



# Climbing the Knowledge Pyramid

How AstraZeneca's Operations Knowledge Fabric Transforms Pharma Operations Through Connected Data

Dr. Maria Sorokina





## Our Purpose:

We push the boundaries of science to deliver life-changing medicines.

## Our Values



We follow  
the science



We put  
patients first



We play  
to win



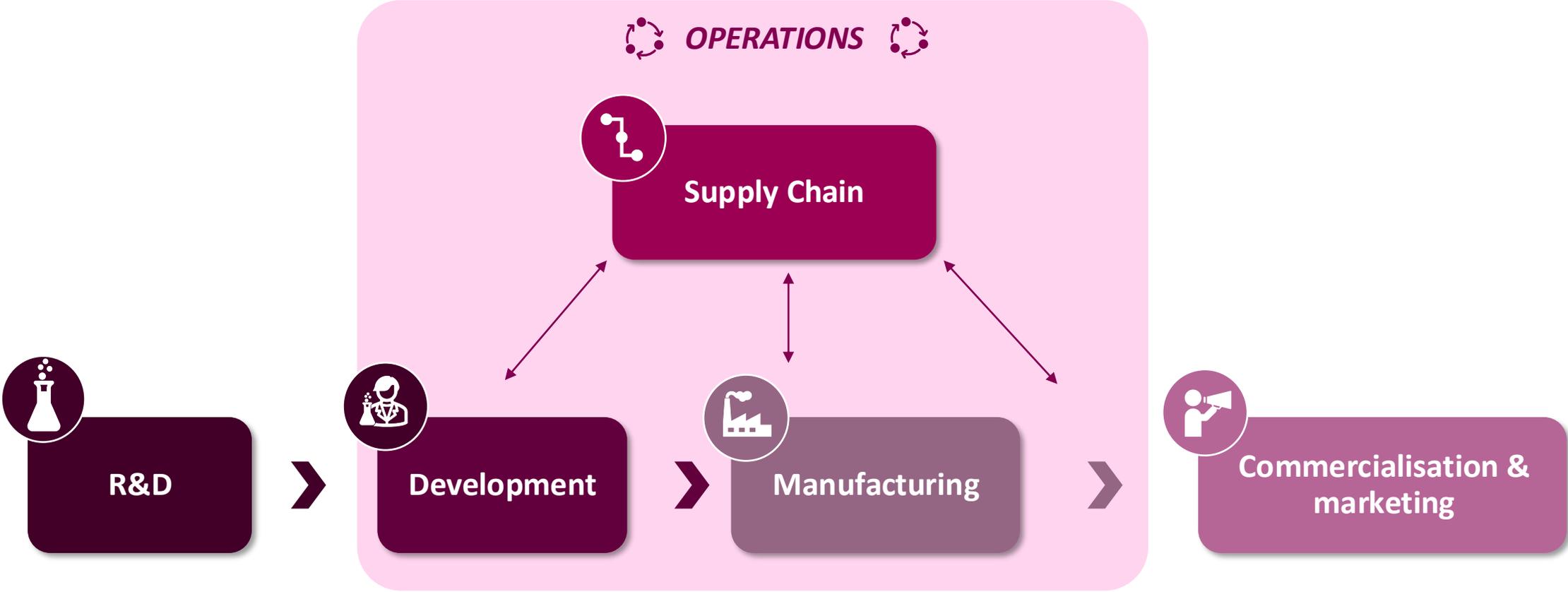
We do the  
right thing



We are  
entrepreneurial



# Because Context Matters: Pharmaceutical Operations





Our Bold Ambition is to be pioneers in science, lead in our disease areas, and transform patient outcomes.

By 2030, we will:

Deliver 20 new medicines

Be an \$80bn company

...and sustained growth thereafter

To make our ambition a reality, we focus on:

- Innovative Manufacturing
- Intelligent Supply Chain
- People and Sustainability



AstraZeneca Operations has been on a data journey...

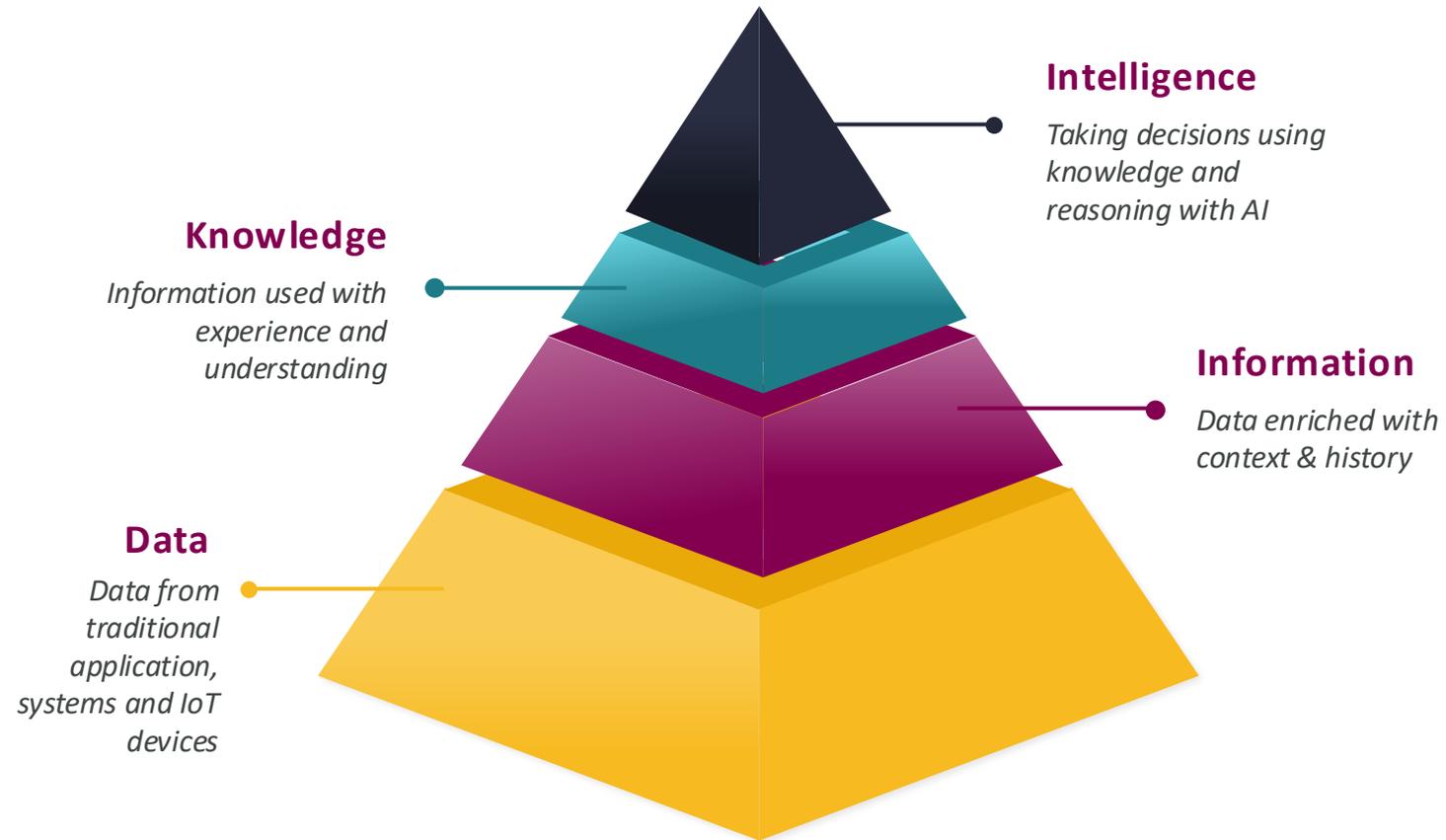


# ...with the aim of climbing the Knowledge Pyramid all the way to Intelligence

Future



Past



# From Data Mess, to Data Mesh, to Knowledge Fabric

We are here!

## OUR OPS2030 AMBITION

Achieve **intelligence** at the summit of the knowledge pyramid by 2030, enabled by GenAI and AI agents' insights.



DATA  
MESS

2022

2023-2024

2025-2026

2030

OPS 2030

Data lake

Data products

Operations Knowledge  
Fabric

AI Agent

Collaborative AI Agents

Operation Knowledge Fabric (OKF) is critical to build enterprise context and enable Ops 2030.

Unlocking knowledge through Knowledge Graph and Semantic capabilities.

Combining IT, OT and unstructured data to develop a single source of enterprise truth.

Accelerating AI and fast-tracking the delivery of the Ops 2030 use cases



# We realised the value is not always in producing more data...

## Data Mess



### Hard to find and access:

We lacked understanding of what data is available to us, delaying our work.



### Lacking in context:

We struggled to interpret raw data in its context, e.g., SAP German 3-letter abbreviations.



### Difficult to trace:

Missing metadata about data origins, transformations, descriptions or owners limited our understanding.

## Data Products



.... but in being agile about packing, provisioning and delivering it



# Then, We Built a Data Mesh: A Shop for Data



Data Mesh is the virtual market to **easily access our quality data** across the enterprise, with decentralized ownership and federated governance



Street Market

Items are hard to find  
Unknown quality  
No insights about options



Local Market

Organised  
Providence  
Small Scale



Super Store

Searchable  
High quality  
Larger Scale



Online Marketplace

Recommendations  
Guaranteed quality  
Global Scale



Data Products are the shopping list, making the experience **more efficient** and **right first time**



# Data Mesh enables data to be where it needs to be

## Our 4 Data Mesh principles are:

- **Domain oriented**  
Our data is owned by those who know it best – the areas that generate it.
- **Data Products**  
We appreciate our data is valuable and useful – we treat it as we would a new medicine.
- **Self serve infrastructure**  
We put in place small central teams – to help the business to make the most of modern data analysis tools.
- **Federated governance**  
We put data governance in the hands of our business experts.



# But a Data Mesh is not Enough



Data Products enable us to easily **find** and **access** pre-packaged data, ready to be used in creating various digital products.



But, on their own, **data products are not enough** to give us the enterprise context required for intelligent AI. **We still need to make data:**



To unlock context, interoperability, reusability and scale beyond data products....

...the next step is Knowledge Fabric

# What is a Data Fabric?

"Data fabric is a combination of architecture and technology designed to manage heterogeneous and diverse data, providing seamless data connectivity, delivering value through a semantic knowledge layer. It leverages metadata, machine learning, and automation to unify data across formats and locations, enabling federated access while maintaining data in situ"

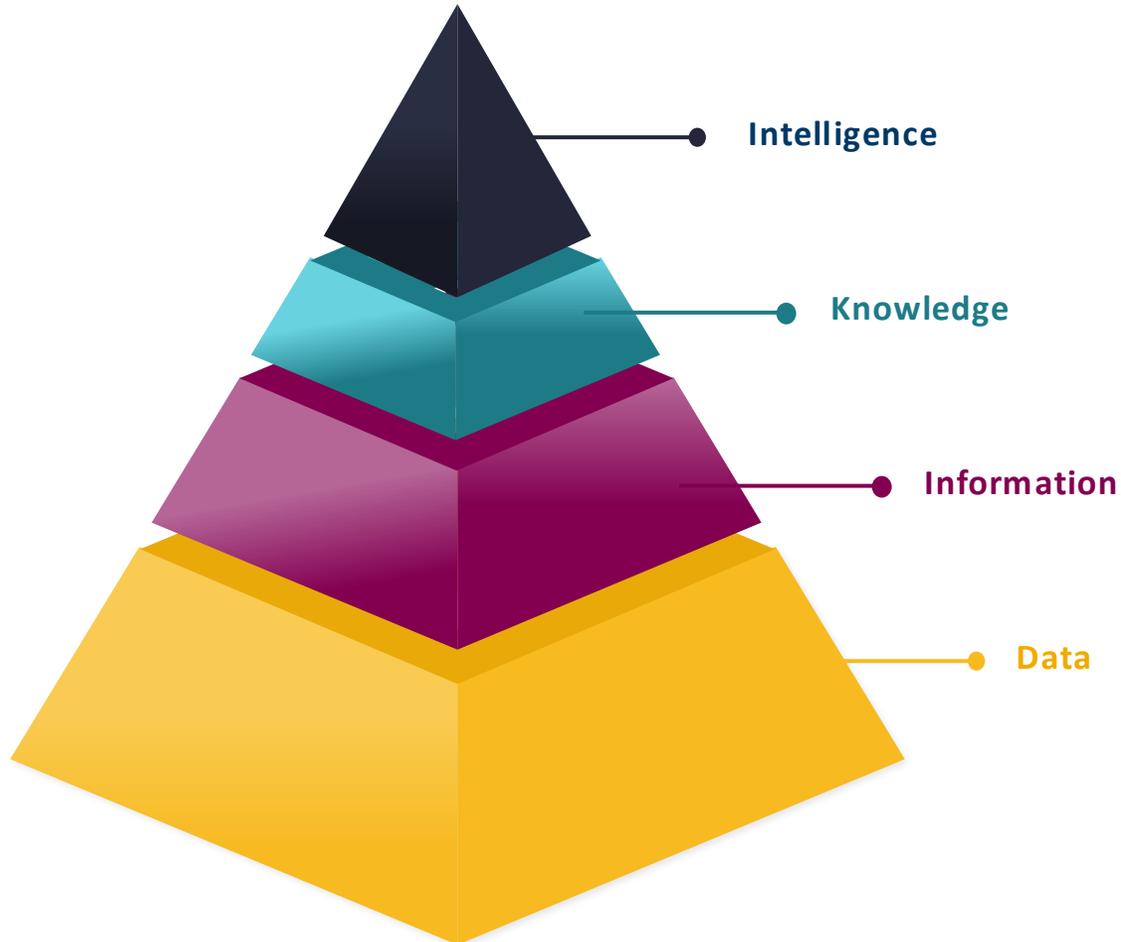


# Operations Knowledge Fabric in the context of our Ops data landscape

OKF is a suite of products and frameworks that convert structured and unstructured data into actionable knowledge, enabling smarter, AI-driven insights and decisions.

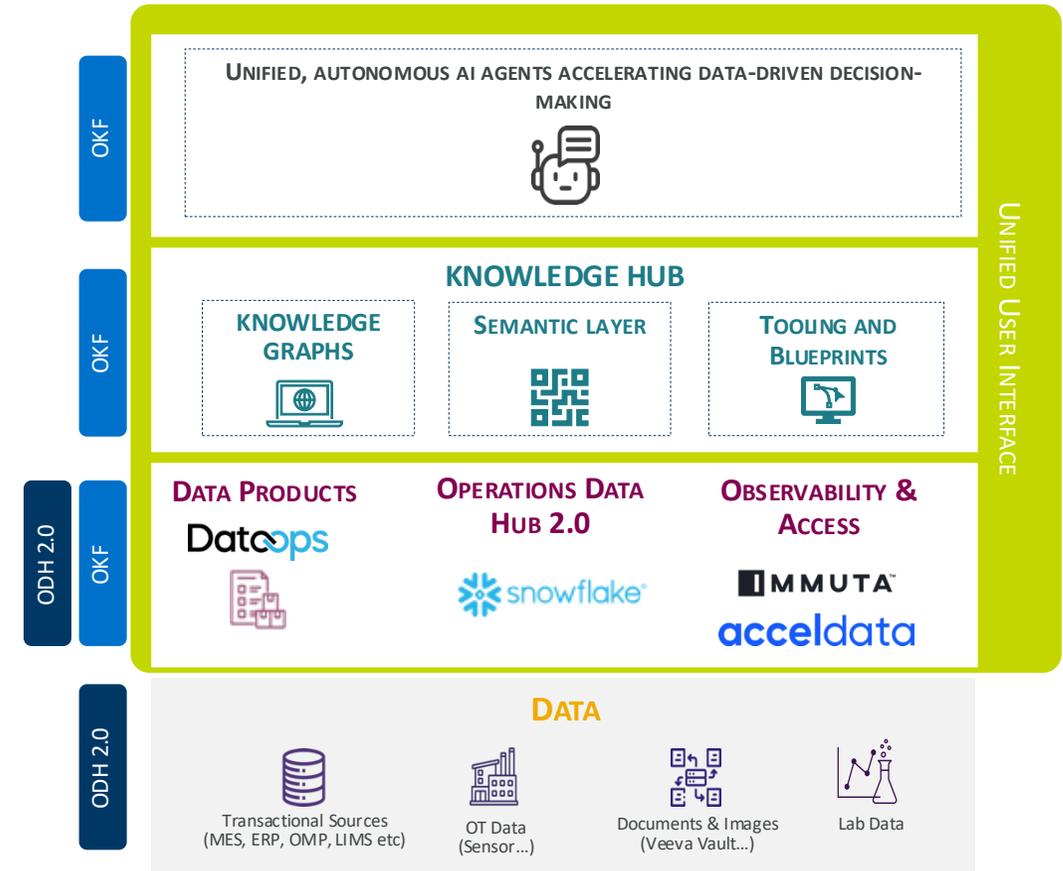
## KNOWLEDGE PYRAMID

Climbing the Knowledge Pyramid is essential to reach intelligence and achieve our Ops20: ambition.



## DATA LAYERS

As part of enabling OKF, we have ongoing efforts in each pyramid layer.



# Unlocking enterprise knowledge requires us to contextualise data and establish links between key concepts and processes

To Knowledge and Intelligence...



DATA + MEANING

## Knowledge Graphs

*Using the Semantic Layer to organise data based on relationships and create a single source of enterprise context, to be applied to relevant use cases.*

MEANING

## Semantic Layer

*a map of AZ's enterprise knowledge, linking data across categories so it can be seamlessly connected and ingested by both humans and AI.*

Ontologies

Controlled Vocabularies (CV)

Operations Reference Model

From Information & Data...

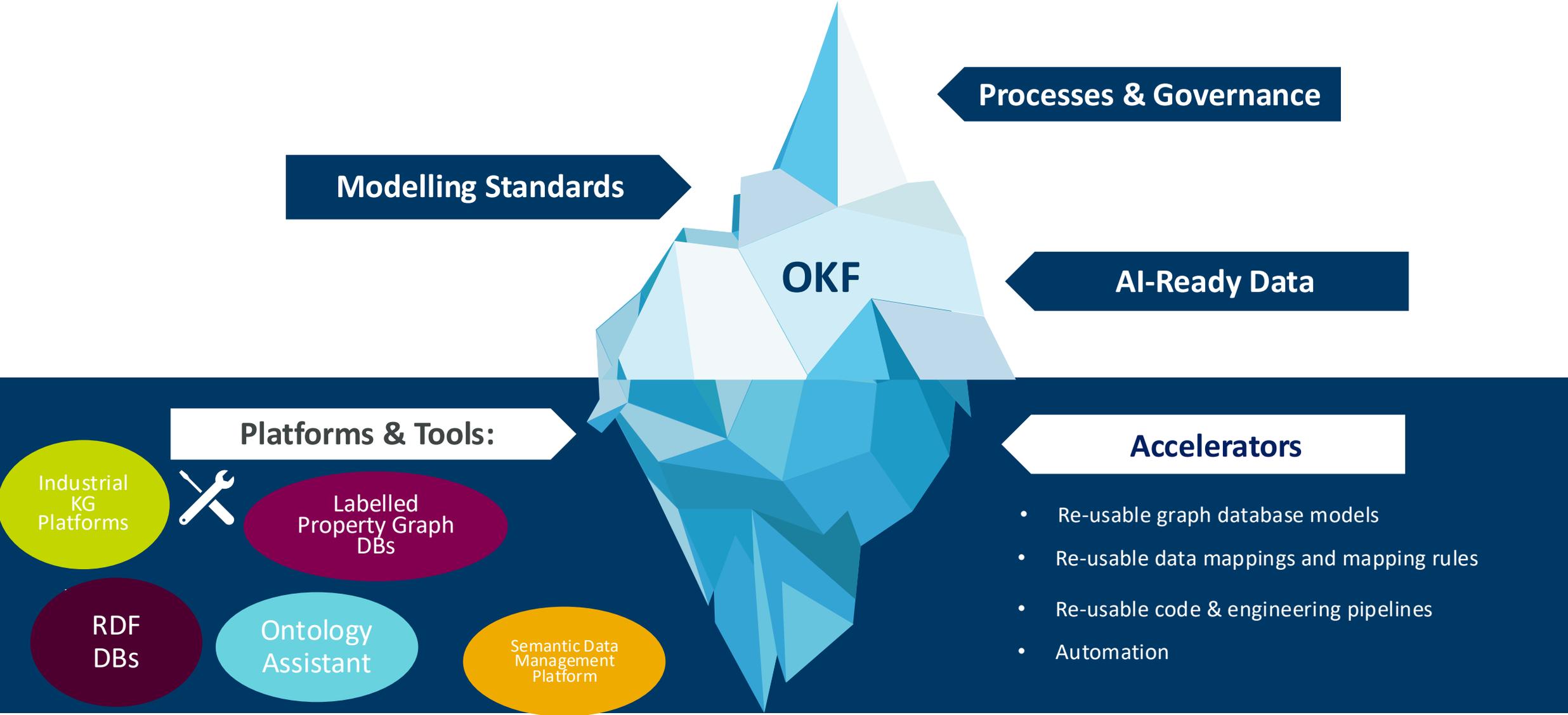


Documents

# OKF: Operations Knowledge Fabric



# What is OKF comprised of:



# Use case types using Semantics and Knowledge Graphs in AstraZeneca Operations



## Analytical use-cases

Need for an LPG database  
Focus on both, contextualization of data  
and graph analytics



## Querying a very big amount of documents

Document/Chunks tagging with  
ontologies/CVs  
RDF technology  
Multi-modal indexing for RAG



## Semantic data products

Data products as KGs  
If no strong graph analytics are needed  
Focus on the contextualization of data



## Semantics for agents

Ontologies for processes: capturing the  
whats, hows, whys, whos?  
Only process ontologies (no KG)  
Shared mindmap  
Deploy analytical KGs when needed



# OKF's Knowledge Graph and semantic capabilities unlock interoperability and scalability across use cases



OKF's Knowledge Graph and Ontologies products **accelerate the mapping** of complex concepts and their relationships.



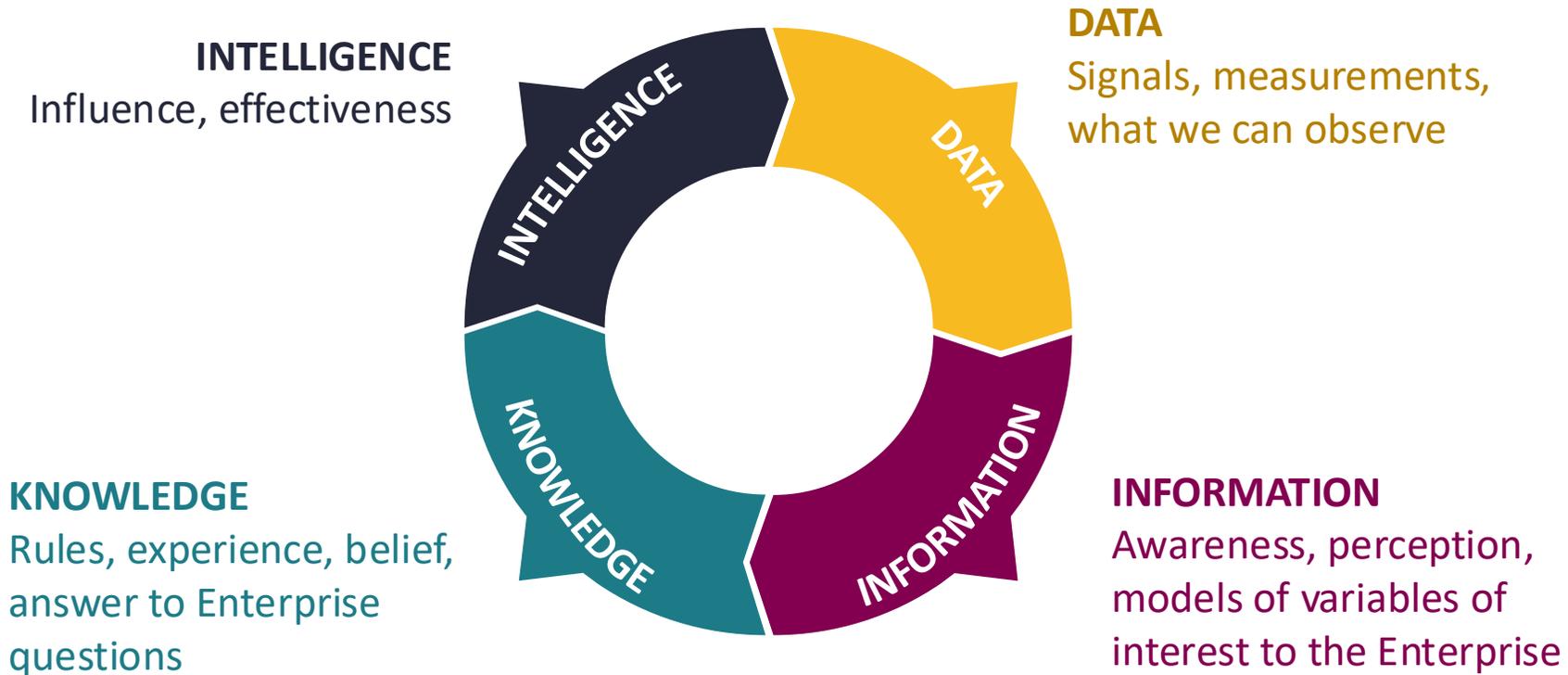
This allows for the establishment of an **Operations Semantic Model**, allowing us to **scale data analytics & AI use-cases quicker** and integrate any **new data sources easier**.



This Semantic Layer **enables radical and “by design” interoperability** – it provides a shared mind map of our knowledge and processes and a structured and governed way to use the data.



# Beyond the Knowledge Pyramid, we are aiming to continuously expand our enterprise knowledge and context through actionable data & information



# The future is in AI Agents and in Contextualized Semantic Data

2026 is the year of AI agents, at AstraZeneca, this means:

## Federated knowledge graphs will:

- Seamlessly integrate diverse operational data
- Break down silos and accelerate insights
- Enable secure, privacy-preserving collaboration across domains

## Agentic AI will amplify human expertise by:

- Delivering autonomous reasoning and orchestration across pharma operations
- Advancing AstraZeneca's mission to deliver life-changing medicines
- Ensuring compliance, transparency, and ethical oversight

## Semantic layer foundations will:

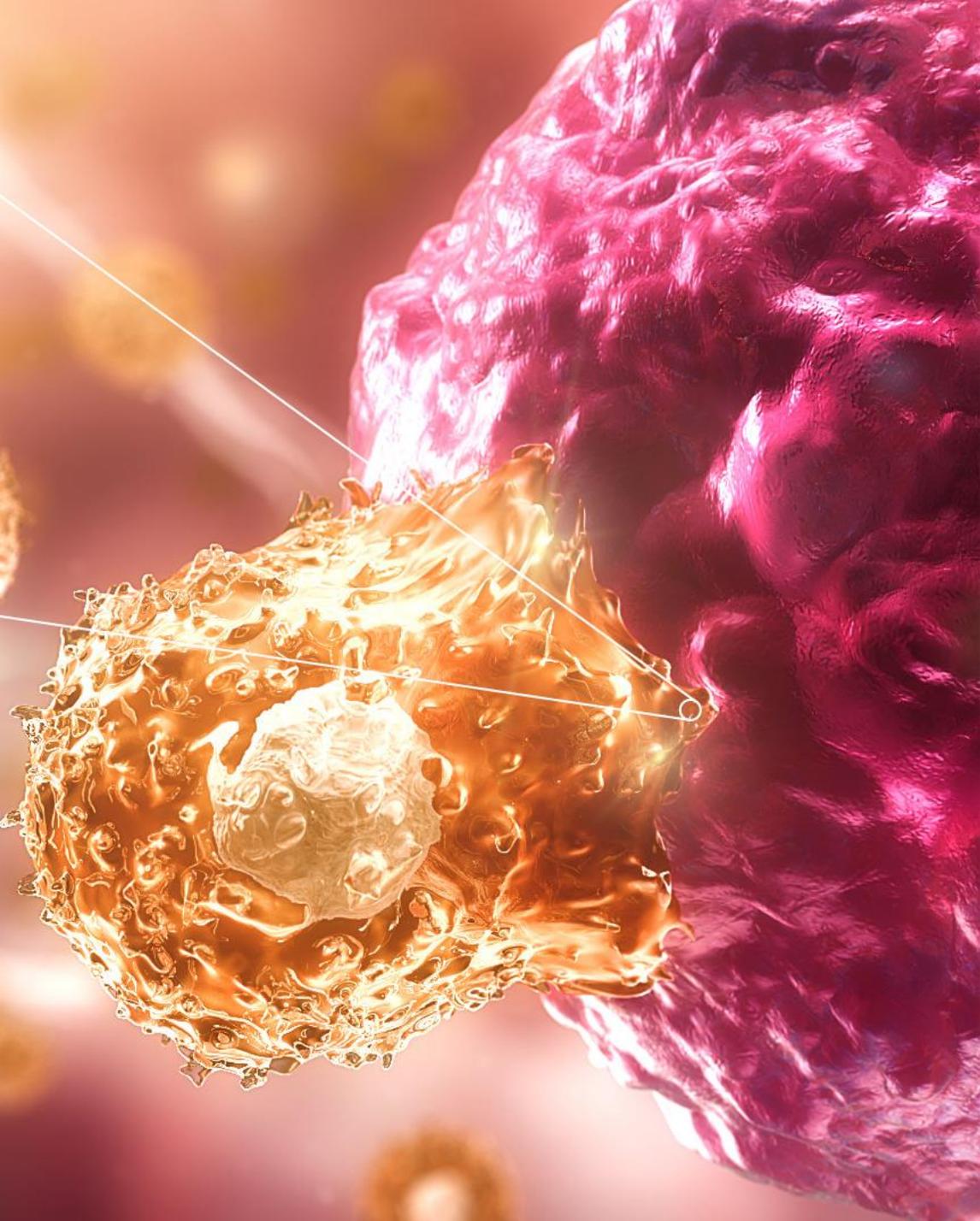
- Turn raw data into trusted, actionable knowledge
- Support self-service analytics and digital twin environments

## The journey continues as:

- Next-generation AI agents and federated knowledge graphs unlock faster innovation
- AstraZeneca drives operational excellence and delivers impactful patient outcomes



*AI-generated image*



# The data journey continues!

Inspired by our purpose and values, we're transforming the future of healthcare by unlocking the power of what science can do – for people, society and the planet.



### **Confidentiality Notice**

This file is private and may contain confidential and proprietary information. If you have received this file in error, please notify us and remove it from your system and note that you must not copy, distribute or take any action in reliance on it. Any unauthorized use or disclosure of the contents of this file is not permitted and may be unlawful.

AstraZeneca PLC, 1 Francis Crick Avenue, Cambridge Biomedical Campus, Cambridge, CB2 0AA, UK  
+44(0)203 749 5000  
[www.astrazeneca.com](http://www.astrazeneca.com)

