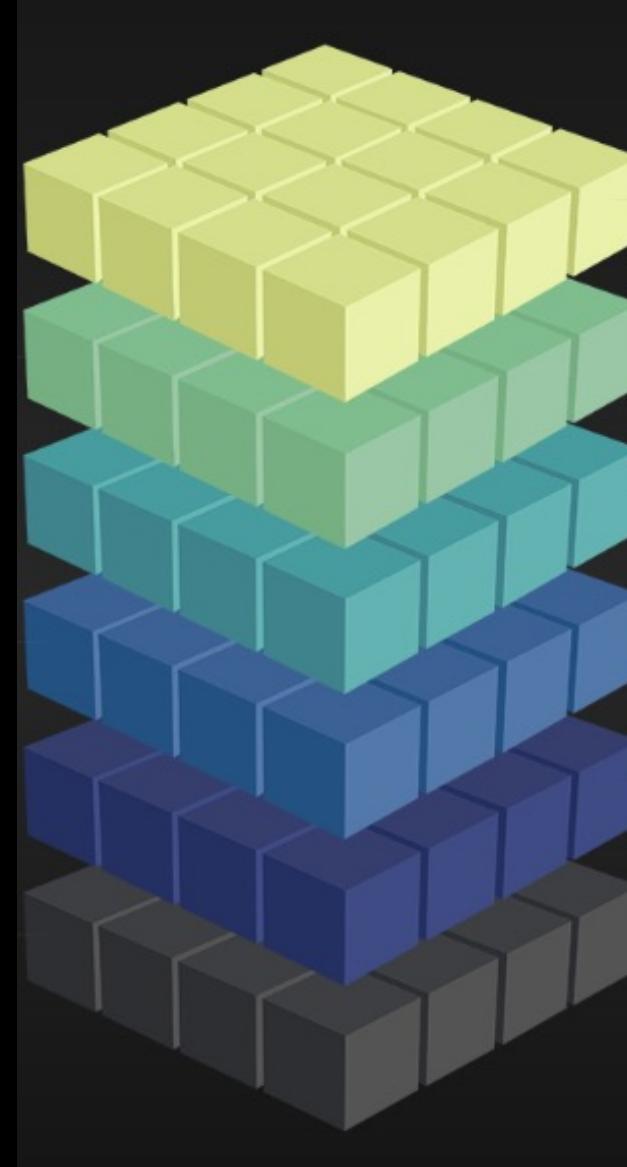


# Background of our team and platform

## WHAT WE BUILD



Suite of Portfolio Construction tools that analyze portfolios and funds using data that spans over 400,000 instruments and 1 Trillion Holdings and Performance data



## OUR CLOUD PLATFORM



- AWS and EKS – Clusters Independently owned and operated by us
- 10 Web applications
- 40 EKS microservices
- Databases: Dynamo, Oracle, Aurora

## TECHNOLOGY STACK



Microservices: Java, Python, NodeJS

WebApplications: ReactJS, NextJS, NodeJS

## OUR TEAM

40 Member team – Mix of Full stack Developers, Backend specialists, Platform Architects, Product Managers, UX Designers



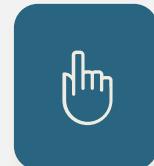
## MODERN TOOLBOX

- Best in class automated pipelines using Terraform, Jenkins, Harness
- Spinnaker for CD
- Splunk, Datadog, Prometheus
- Jira, Service Now, Figma



## OUR SUPPORT MODEL

- You Build It, You run it Model
- Weekly rota system with 2 developers on call at all times
- “Follow the Sun” system with support teams in APAC, India and US.



# Why the Analogy between Juggling and Software Development?

Practice

Precision

Skills

Speed

Adaptability

Creativity



# Why embrace the “You Build It, You run it” culture?

Why not have a dedicated Support SRE team?

- Build Ownership and Accountability and knowledge that comes from running systems.
- Improved fungibility achieved by supporting the entire stack of different applications, services and operations.
- Improved team communication and soft skills by pairing with Senior Operations and improved writing skills by writing root cause analyses.
- Opportunity to work with actual end users and get real time feedback.

# But are developers ok with “You Build It, You run it”?



Developers like to code and build stuff



But they do not like to support applications  
that they have *not built !!!*



# What makes Application Development so attractive?



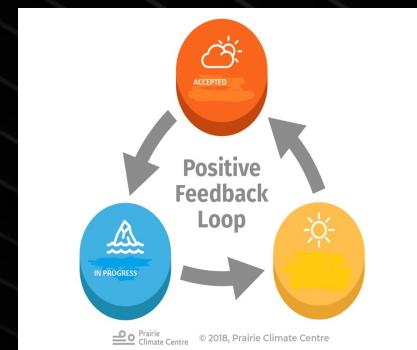
**Latest Technology:** Developers love to work with the latest and greatest tools and build cutting-edge software and the opportunity to create fresh code, and to leave behind them a lasting legacy



**Flow** - Developers become absorbed in their work and are highly productive when they are in their flow state.



**There is a clear goal** – each story has well defined acceptance criteria – Developers know what they are working towards and they feel a sense of accomplishment as they make progress.

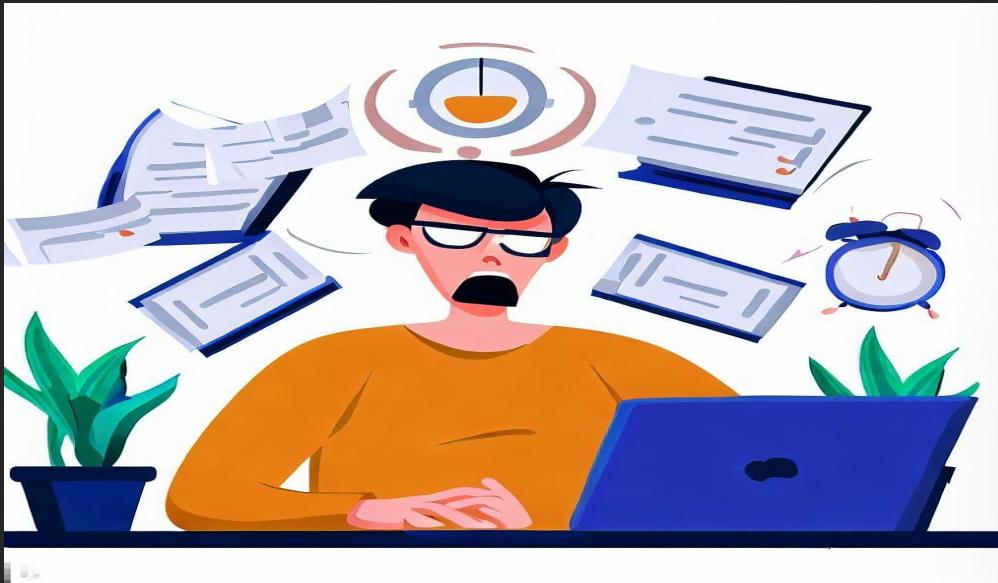


**Rapid Feedback:** Developers can unit test their code, and deploy it, they get immediate visibility of code changes, and this enhances the flow state as they can see the impact of their actions.

# On the other hand, doing production support ...

- Hinders flow
- Feeling lost in the multitude of services and applications that you have no clue about.
- Inundated by Cognitive load caused by having to learn different platforms

## A day in the life of an “On-Call” UI developer



Can you fix the terminated batch load process? Alerts are blowing up

Uh ..  
How do I find the right confluence page?....

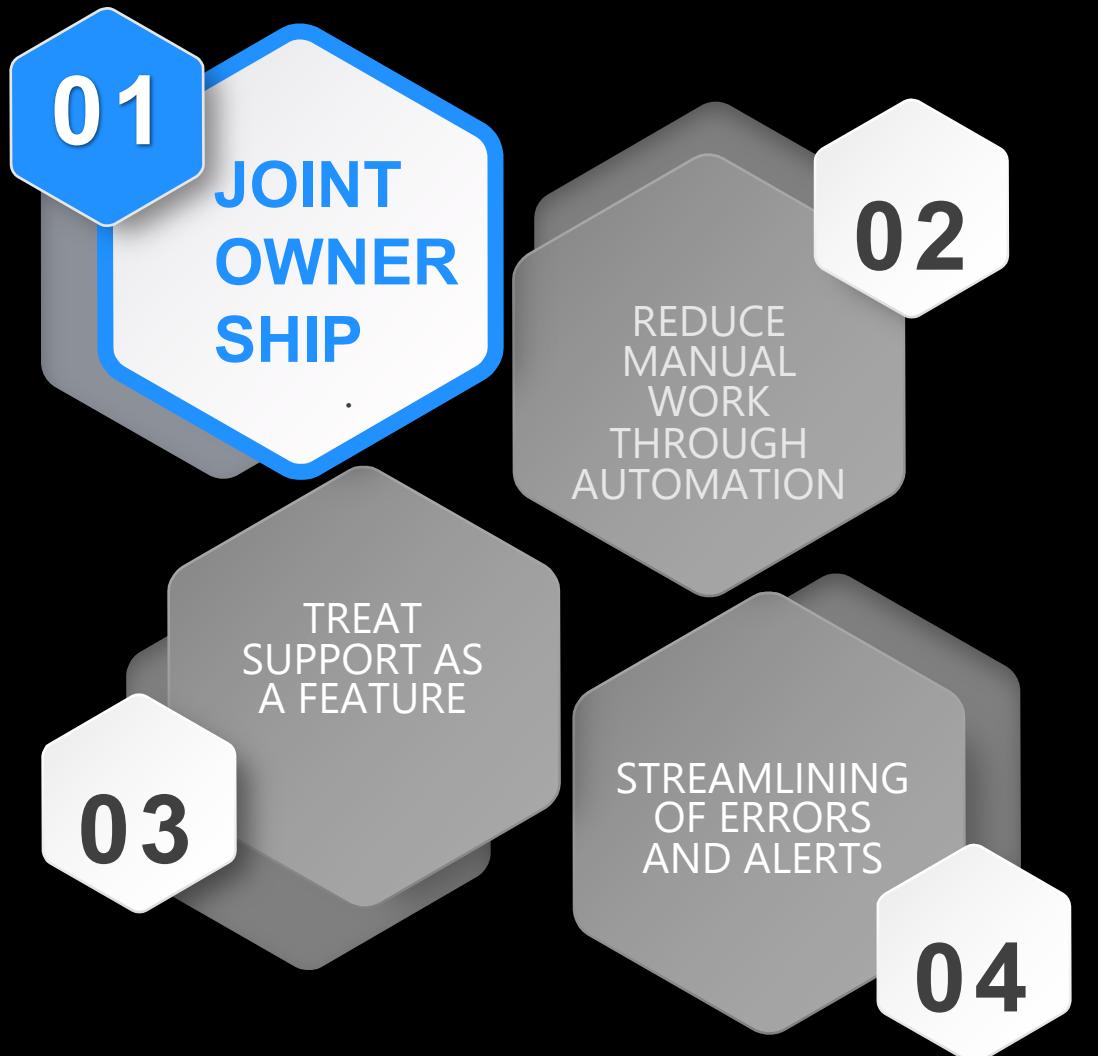
We have a confluence page on the steps that need to be taken to fix that...



So, how do we get **developers** to like Production Support ???

Or is that an oxymoron?

# Joint Ownership by both PMs and Developers



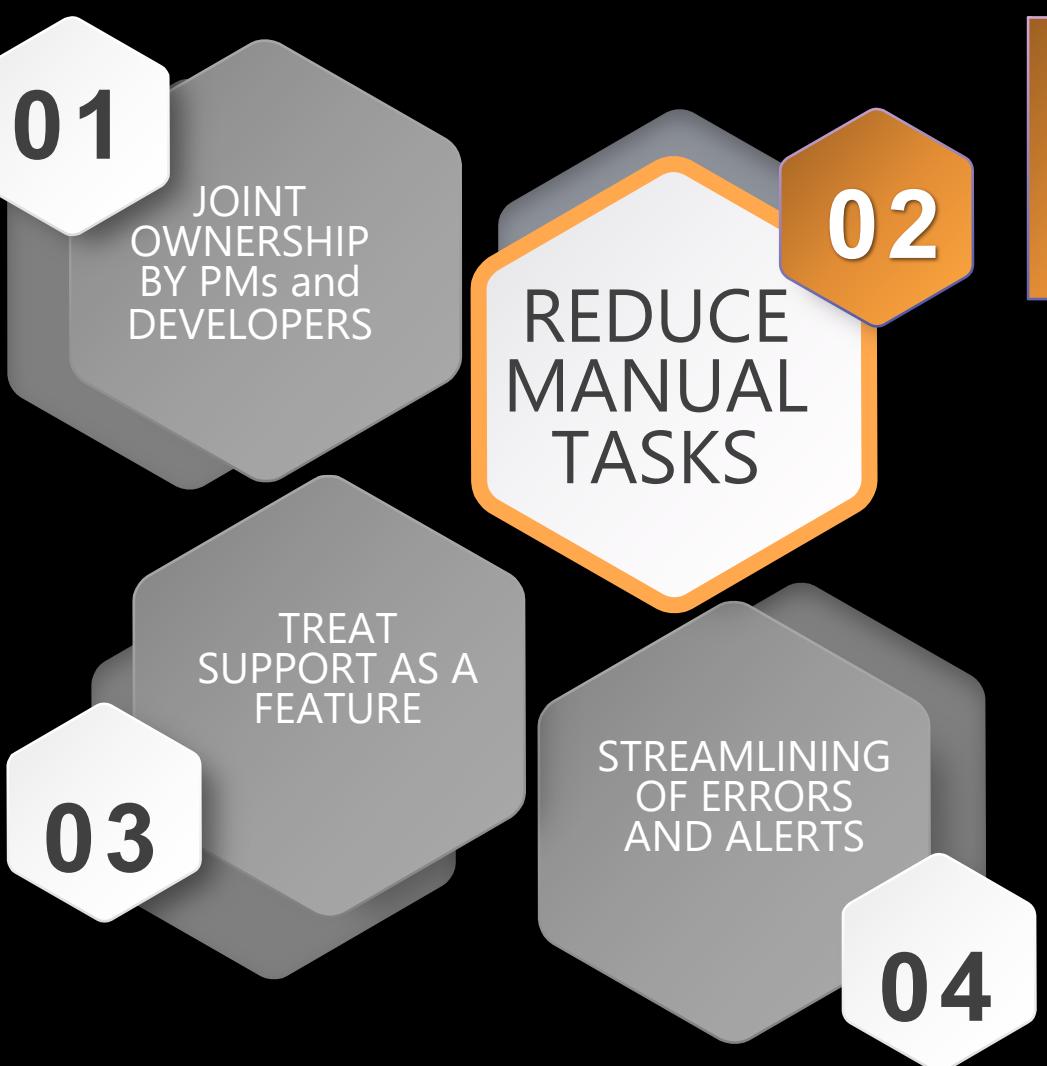
01

**No one knows the Product better than the PM:**  
The PM can quickly assess if a functionality is critical or not or can work with the Business to assess the damage and can triage critical issues

**PMs help in prioritizing:**  
Our PMs categorize user reported issues into 3 buckets: Show Stoppers, Medium and Low

**Our PMs are technology savvy**  
PMs once trained can help validating stories better, can check for ADA compliance, data validation and more

## Reduction of Manual Tasks by Automation



**Identify the issues that are most often occurring or consuming the max time to fix – We had frequent issues with our batch processes leading to incorrect performance data points**

**Limit Production Access – We built Self Service Admin tools that can help resolve issues without having to break glass in production**

**Improve Developer Experience – Improved Automated Testing and Faster Pipelines to deploy hotfixes quickly**

**Improve Service Documentation – Each service is well documented with Swagger endpoints with sample request and response**

# Treat Production Support as a Feature and Integrate it into SDLC

OPTION  
**01**

JOINT OWNERSHIP BY PMs and DEVELOPERS

OPTION  
**02**

REDUCE MANUAL WORK THROUGH AUTOMATION

OPTION  
**03**

TREAT SUPPORT AS A FEATURE

OPTION  
**04**

STREAMLINING OF ERRORS AND ALERTS

**03**

**Differentiate between Planned and Unplanned Support Work** – Create stories for all production work and have well documented processes for the planned work

**Allocate time for Unplanned work in each sprint** by adding story points for production support to each sprint

**Blameless postmortems and retros** – Don't ask who, but what or why? Identify trends and create stories to add functionalities that will prevent repeat offending issues

**Incident Management** – Documentation again is key. Knowing when to call external teams for support and how to engage them.

## Streamlining of Alerts by better classification

01

JOINT OWNERSHIP BY PMs and DEVELOPERS

02

REDUCE MANUAL WORK THROUGH AUTOMATION

03

TREAT SUPPORT AS A FEATURE

STREAMLINING OF ERRORS AND ALERTS



04

04

Error fatigue is real with automated alerts:

Consolidated errors- Its easy to get lost when you get too many alerts, or duplicate alerts for the same error from different systems.

**Classification of errors:** Identify which errors are affecting users vs errors which are silent or self healing. We set alerts for user facing errors or when a threshold is exceeded.

**Knowing what Good looks like:**

We trained our developers to know how the system behaves normally, so that they can identify anomalous behavior

**Real User Monitoring and Session Replay**

For the “Difficult to reproduce” errors, we use Datadog for replaying user sessions to reproduce the steps taken by user.

# Do

- **Build it right the first time – Extensible Architecture is crucial.**
- **Let the On Call rota team figure out issues and try to resolve them**
- **Pick the right tech stack that majority of developers can understand and support**
- **Keep all your applications ever green and deploy via the pipeline ever so often**
- **Gather user feedback in addition to metrics for SLI, SLO, SLA and strive to provide value**
- **Encourage human connection: Pairing, knowledge sharing, constructive feedback, and a growth mindset.**

# Do not

- **Cut corners to get the MVP out. You may end up paying more for support.**
- **Try to do their job, even if it is easier for you to step in and do it.**
- **Choose a new tech stack just because developers want to try out something new.**
- **Ignore applications that are deployed less often, you never know when you need to apply a hotfix.**
- **Rely on metrics alone – it may not provide a comprehensive view and beware of observer effect**
- **Expect all developers to enjoy Production Support or be at the same level**

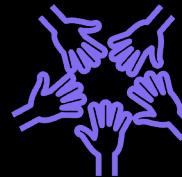


**Remember that in  
the juggle of  
software  
development, it's  
a team effort!**

# Success Stories by following these practices



**Developers feel more relaxed after issues are prioritized**



**More empathy between developers and PMs**



**Business is happy with speed of issue resolution**



**Issues are followed up in Weekly Handoff meetings**

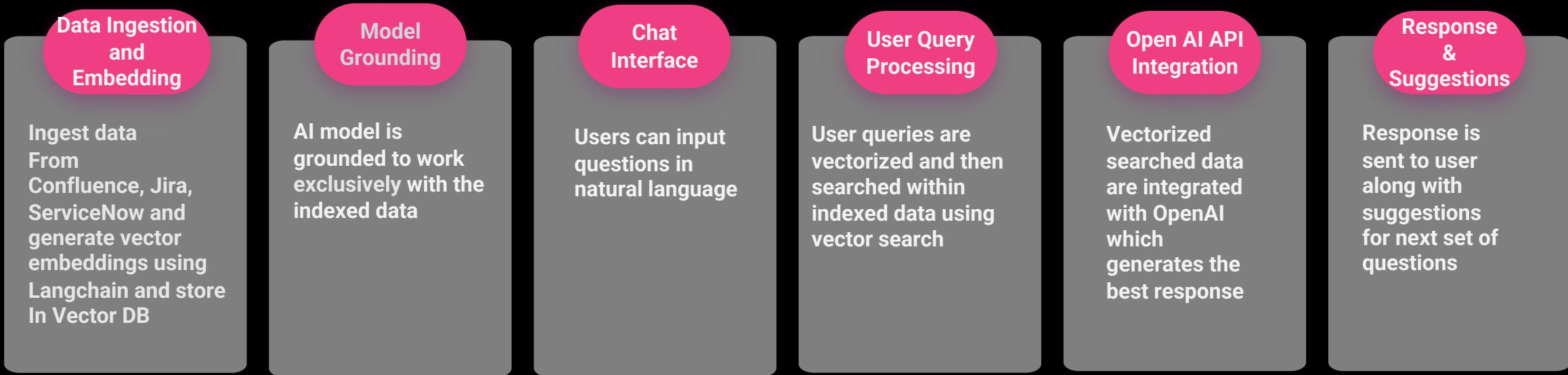


**Increased skillset for both developers and PMs**



**Documentation is vastly improved with active contributors**

# In the works – POC to use AI to augment Support



## Using AI for Searching within knowledge base:

Muscle Memory is overrated.

Make it easy for Developers and PMs to search within the internal knowledge base that is spread across Confluence, Jira, Service Now.

## Leverage the power of Generative AI for automation

- Generate outage emails
- Write Splunk queries, Prometheus queries, dashboards, Excel formulas.
- Help with the transcription of outages



Does this picture  
look like your team?

Let's discuss and share your ideas!!!

Thank you