From Industrial Big Data to Artificial Intelligence @ Airbus

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AI and Industry – what, why and when?

- Why now? -> AI enabled by Data Lake (Big Data) & Cloud (external data)
- AI will push decision making and planning into more complex and judgment-led analysis roles
- From reporting and lagging indicators to forward looking and uncovering new opportunities
- Increased standardization for regulatory and compliance requirements require low-value-added tasks that are ideal for robotic process automation (RPA).
- Central functions and strategic functions (intercompany reconciliations, disclosure, financial analysis, asset allocation, forecasting) – AI and Big Data enable (near-)real time analysis
- Today: AI Natural Language Generation technology can communicate insights hidden in data and generate reports from raw data
- one in four of today's jobs are expected to be impacted by AI technologies by as soon as 2019 (Forrester)

AI & Cognitive Computing Systems

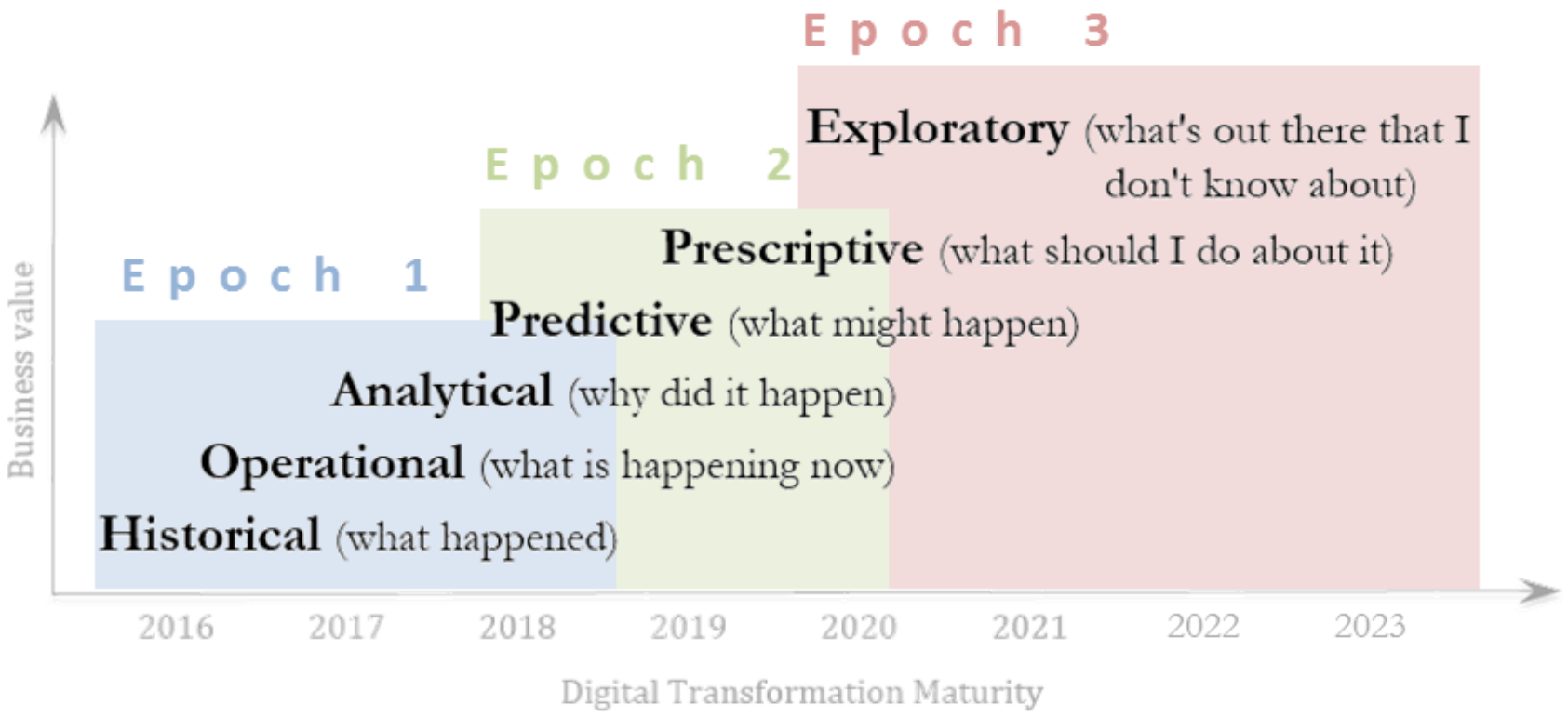
AI & Cognitive Computing enables a new interaction model for exploring **complex and large data-sources** (structured & unstructured, text, images, video, speech, audio, sensors) with **conflicting answers, ambiguous evidences**, and **hard to automate processes**

The ability to learn from data makes AI powerful. No more hardcoding every single possible behavior, **a cognitive system learns and improves with data** (& outcomes). We want to create **Algorithms that can learn, adapt, interact and understand**

… to carry out tasks in a way that we would consider **“smart”.**

Data-driven Transformation

Evolution of Data Science and it's impact on business



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How will industrial artificial intelligence influence us?

Optimized production

Innovative products

New business models

… today just selected aspects

Credit: Airbus
Icons from The Noun Project Industry by Creative Stall / Paper Airplane by corpus delicti / analytics by DesignNex

Before you do AI, you need to master Big Data

Airbus embarked two years ago on a Big Data journey
- Integrate data from multitude of data sources
- flatten structure
- join unstructured & semi-structured data
- create big data lake platform

-> map-reduce, pig, hive, spark to transform data into ‘structure on read’

Lighthouse project example
- combine application data, IOT and unstructured reports on non-quality data

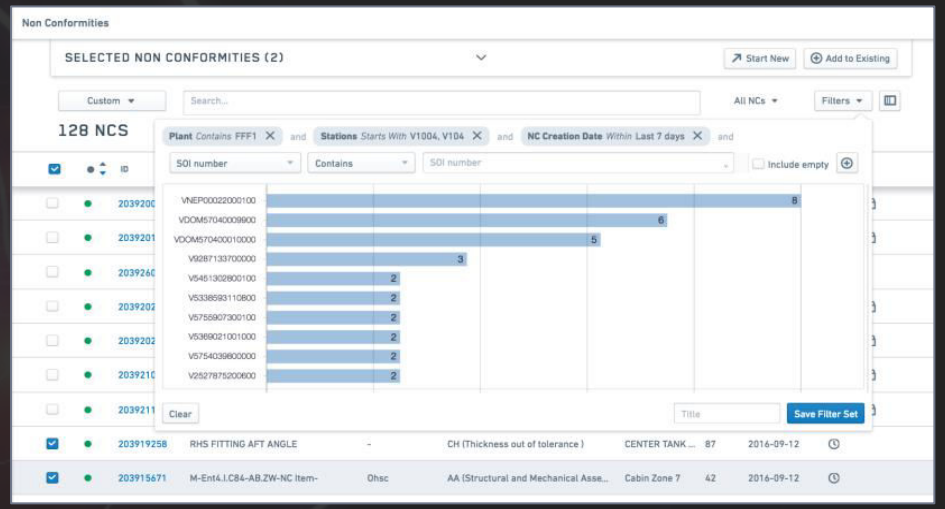
-> machine learning to create similarity search

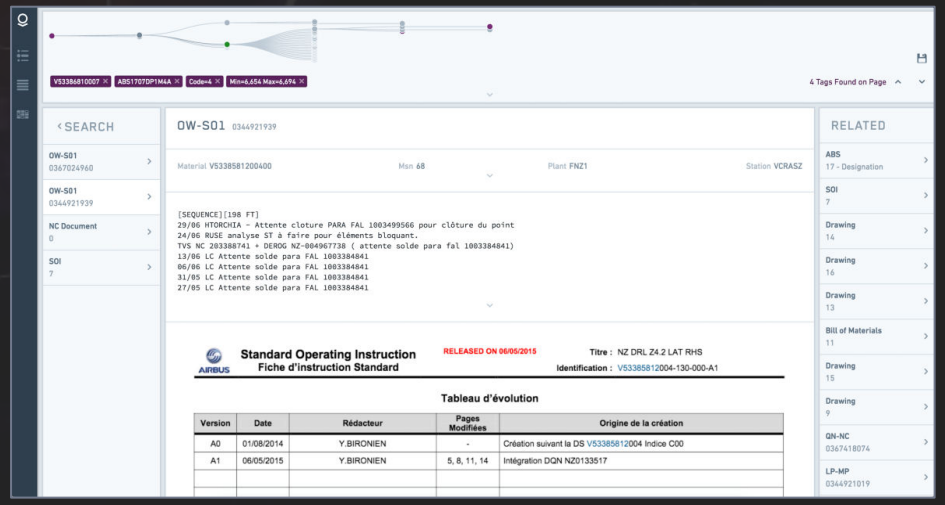
Similarity Matching for Non Conformities

- Avoid production interruption by finding and fixing repeat issues
- Find root cause of issues quickly
- Re-plan work to keep the line moving

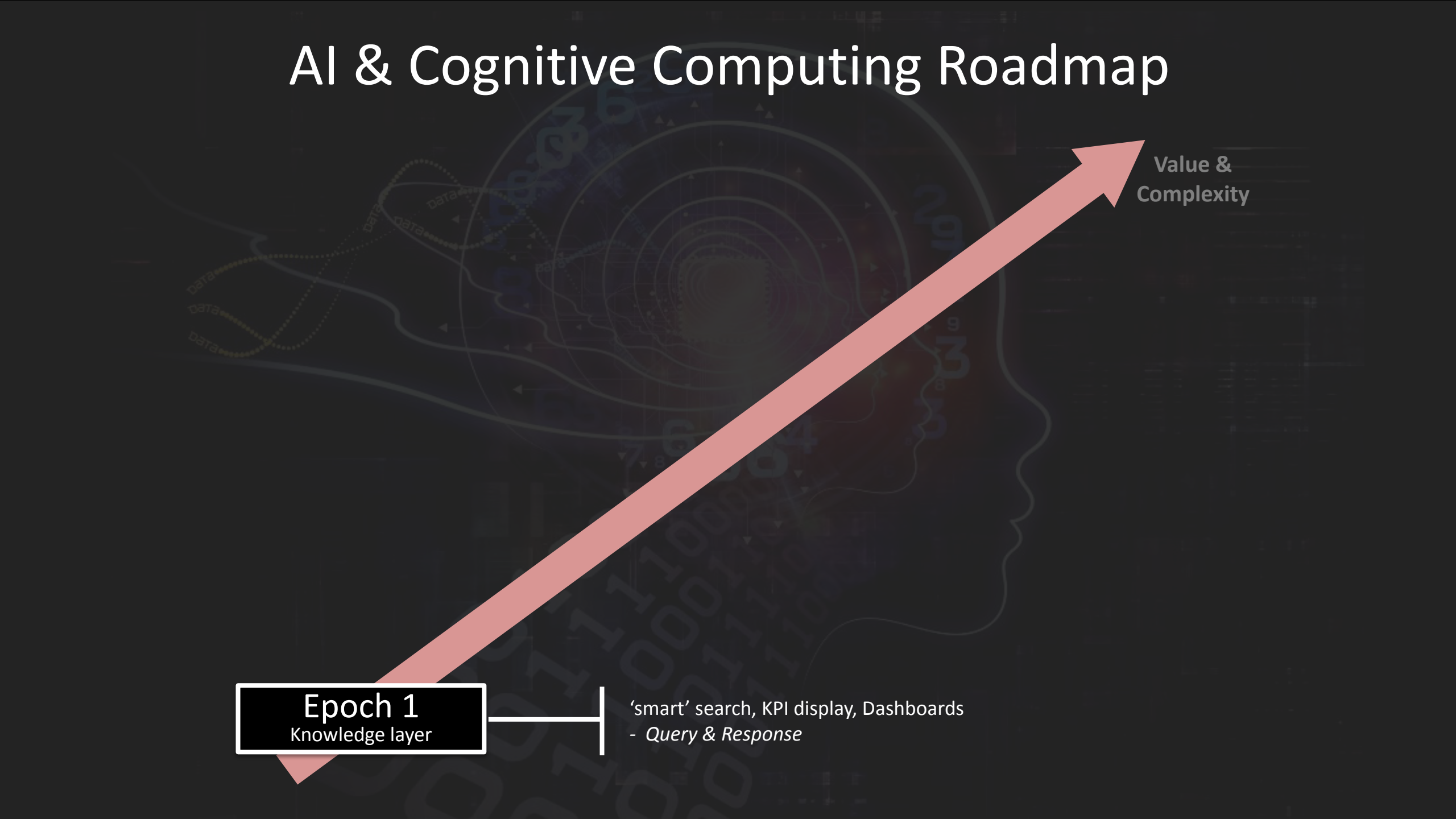
- ”Fuzzy matching” of issues based on full text analysis
- Constrained dynamic optimization

- Cumulative program knowledge available to everyone on the shop floor

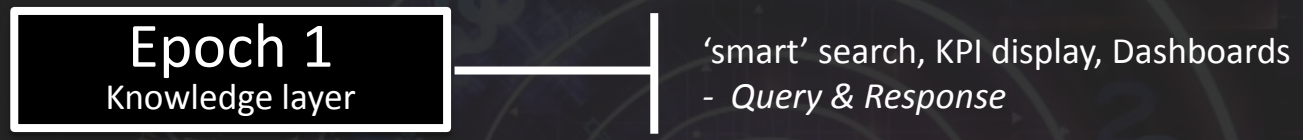




AI & Cognitive Computing Roadmap



Epoch 1: Knowledge Layer & smart search



(Built on Big Data Layer)

- semi autonomous data ingestion, taxonomy & governance
- contextualized knowledge representation of structured, unstructured data, implicit and explicit process data
- smart search, similarity matching, process (semi-)automation
- continuous model update
- outlier & anomaly detection (time series analytics)
- operational optimization based on events and deep learning
- high speed computer vision target recognition

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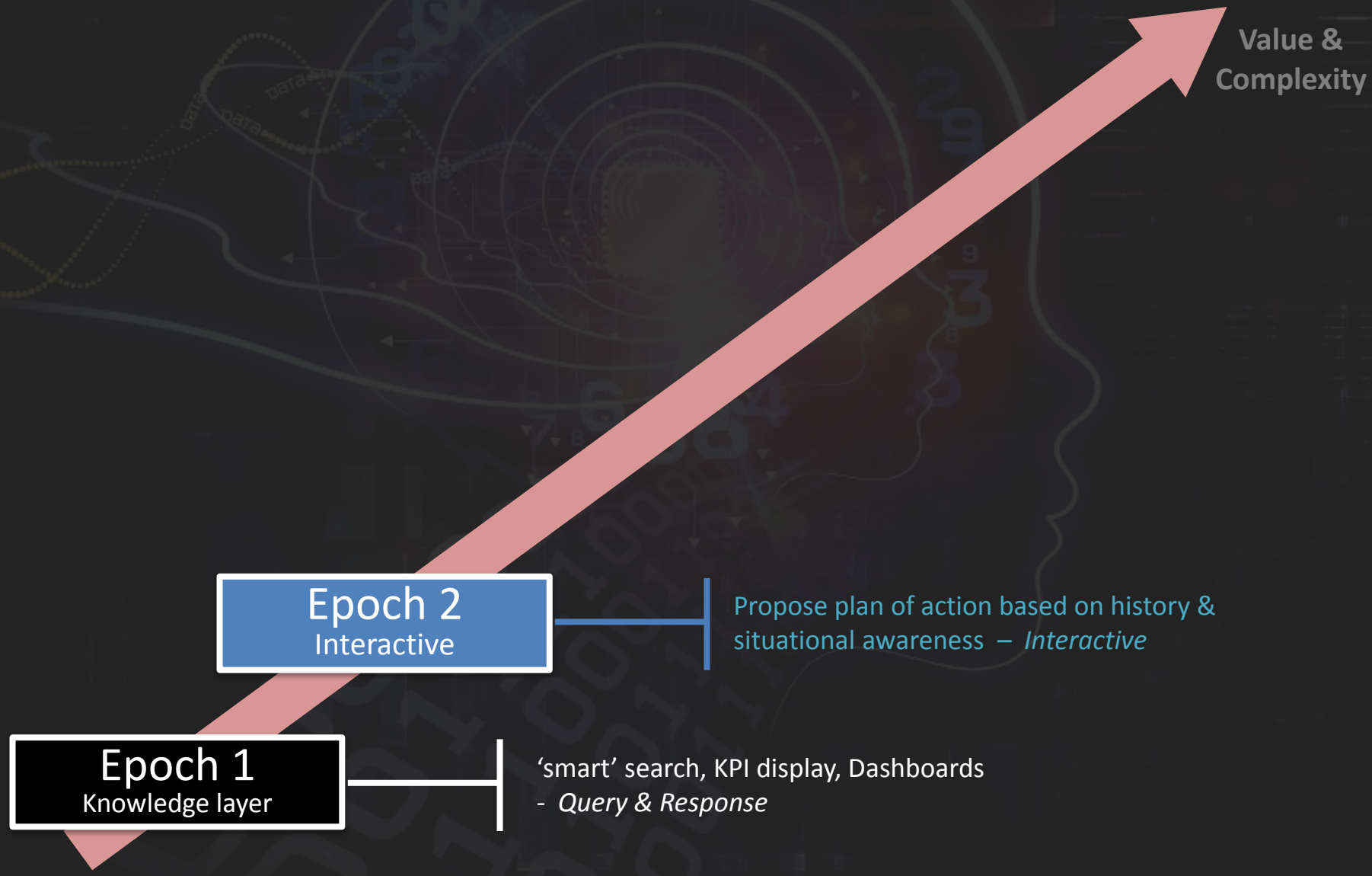
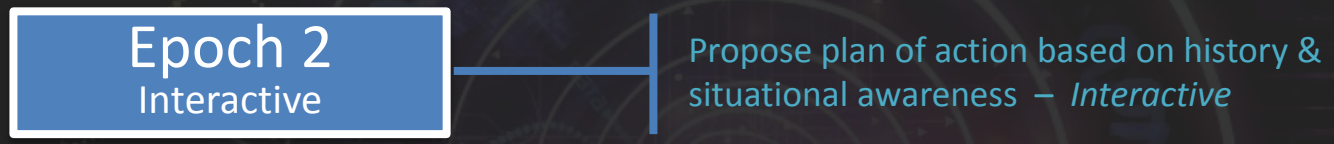


Epoch 2: Learn from past situations and propose plan of action



- capture of interaction to learn better decision making/support
- bots
- interactive SOI - extract process information from structured documents
- (semi-)automation of interactions with human customer.
- reduction of work for human interaction and workload
- ability to mine interaction to detect potential unknown elements
- first level of decision support and dynamic re-tasking/re-planning.

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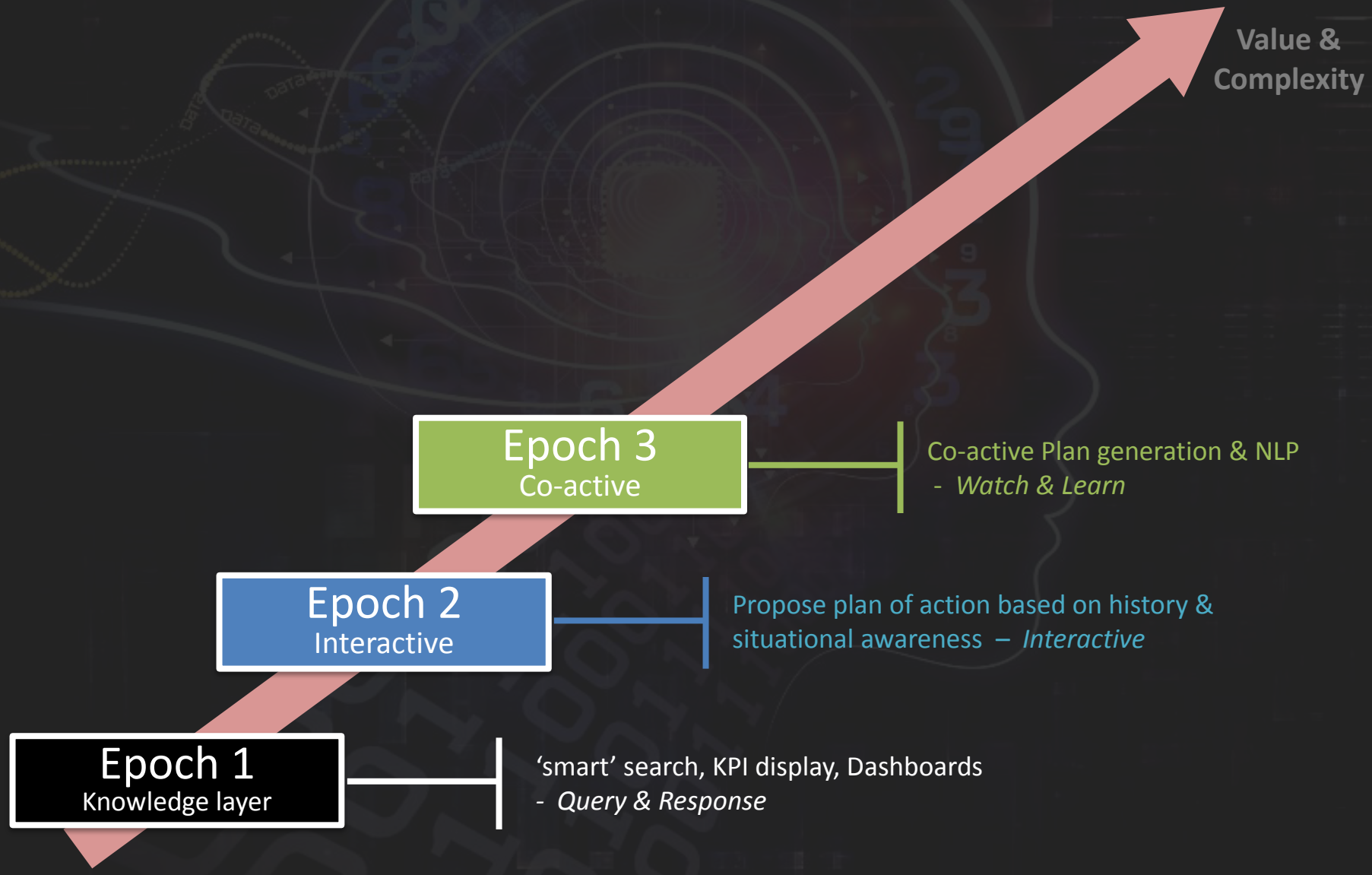
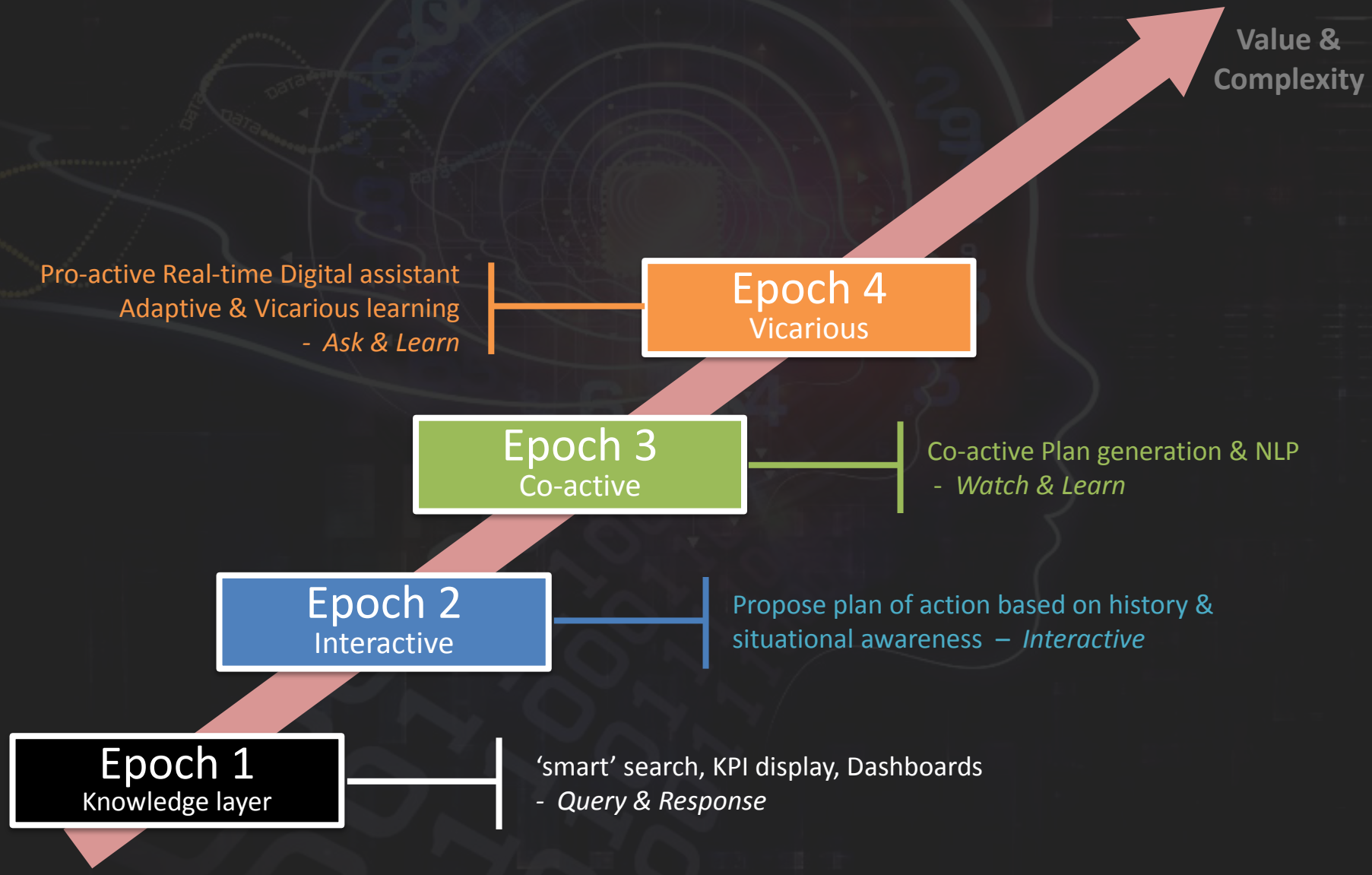


Epoch 3: Integration of real-time interaction for learning

- virtual assistants - follow and adjust plans if reality starts to deviate.
- first self-learning using adversarial ML, reinforcement ML
- combine classical planning and deep learning for planning & scheduling
- improve feedback from SOI through real-time contextual capture and learn from failures and speed-ups
- reduce quality issues due to non-compliance or omitted task steps
- close the loop enabling ‘development for manufacturing’

AI & Cognitive Computing Roadmap



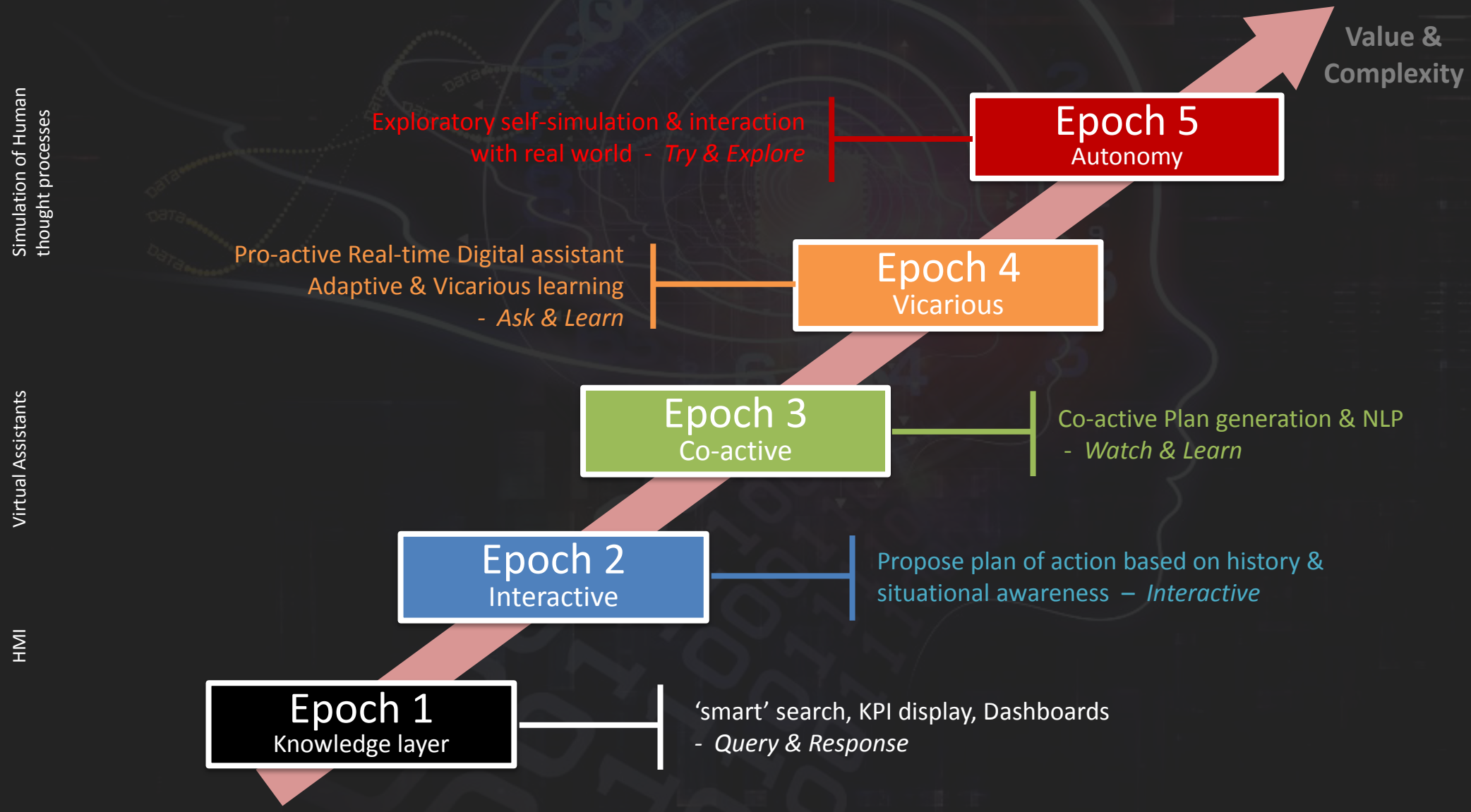
Epoch 4: Intent Recognition

Pro-active Real-time Digital assistant
Adaptive & Vicarious learning
- *Ask & Learn*

Epoch 4
Vicarious

- detect intentions behind plans and adjust based on that.
- use situational awareness to propose new action plan that maximizes success probability on larger KPI level.
- ability to ‘development for operations’ – OODA loop.
- self-learning focus.

AI & Cognitive Computing Roadmap



Epoch 5: Autonomous Systems

- adaptive/mission oriented systems
- exploratory intelligence
- self-healing
- fly-by-feel