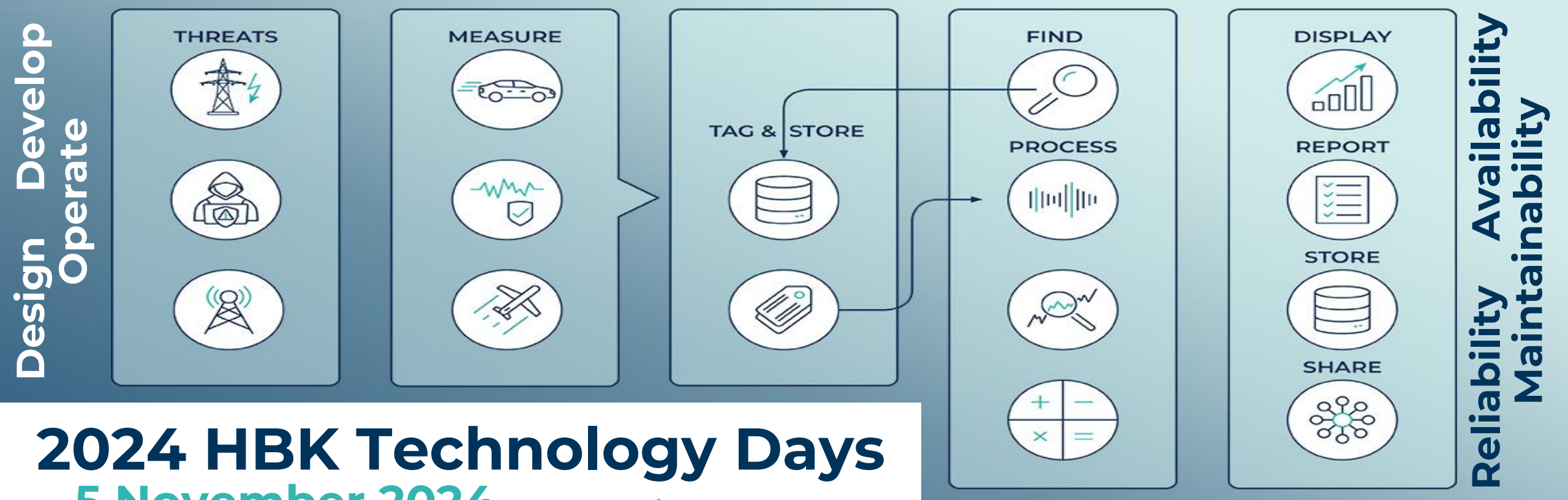


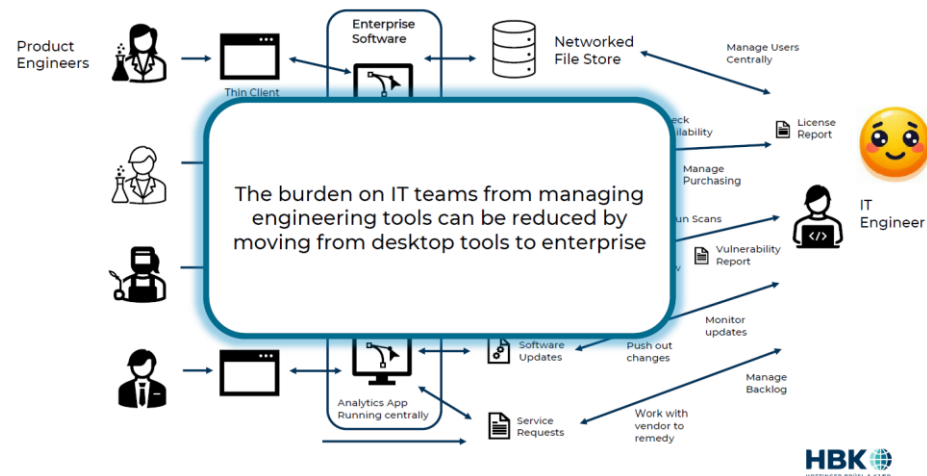


2024 HBK Technology Days

5 November 2024

Session 2:
Minimising Cyber Threats to Sensors, Vehicles and Software

IT Burden of desktop software



- Security and deployment benefits of enterprise and private cloud solutions for measurement and durability analyses

Jon Aldred & Chris Phillips,
HBK

Security and deployment benefits of enterprise and private cloud solutions for measurement and durability analyses

Abstract

- The increasingly connected world brings many benefits, but also an increasingly complex cybersecurity landscape. An increase in bad actors and increasingly stringent legislation to address these mean increased volumes of work and pressure for IT and Security teams trying to balance the need to support key engineering tools while protecting their organizations. While these legislative changes aim to enhance security and protect sensitive data, they pose considerable challenges for software, necessitating upgrades or even complete overhauls to meet current standards.
- Engineering software presents a particular set of challenges: business critical, high value and specialized, but frequently built and/or managed over many years by internal teams with little security experience. In this presentation we will consider the difficulties of managing engineering software with a focus on measurement and durability solutions. We will look at how modern software engineering techniques and deployment models can be used to address technical, organizational, and compliance risks. And we will consider how taking advantage of these deployment models can add value to both data and processes.

Security and deployment benefits of enterprise and private cloud solutions for measurement and durability analyses

▲ About the presenters

▲ Jon Aldred, Director, Product Management, HBK

- Jon is Director of Product Management for HBK, and responsibilities include the product roadmaps for nCode and ReliaSoft software brands for durability and reliability engineering. His responsibilities include assessing the impact of new market trends such as electrification, digitalization and lightweighting on future software needs. Jon joined HBK in 1996 and prior to that worked at Chrysler in Auburn Hills and Jaguar Cars in the UK, performing CAE simulations for NVH, crash and durability.

▲ Chris Phillips, Product Manager - Aqira, HBK

- Chris is a product manager at HBK responsible for the development of Aqira, an enterprise system for test data management and process democratization. His background includes developing and deploying remote asset monitoring systems for railway signalling, systems to manage the operation of rail plant, and working on ground crew training simulators for the MoD. He has an MEng in Electronic Engineering and Embedded Systems from the University of Sheffield.

HBK – Hottinger Brüel & Kjær

SECURITY AND DEPLOYMENT BENEFITS OF ENTERPRISE AND PRIVATE CLOUD SOLUTIONS FOR
MEASUREMENT AND DURABILITY ANALYSES

Chris Phillips: Product Manager – Aqira
Jon Aldred: Director of Product Management

Introduction of Chris Phillips

- ▲ Product Manager for Aqira
- ▲ 5+ years with HBK
- ▲ Previously:
 - Product Manager at Balfour Beatty Rail Technologies – Remote monitoring of Rail Signalling Systems
 - Software engineer: rail signalling & plant / test trains
 - Embedded software engineer / electronic engineer: Gas pipe welding; snow machines; Harrier maintenance simulators
- ▲ Enjoys bouldering, board gaming

Introduction of Jon Aldred

- ▲ Director of Product Management at HBK, responsible for nCode and ReliaSoft products.
- ▲ 28 years with HBK
- ▲ Automotive background, starting with Jaguar Cars and moving to Detroit to work at Chrysler, performing durability and NVH simulation
- ▲ Based in Farmington Hills, MI just outside Detroit

Welcome to today's session

Security and deployment benefits of enterprise and private cloud solutions for measurement and durability analyses

1. Challenges in modern product engineering and how enterprise software and cloud solutions can help address them
2. IT / Cyber challenges in engineering organisations



Addressing Modern Product Engineering Challenges

Modern Product Engineering Challenges

The Trends:

- More Sensors and Connectivity mean increased data volumes
- Product Teams are more remote / geographically distributed
- Product Teams have less engineering resource

The Challenges:

- Expectation of quicker and better decisions / insights
 - Hard to achieve quicker insights with more data and the same tools.
 - Engineer's time spent finding data rather than adding value
- Loss of organisational and domain knowledge
 - Engineers leaving can result in loss of many years of experience
 - New engineers take time to learn tools and data

Do existing tools address these challenges?

- In house tools
 - Allows custom analytics IP but can be hard to learn and to manage.
- In house data storage solutions
 - Don't scale up well for large volumes or distributed /siloeed data



How can enterprise software support productivity



Enterprise Software: Large scale; centrally installed and managed; designed to streamline / automate processes



The HBK enterprise solution Aqira provides an example of the benefits that can be gained by centralizing engineering data access and tools



Data Access

Central location for data access allows engineers to focus on **what** not **where** data is.
Tools to allow data discovery across network are a significant time saving



Process Automation

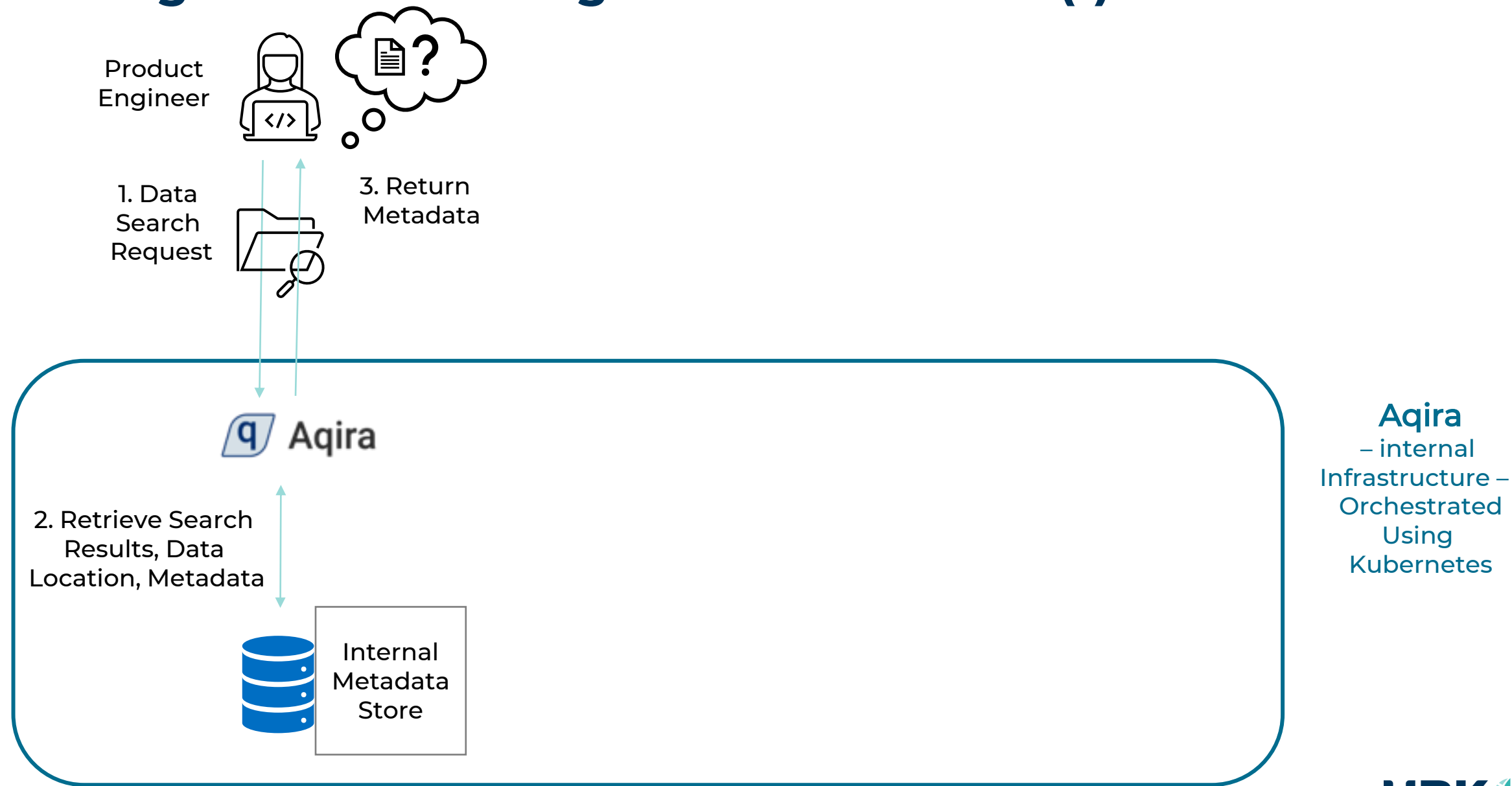
Run workflows automatically so **data** is made available and discoverable **as soon as possible**
Scale out resources to **support larger workloads**



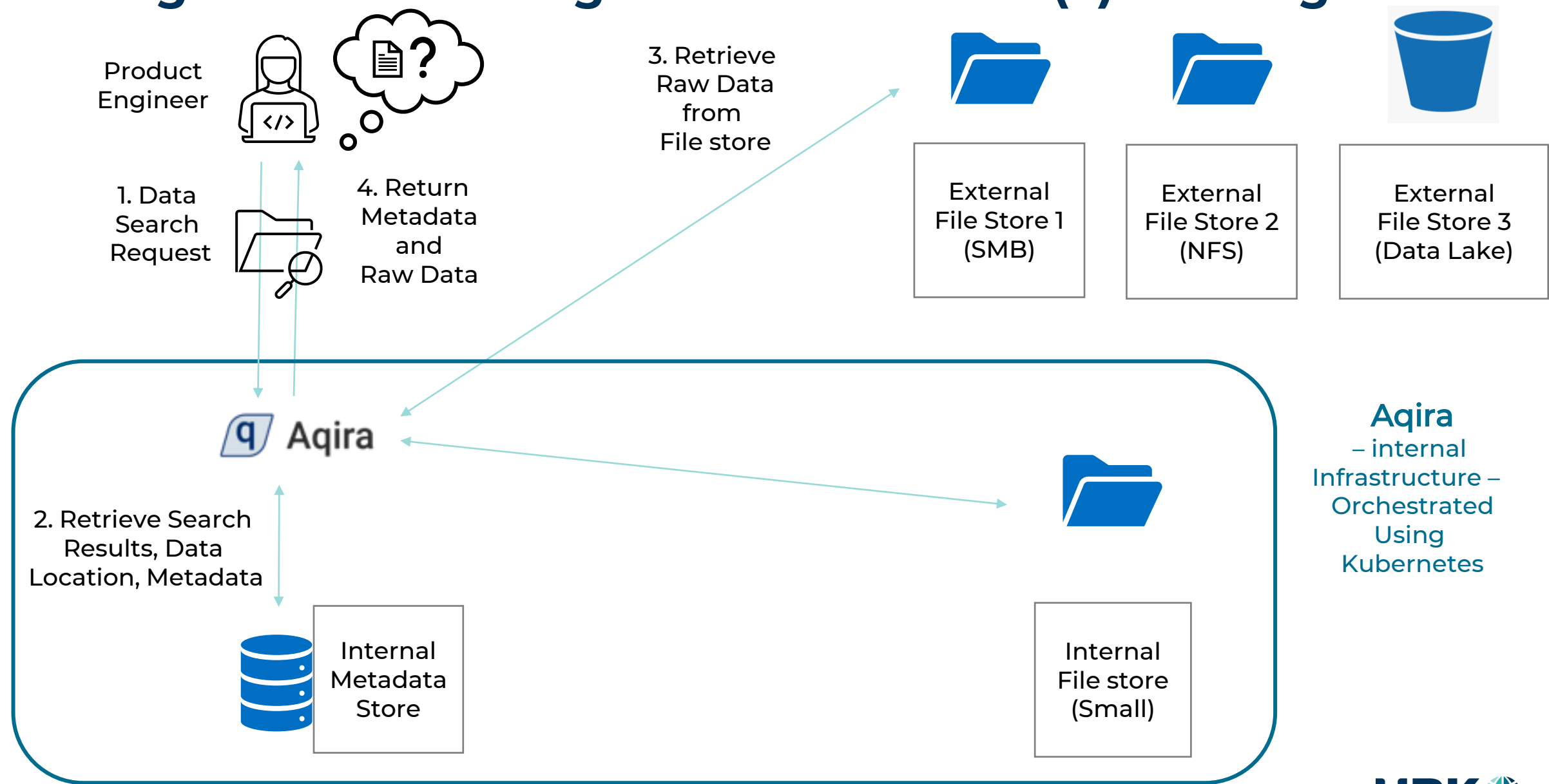
Democratisation

Capture and share **expert knowledge** using powerful analytics tools such as nCode / nCodeDS
Central management of analytics tools ensures **the right people have access to the correct versions**

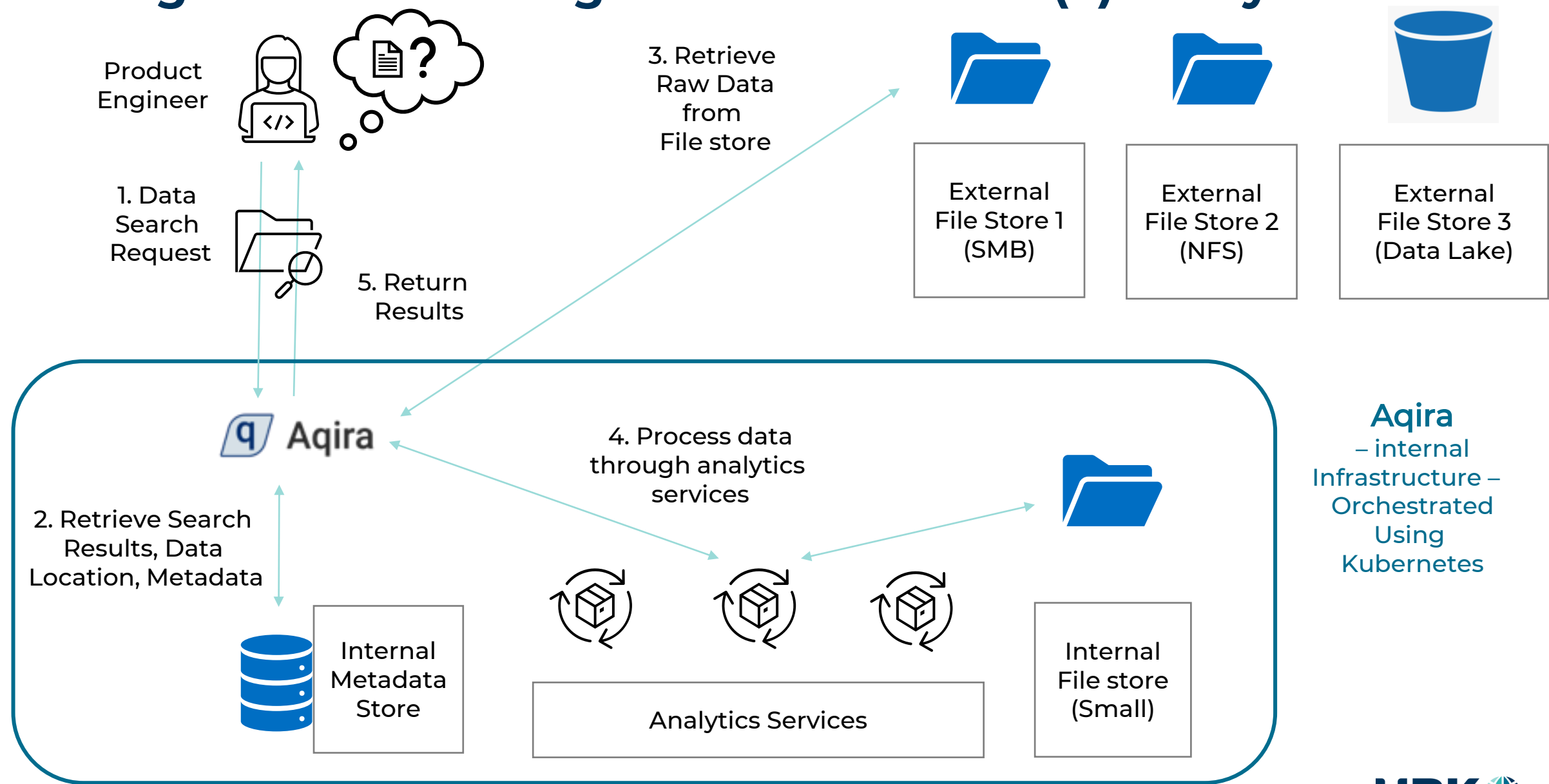
Solving the Data Management Problem – (1) Metadata



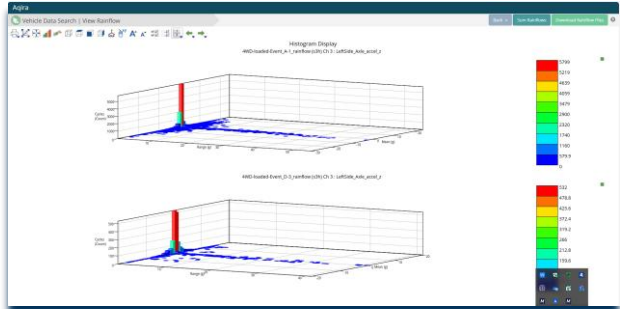
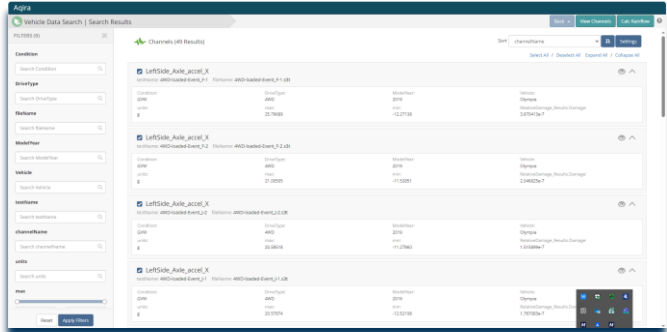
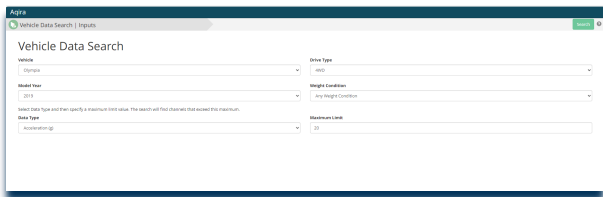
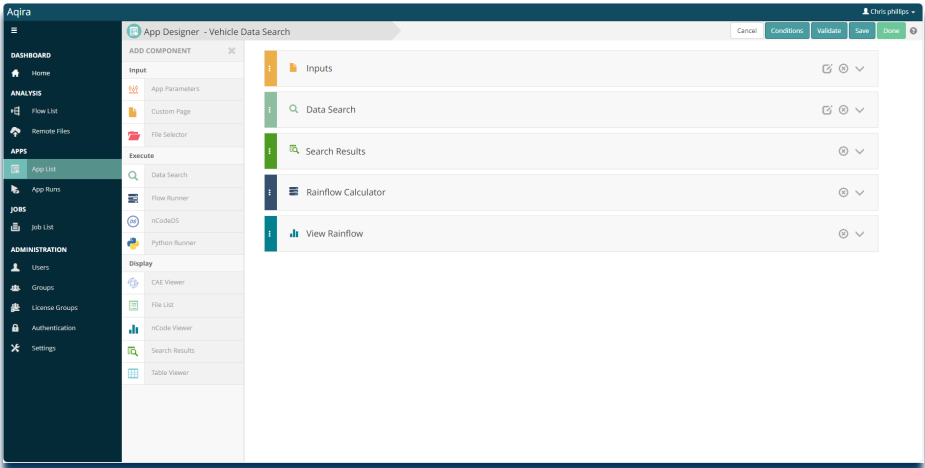
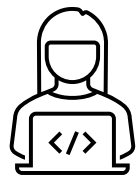
Solving the Data Management Problem – (2) Existing Data



Solving the Data Management Problem – (3) Analytics



Democratizing Expert Knowledge



Democratizing Expert Knowledge

Aqira

Chris phillips

DASHBOARD

Home

ANALYSIS

Flow List

Remote Files

APPS

App List

App Runs

JOBS

Job List

ADMINISTRATION

Users

Groups

License Groups

Authentication

Settings

App Designer - Vehicle Data Search

CancelConditionsValidateSaveDone

ADD COMPONENT

Input

App Parameters

Custom Page

File Selector

Execute

Data Search

Flow Runner

nCodeDS

Python Runner

Display

CAE Viewer

File List

nCode Viewer

Search Results

Table Viewer

Inputs

Data Search

Search Results

Rainflow Calculator

View Rainflow

UNRESTRICTED

HBK
HOTTINGER BRÜEL & KJÆR

Democratizing Expert Knowledge

Aqira

Vehicle Data Search | Inputs

Search

Vehicle Data Search

Vehicle

Olympia

Model Year

2019

Drive Type

4WD

Weight Condition

Any Weight Condition

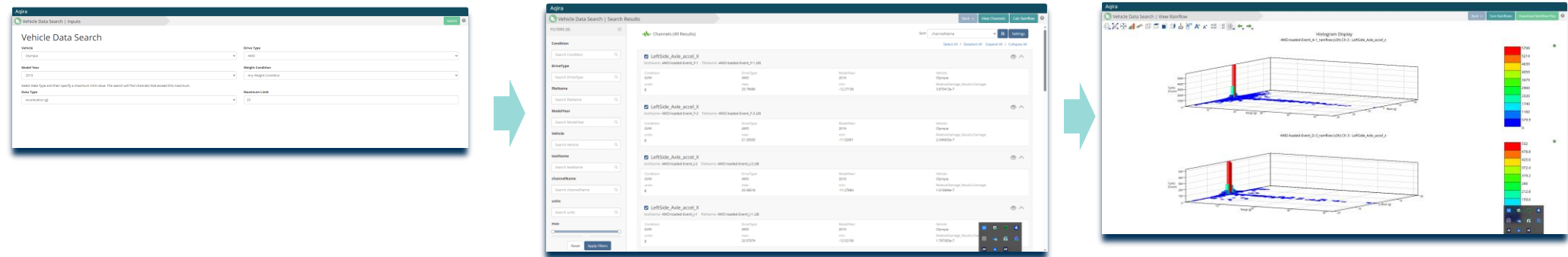
Data Type

Acceleration (g)

Maximum Limit

20

Select Data Type and then specify a maximum limit value. The search will find channels that exceed this maximum.



Democratizing Expert Knowledge

Aqira

Vehicle Data Search | Search Results

BackView ChannelsCalc Rainflow?

FILTERS (0)

Condition

Search Condition

DriveType

Search DriveType

fileName

Search fileName

ModelYear

Search ModelYear

Vehicle

Search Vehicle

testName

Search testName

channelName

Search channelName

units

Search units

max

ResetApply Filters

Channels (49 Results)

SortchannelName

Select All / Deselect AllExpand All / Collapse All

☒ LeftSide_Axle_accel_X

testName: 4WD-loaded-Event_F-1 fileName: 4WD-loaded-Event_F-1.s3t

Condition:	DriveType:	ModelYear:	Vehicle:
GWV	4WD	2019	Olympia
units:	max:	min:	RelativeDamage_Results.Damage:
g	25.79689	-12.27138	3.870413e-7

☒ LeftSide_Axle_accel_X

testName: 4WD-loaded-Event_F-2 fileName: 4WD-loaded-Event_F-2.s3t

Condition:	DriveType:	ModelYear:	Vehicle:
GWV	4WD	2019	Olympia
units:	max:	min:	RelativeDamage_Results.Damage:
g	21.00505	-11.52851	2.046825e-7

☒ LeftSide_Axle_accel_X

testName: 4WD-loaded-Event_J-2 fileName: 4WD-loaded-Event_J-2.s3t

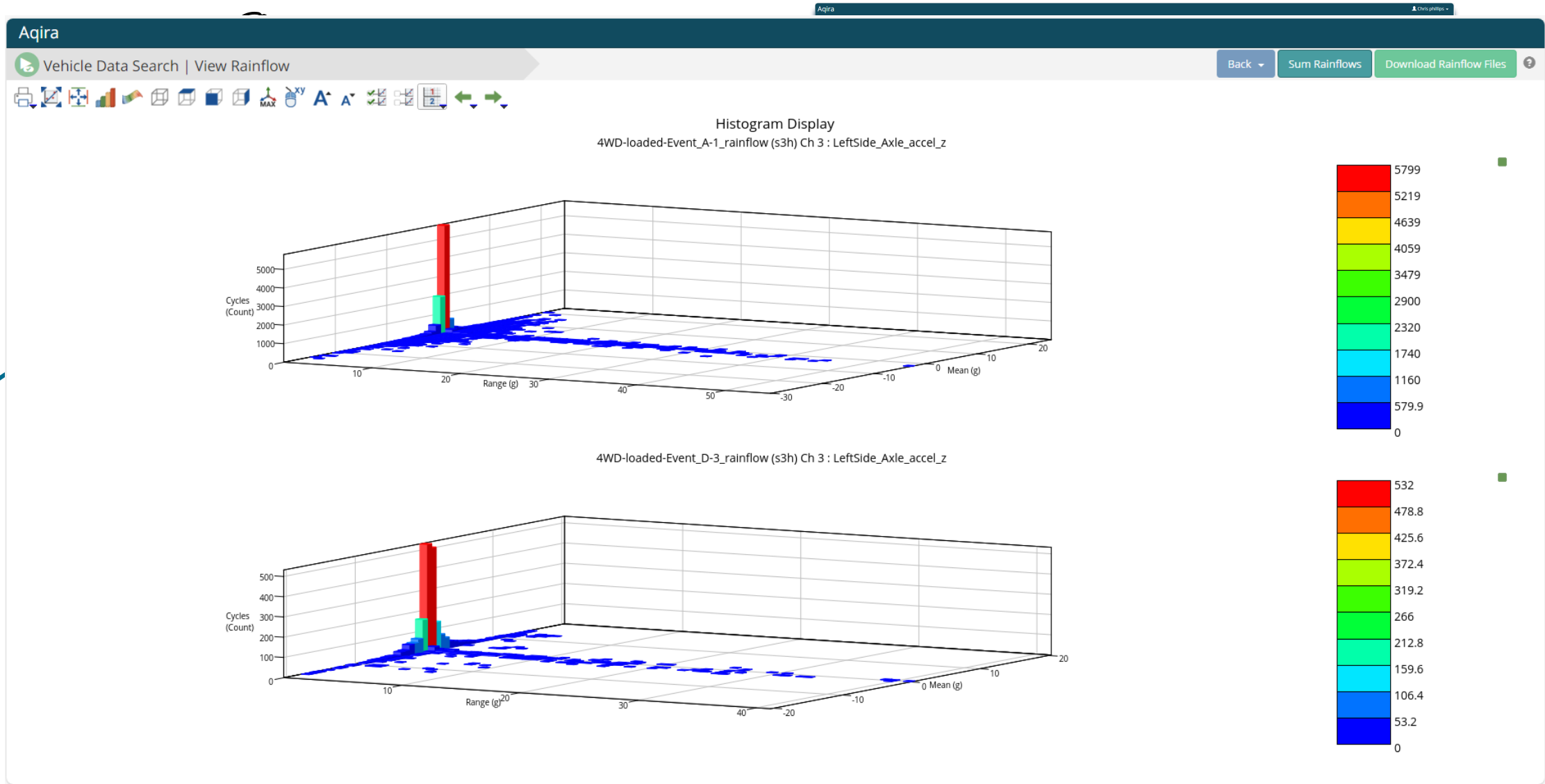
Condition:	DriveType:	ModelYear:	Vehicle:
GWV	4WD	2019	Olympia
units:	max:	min:	RelativeDamage_Results.Damage:
g	20.58518	-11.27860	1.515899e-7

☒ LeftSide_Axle_accel_X

testName: 4WD-loaded-Event_J-1 fileName: 4WD-loaded-Event_J-1.s3t

Condition:	DriveType:	ModelYear:	Vehicle:
GWV	4WD	2019	Olympia
units:	max:	min:	RelativeDamage_Results.Damage:
g	20.57874	-12.52108	1.767083e-7

Democratizing Expert Knowledge



Democratizing Expert Knowledge

Available Data

ASCII Files

Multi-column

Time series

sine.s3t - /hbm/HBM/

Vehicle

Model Year

2013

Select Data Type

Basic Type

Acceleration

TSInput1

0 Test(s)

Display

Rainflow1

HistogramOutput1

Rainflow Properties

Name	Value	Description
General		
Method	Rainflow	Specifies the counting method.
HistogramType	RangeMean	Specifies the type of histogram to create
CloseResiduals	True	Determines whether residual turning points are closed down at t
BinResolutionOnly	False	Bin data prior to performing rainflow
Gate		
Gate	0	Cycles whose range is less than the gate are discarded.
GateUnits	Percent	Sets the units of the gate value.
RangeMeanSizing		
HistogramSizingX	Auto	Specifies how to define the X-axis limits
HistogramSizingY	Auto	Specifies how to define the Y-axis limits
XLimitsAuto		
NumberOfXBins	64	Sets the number of bins on the X axis in the output histogram
YLimitsAuto		
NumberOfYBins	64	Sets the number of bins on the Y axis in the output histogram

Apply

OK

Cancel

Help

GlyphWorks

Input

Function

Basic DSP

Amplitude Distribution

Arithmetic

Butterworth Filter

Concatenation

Curve Fitting

Differentiation

Electric Power

Extraction

Fast Fourier Filter

Frequency Spectrum

Signal

VibeSys

DesignLife

Fatigue

Vibration Profile Design

Optimized Testing

GlyphBuilder

SuperGlyph

Display

Output

Workspaces >>

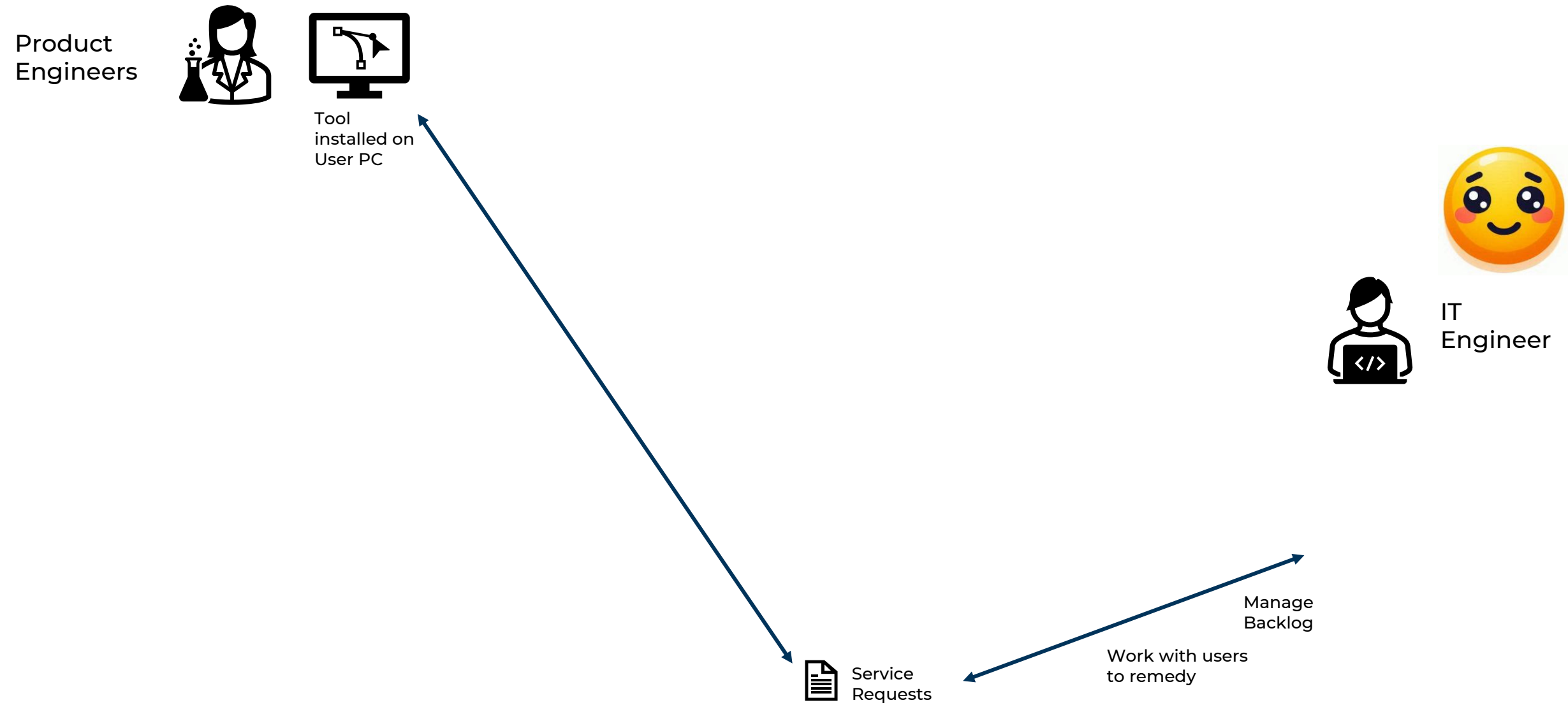
WS1

Views >>

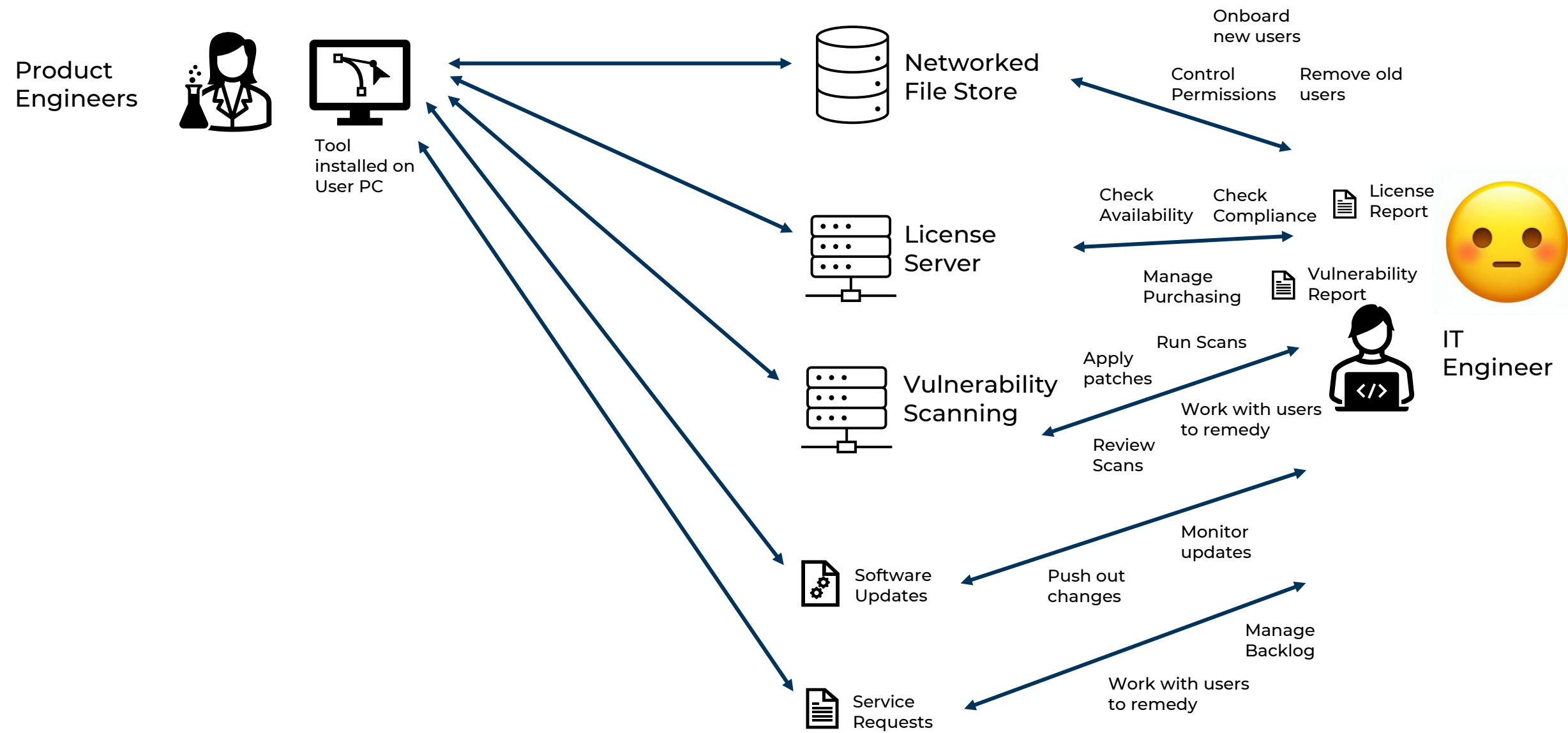
V1

Addressing IT / Cyber Challenges in Engineering Organisations

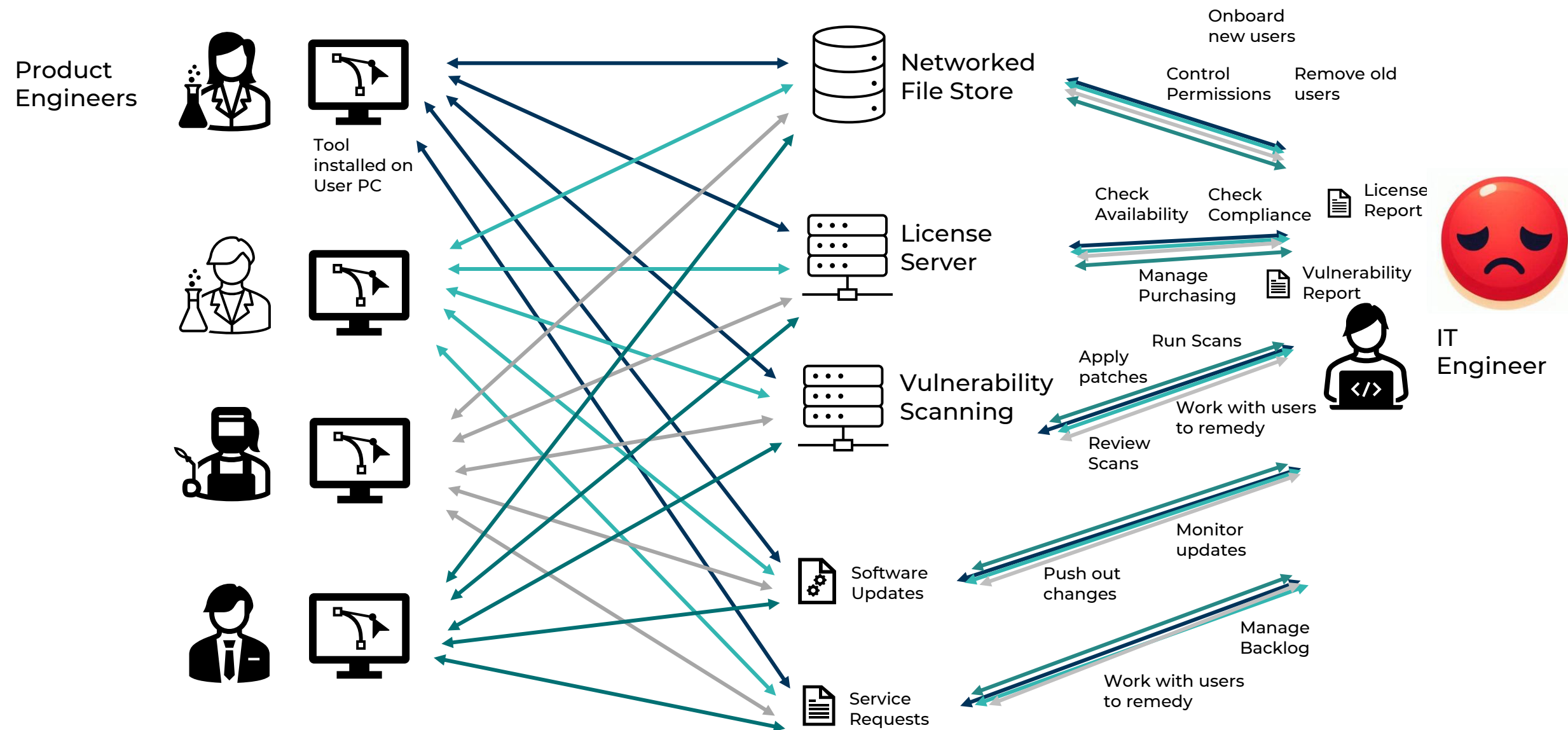
IT Burden of desktop software



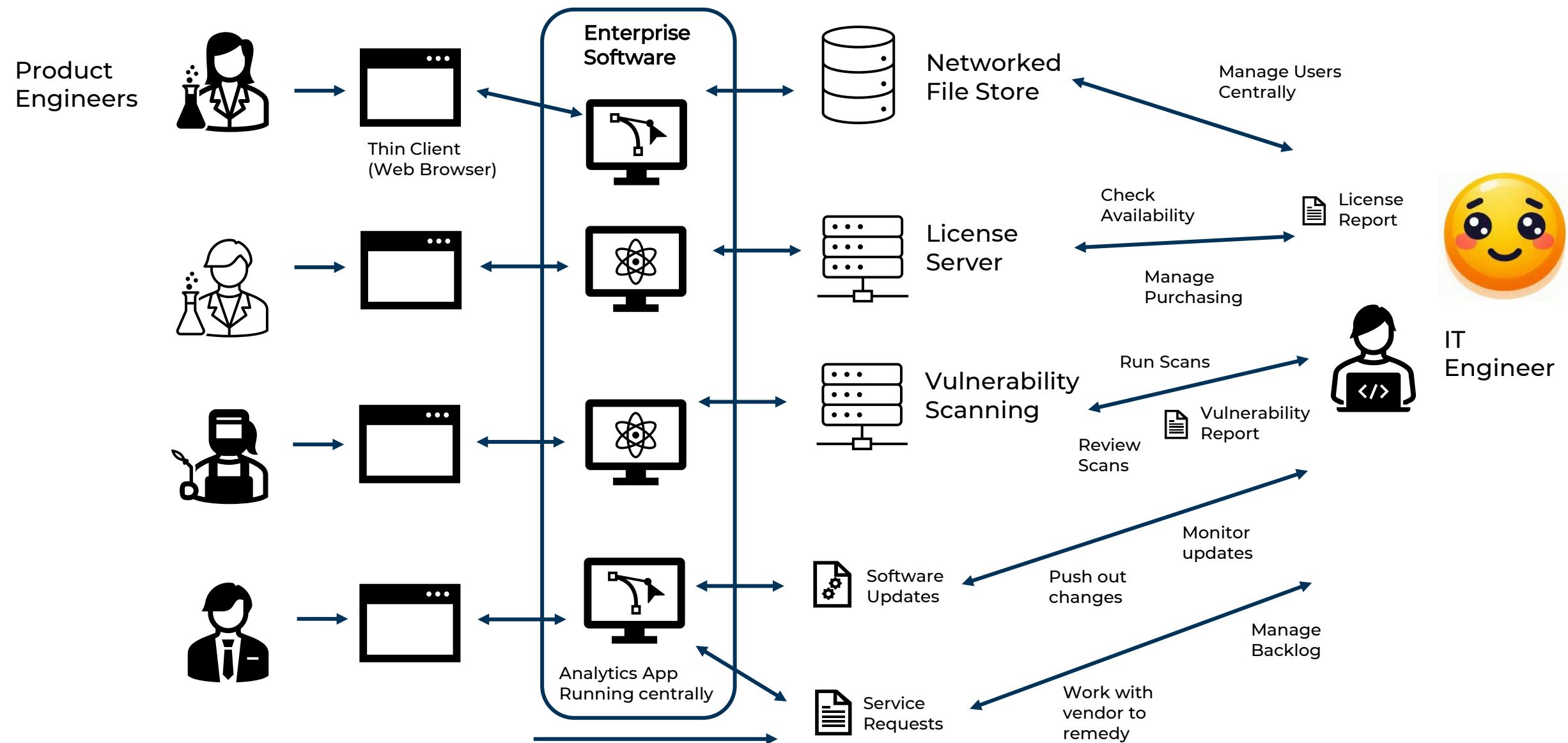
IT Burden of desktop software



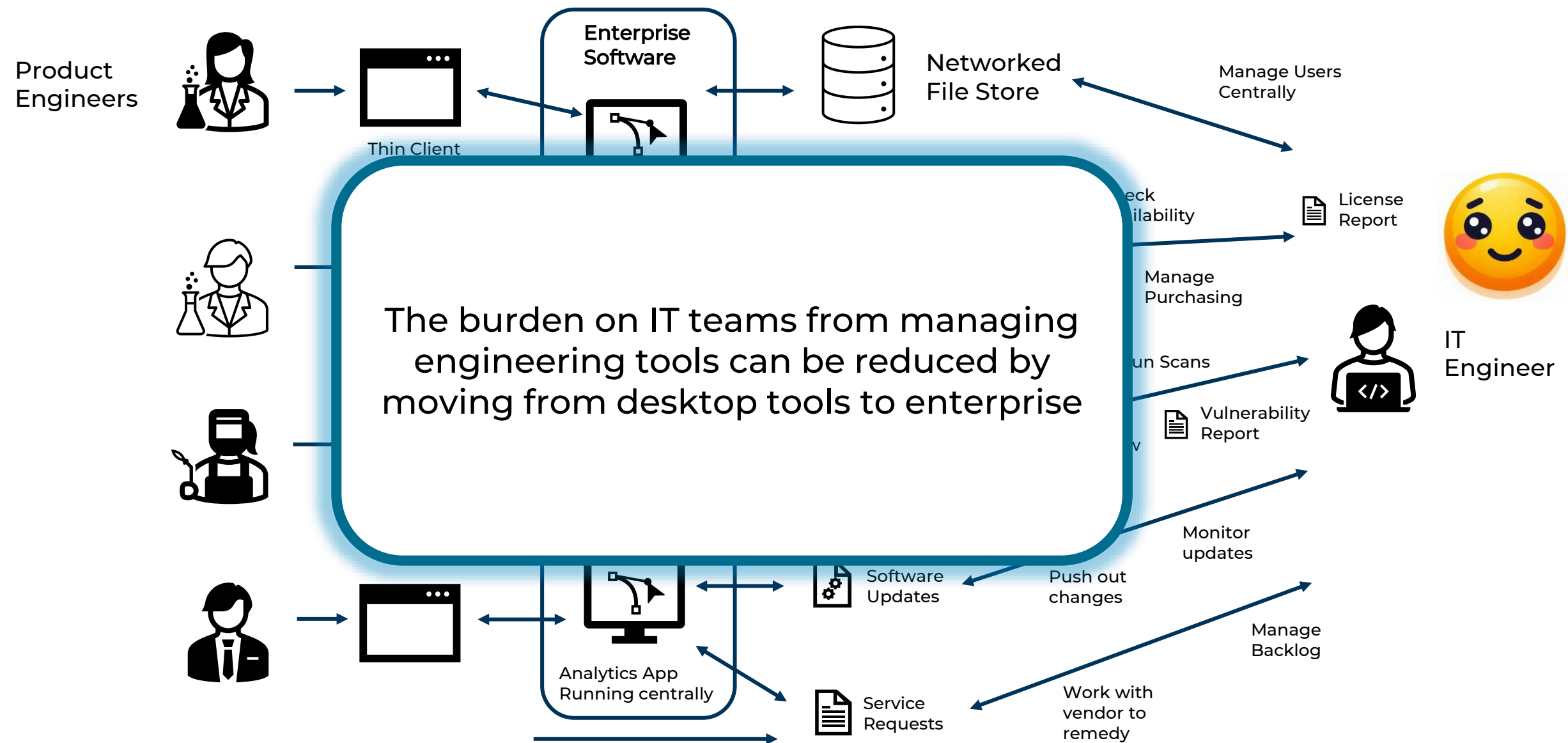
IT Burden of desktop software



IT Burden of desktop software



IT Burden of desktop software



IT Team Benefits of Enterprise Software

Wide range of advantages to IT teams from centralising software, including:

- Applying updates and patches in one place
- No expectation on engineers to ensure security of internally developed software
- Ability to control user access centrally
- Scalability without adding to security burden
- Devolving Data Management from IT to data managers in organisation

Despite these benefits security concerns remain that can slow down the move to enterprise / private cloud tools.

- Why might we see resistance from IT teams and how can this be addressed?



What do we mean by deploying to cloud?

Isn't the Cloud just someone else's computer?

- At a very basic level, yes, but it is also far more than that:
- Someone else's 100,000 computers...
- and network devices... and storage.. and management tools for these... and a wide range of services, applications, and tools to make use of these.

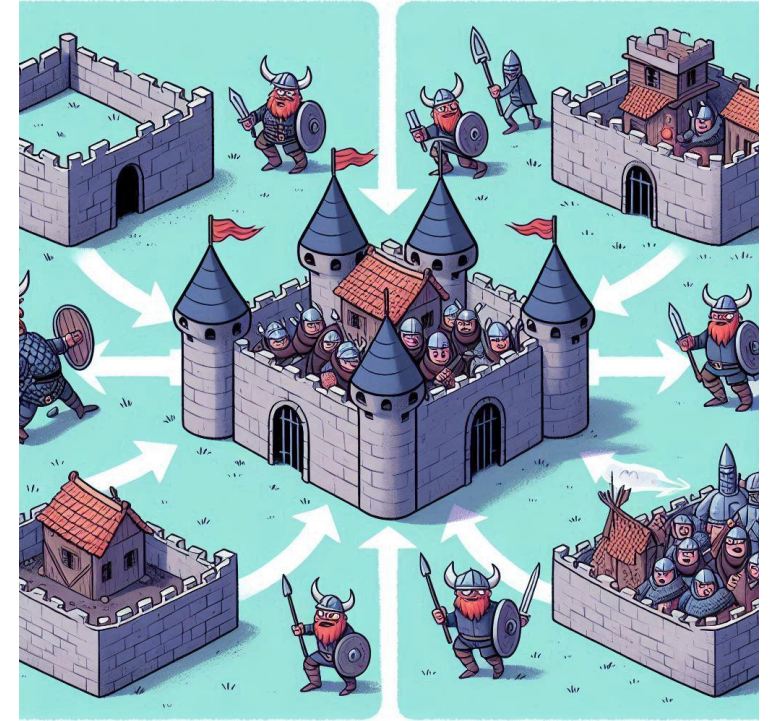
Public vs Private vs Hybrid Cloud

Cloud Providers support a range of models:

- Infrastructure as a Service / Platform as a Service / Containers as a Service / Software as a Service
- Cloud Management is a Shared Responsibility – and these models describe Who does What.

Cyber Security concerns in Enterprise / Private Cloud

- Traditionally engineering firms prefer isolated networks to protect sensitive commercial data.
- Gaining the benefits of geographically distributed data collection and collaboration mean that we move towards de-perimeterisation.
- 'Computing outside your perimeter'. Describes how barriers between organisation and the outside world are removed, with corresponding positive and negative impacts.
- We could be centralising data / tools in an insecure network – whether this is on-prem, private cloud, public cloud, or something between.
- If we can't rely on perimeter security, what is the alternative?



Zero Trust Philosophy

- Combination of development / deployment / operation principles
- Don't assume bad actors can't access our network
- Assume every request is hostile - always require proof
- Constantly monitor and validate

Zero Trust in Practice



Need to consider security as part of deployment:

- Identify Users with Identity Servers / IP range restrictions / VPN
- Tools configurable to ensure GDPR / data security compliance
- Use of private keys to restrict access to data stores / internal services

Need to consider security as an ongoing concern:

- Understand what is happening in your network: Monitoring and Logging
- Continuous Vulnerability Scanning to identify code / container risks
- Scanning for misconfiguration / auto-rectification of configuration issues

Not a surprise IT teams might find this a lot to address:

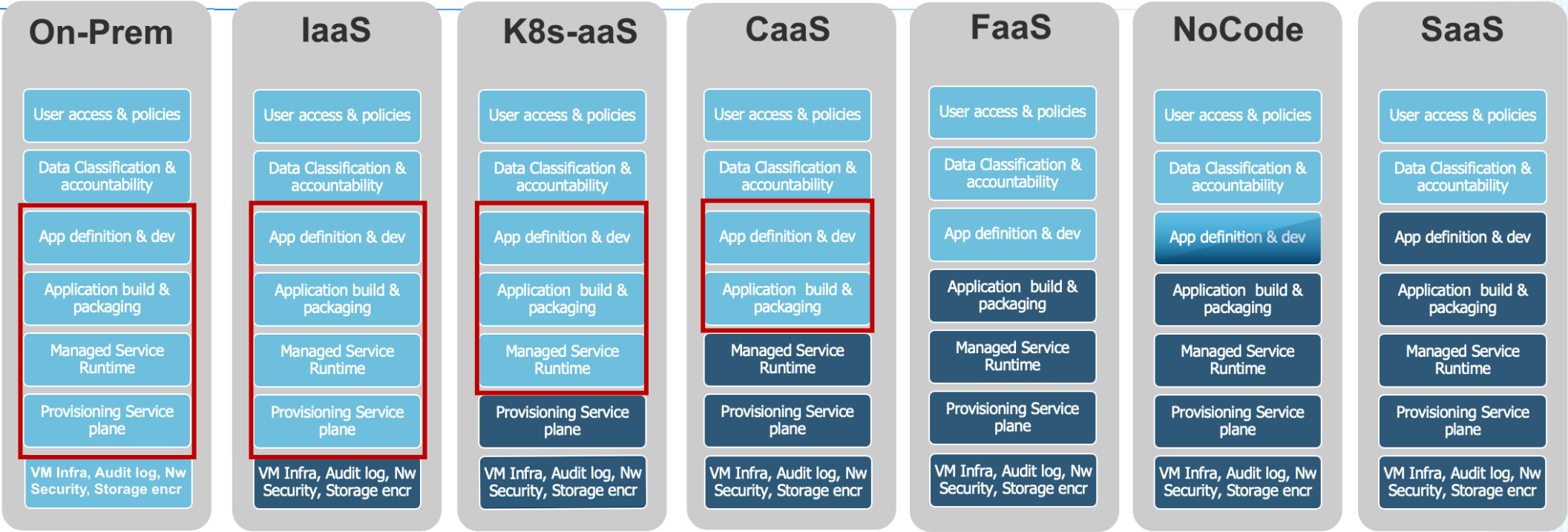
- Various of these tools are available for on-prem use, but time consuming to set up, administer, and monitor
- Public cloud providers typically provide these. Is this an argument to deploy to virtual private clouds? Possibly...
- Right choice of deployment model might alleviate burden.

The Shared Responsibility Model

Of key importance is to understand who is responsible for what:

**Based on diagram from Cloud Security Alliance*

SHARED RESPONSIBILITY MODEL



Platform Provider Application Owner Software Partner

Traditional PaaS

Summary

- ▲ Throughput and efficiency for engineering analysis is improved by using server-based enterprise software
- ▲ IT burden can be reduced by avoiding desktop installations
- ▲ Security will always remain a concern but can be addressed with the right deployment models and working with security aware software partners



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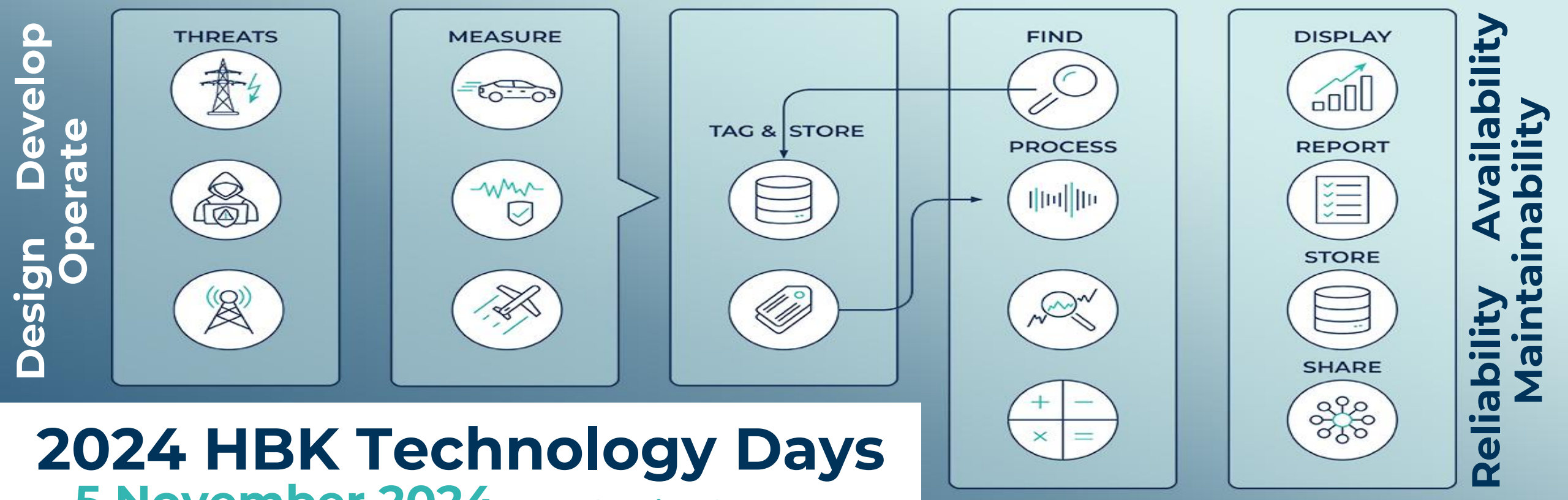
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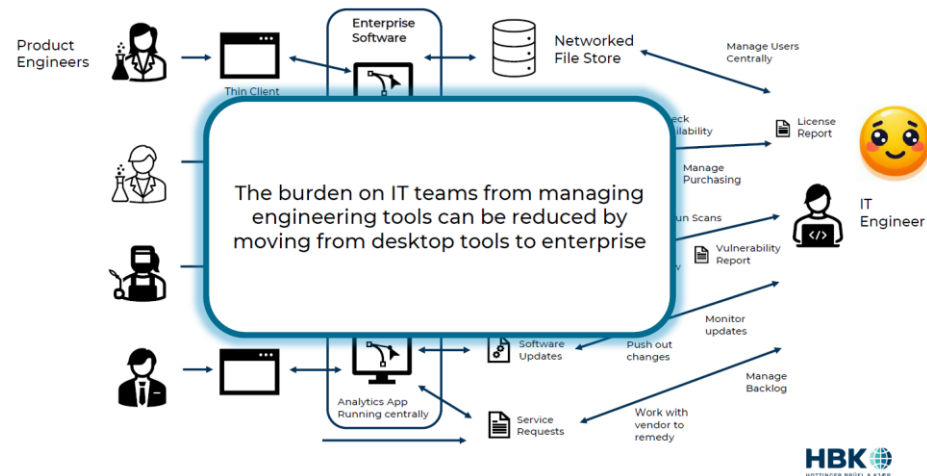


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