



HEALTH CARE MODERNIZATIO N AT SCALE

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David Cherryhomes
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WHO WE ARE



**DAVID
CHERRYHOMES**
VP Software Engineering

David has held multiple roles in technology where he learned the hard way to craft flexible designs, write clean code and reduce risk through automated testing. He dislikes marketecture, armchair architects, and seagull managers. David has a bachelor's degree in philosophy from the University of Southern California (that failed to launch a career) and a master's degree in software engineering from University of Minnesota (yay for success!).



**HEATHER
MICKMAN**
VP Platform Engineering & Practices

Throughout her career, Heather has built APIs to unlock enterprise data, created awesome platforms, led organizations' operations and built supply chain software for Fortune 50 companies. She has a passion for technology, building high performing teams, driving a culture of innovation and having fun along the way.

Heather serves on the Minnestar board: a Twin Cities non-profit building and supporting our technology community. She is also a local Minneapolis DevOps Days organizer.

WHAT WE DO

UNITEDHEALTH GROUP

A DISTINCTIVELY DIVERSIFIED ENTERPRISE



HEALTH BENEFITS



HEALTH SERVICES

FOUNDATIONAL COMPETENCIES



CLINICAL INSIGHT



TECHNOLOGY



DATA & INFORMATION



OUR MISSION

We help people live
healthier lives and help
make the health system
work better for everyone.



FAST FACTS

2018 Revenues

\$226B

Serving **230M** individuals
worldwide

Supported by a staff of
300,000 people

FORTUNE WORLD'S MOST **ADMIRE** COMPANIES 2019

Ranked No. 1 in **Insurance and
Managed Care**

Ranked No. 1 overall in its sector
for **9 consecutive years**

Member of the **Dow Jones
Industrial Average**

OPTUM TECHNOLOGY BY THE NUMBERS

PEOPLE 	21K <i>Team members worldwide</i>	150+ <i>Distinguished and principal engineers</i>	2,300 <i>Culture ambassadors</i>	3,500 <i>College recruits: Technology Development Program</i>
INFRASTRUCTURE & TECHNOLOGY 	100K <i>Servers</i>	7 <i>Mainframes</i>	~\$3.5B <i>spent annually on technology and innovation</i>	150 petabytes <i>of data</i>

UNLOCKING THE DATA

Heather Mickman
@hmickman



MODERNIZING A LARGE ENGINEERING TEAM

David Cherryhomes
@ogcherryhomes

MODERNIZING DATA: WHERE WE STARTED

Accessing data is the #1 developer challenge



THE API CHALLENGE

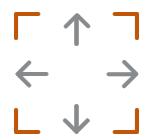
1000s of APIs



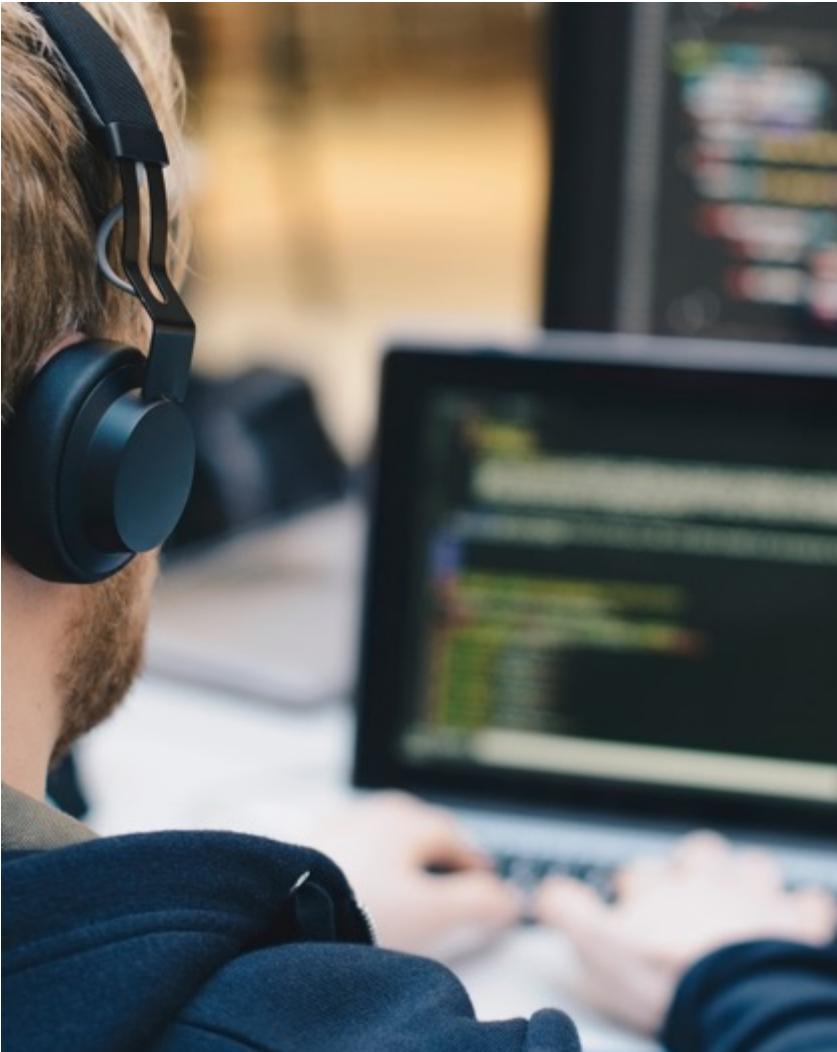
UNLOCKING THE VALUE IN DATA



Reuse
architecture



Scale
to the cloud



Learn
the implementation



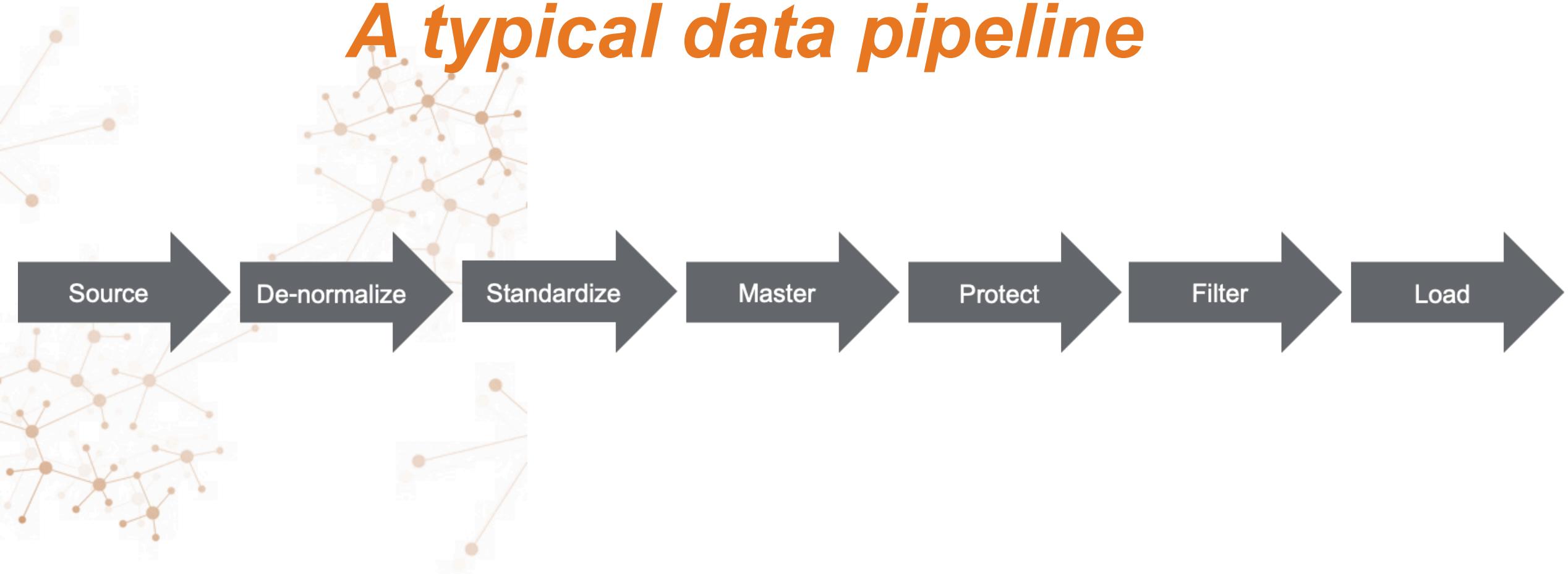
Insulate
Source Systems



Rationalize

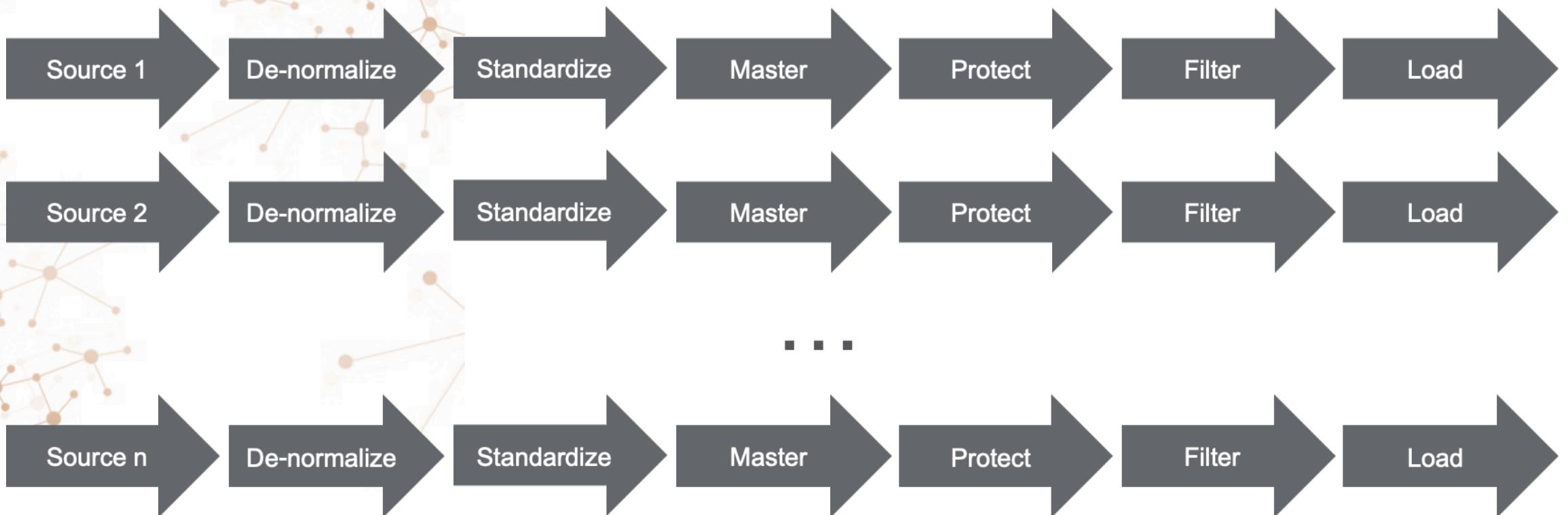
WHY A DATA PLATFORM APPROACH

A typical data pipeline



WHY A DATA PLATFORM APPROACH

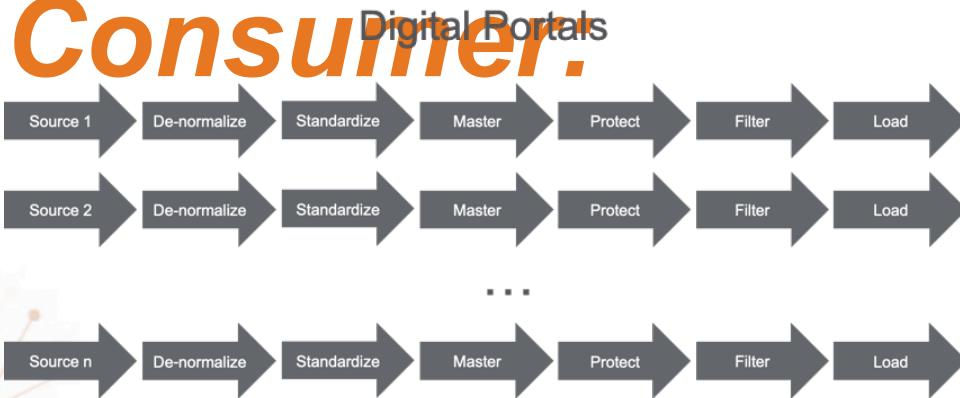
Pipelines created for each Source System



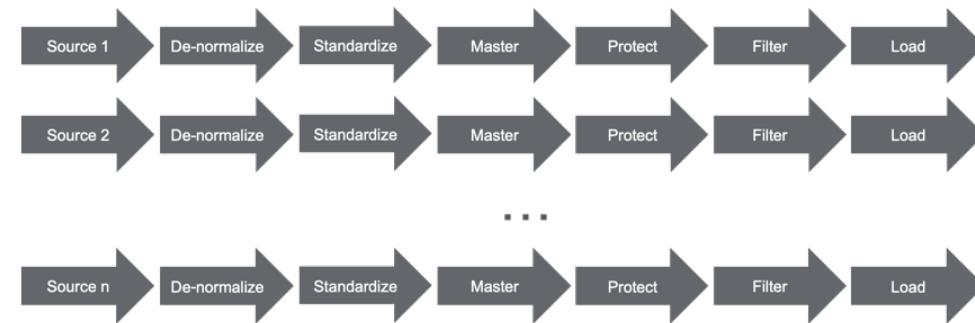
WHY A DATA PLATFORM APPROACH

Many Source Systems for every

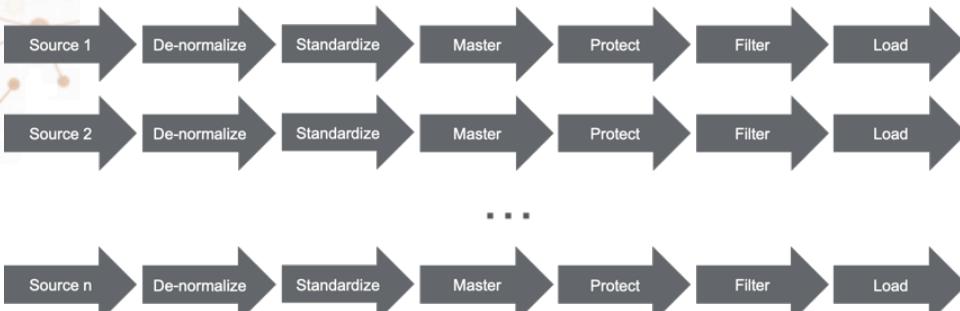
Consumer:



Data Warehouses

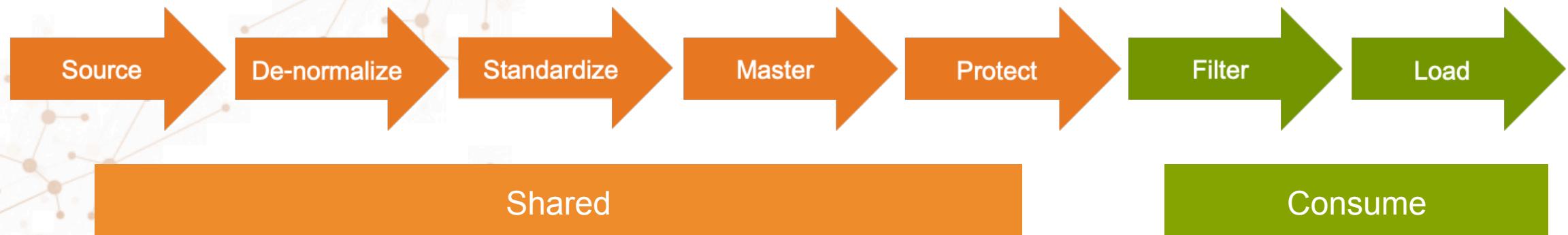


Call Centers



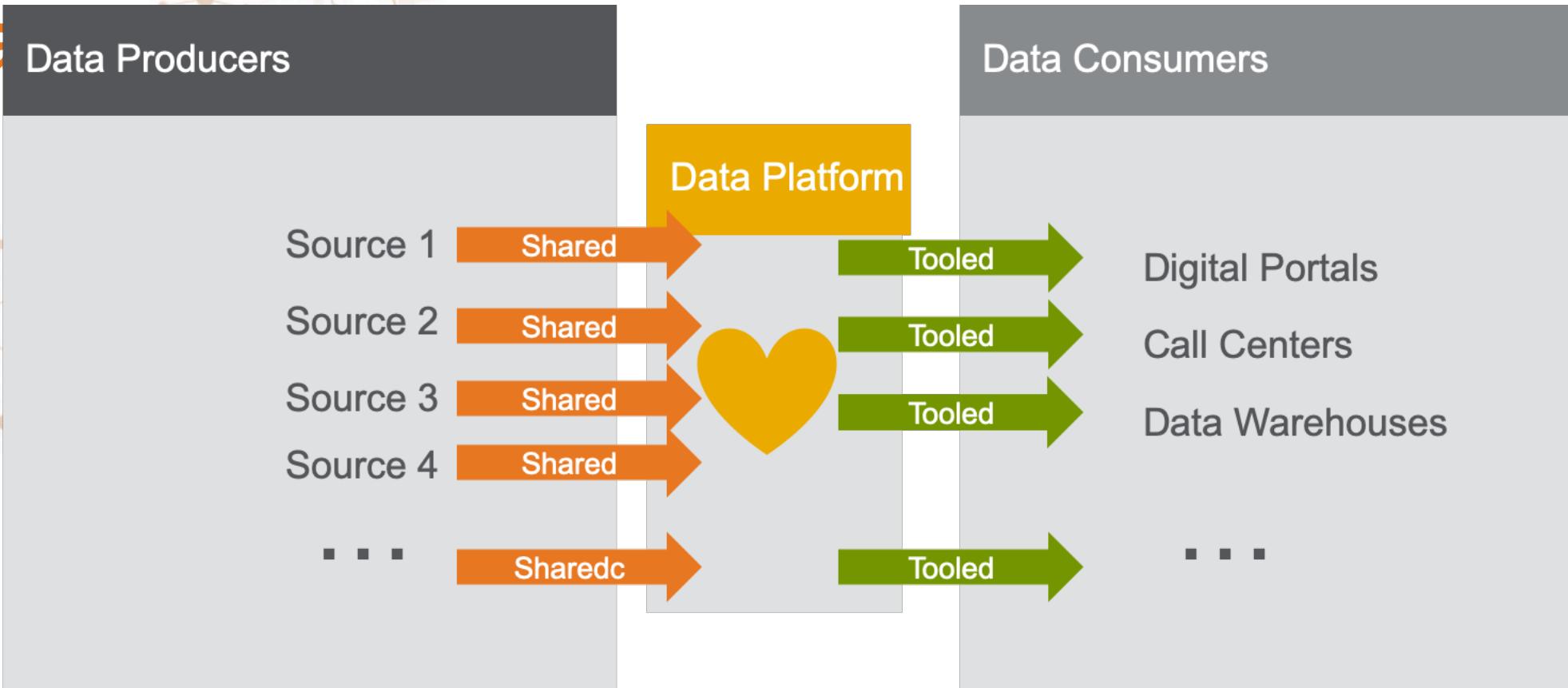
HOW TO: THE DATA PLATFORM APPROACH

Do the shared work once, tool for consumption:



Insulate Sources, Data Platform: Digitally

Ena



WHERE ARE WE NOW?

After 1.5 years:

Infrastructure as code automation
with
0
manual touchpoints

160
teams

7k topics,
200k messages /
second

90

Kafka / Cassandra/
Elastic clusters

OSS API Gateway
~20m transactions/
day

Many mainframe
MIPS offloaded,
saving millions/year

WALK THE TALK



MODERNIZING THE PLATFORM: NEXT GEN ADMINISTRATION SOFTWARE



Target efficiency
Reduce costs to 1/3 of previous levels



Initial rollout
Over 1 million members

MODERNIZING A LARGE ENGINEERING TEAM

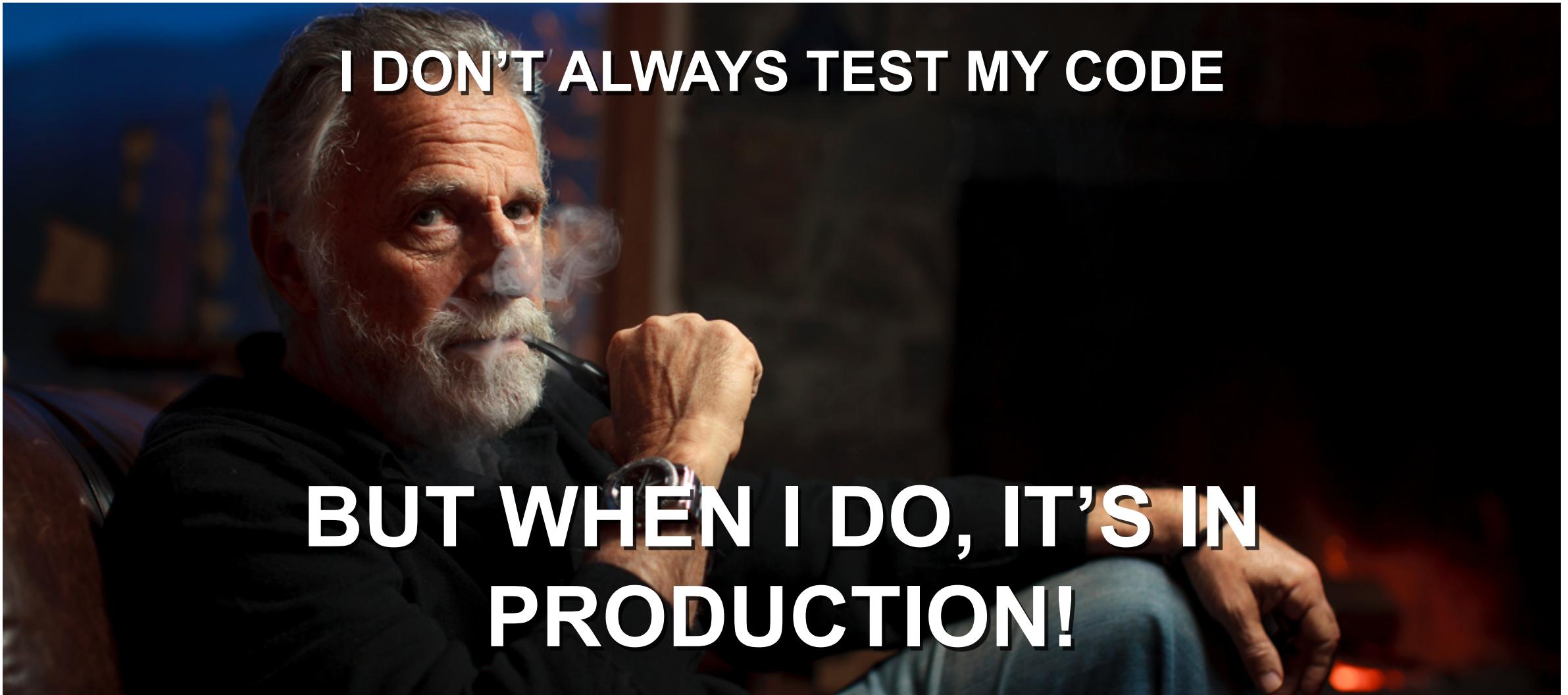


It starts with people
What matters to them?



Individual success
generates
business success
*Agility, speed to
market, higher
quality...higher Net
Promoter Scores*

AGILE SOFTWARE DEVELOPMENT



OUR AGILE EVOLUTION: DEVOPS



AGILE

- Evolving project management
- Rapid response to change
- Improved business value
- Direct user engagement
- Systems improvement
- Questioning the process
- **Quality**

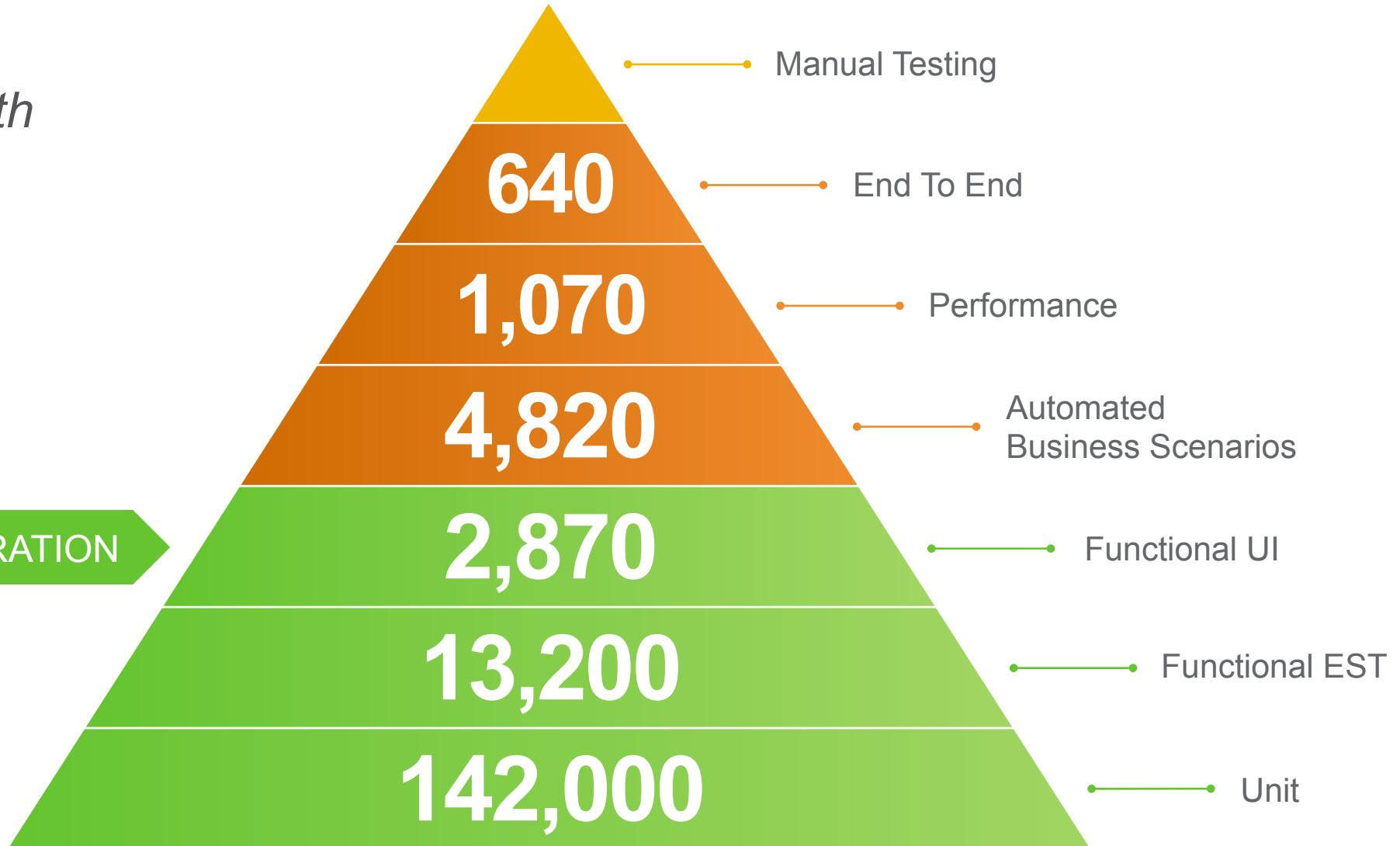


DEVOPS

- Evolving Agile
- Continuous improvement
- Continuous delivery
- Ownership, responsibility, accountability
- Engineering culture
- **Quality**

EMBRACING QUALITY ENGINEERING

*Invest in quality with
automated testing*



OUR DEVOPS STORY

2 per day

Average *daily*
releases *this*
year

2,531

User stories
deployed *this*
year

1,486

Total number of
defects resolved

**under 24
hours**

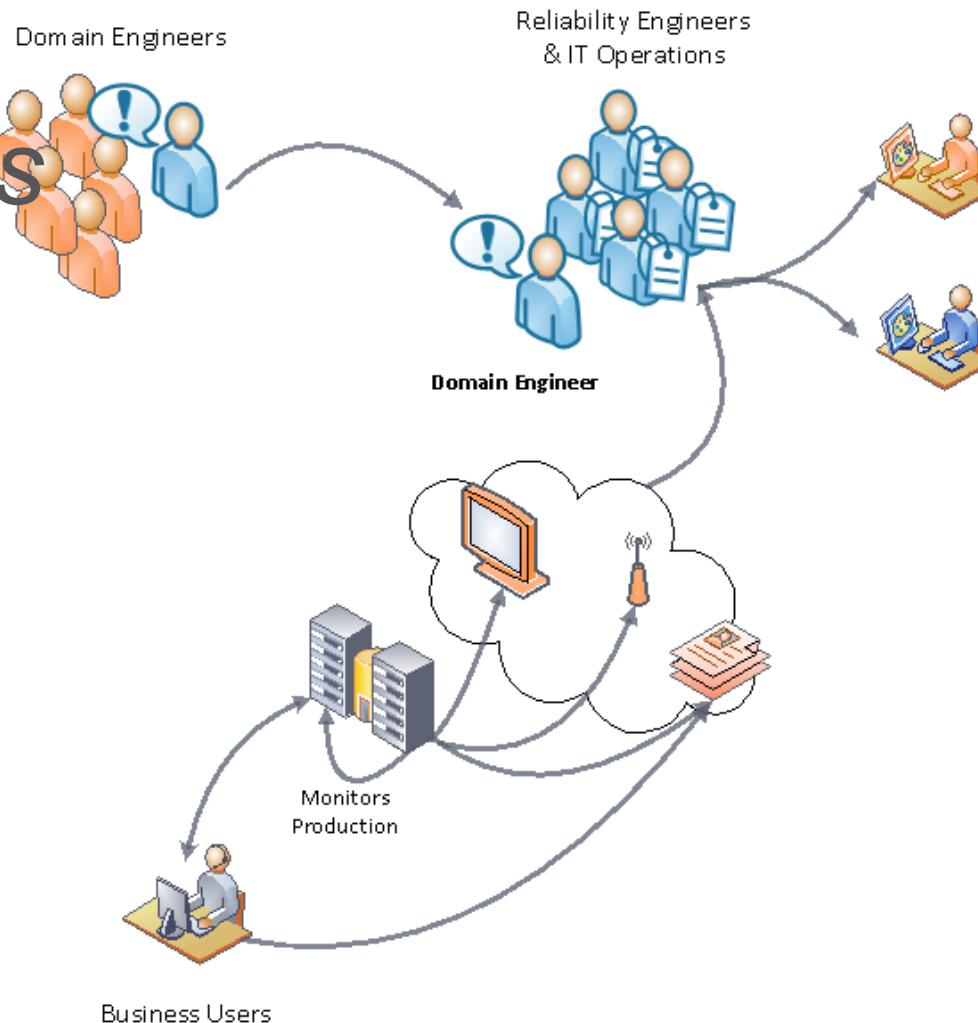
Critical incident
MTTR

10 days

Medium *incident*
TAT (*from notice*
to fix deployed)

SCALING DEVOPS

*Delivery teams
rotate through
production
support*



Rotation model

- Volunteer engineers from the domains
- Trained by SRE & IT Ops
- 10-week duration
- 1-week overlap

Support model

- Daily standup
- Automated updates to dashboards, incidents and send alerts
- Triage → workaround → defect

SCALING DEVOPS: ROTATION & SUPPORT MODEL APPROACH

Pros:

- Can scale support on demand
- 103 engineers have rotated this year
- Monitors & alerts written by SREs
- Monitors & alerts written by domain
- Operations lessons move back
- Performance expertise move back
- Engineers learn, improve & experience the joy of production support
- Quality improves

Cons:

- Over 50% of the support team is new every 10 weeks.
- Support engineers are not necessarily the authors of the code.

THE JOURNEY AHEAD & WHAT WE WANT TO TALK ABOUT WITH YOU!

- Early days of data modernization and cloud
- Many engineering & business teams to begin the DevOps journey
- Evangelizing a new architecture or process is a labor of love
- Engineering patterns, tooling, and processes are needed
- Educating team members and enhancing their skills with new technologies and processes at a large organization is hard
- **Automation, documentation, training, and guardrails are SUPER important!**



THANK YOU

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