Use and Implementation of Computational Intelligence

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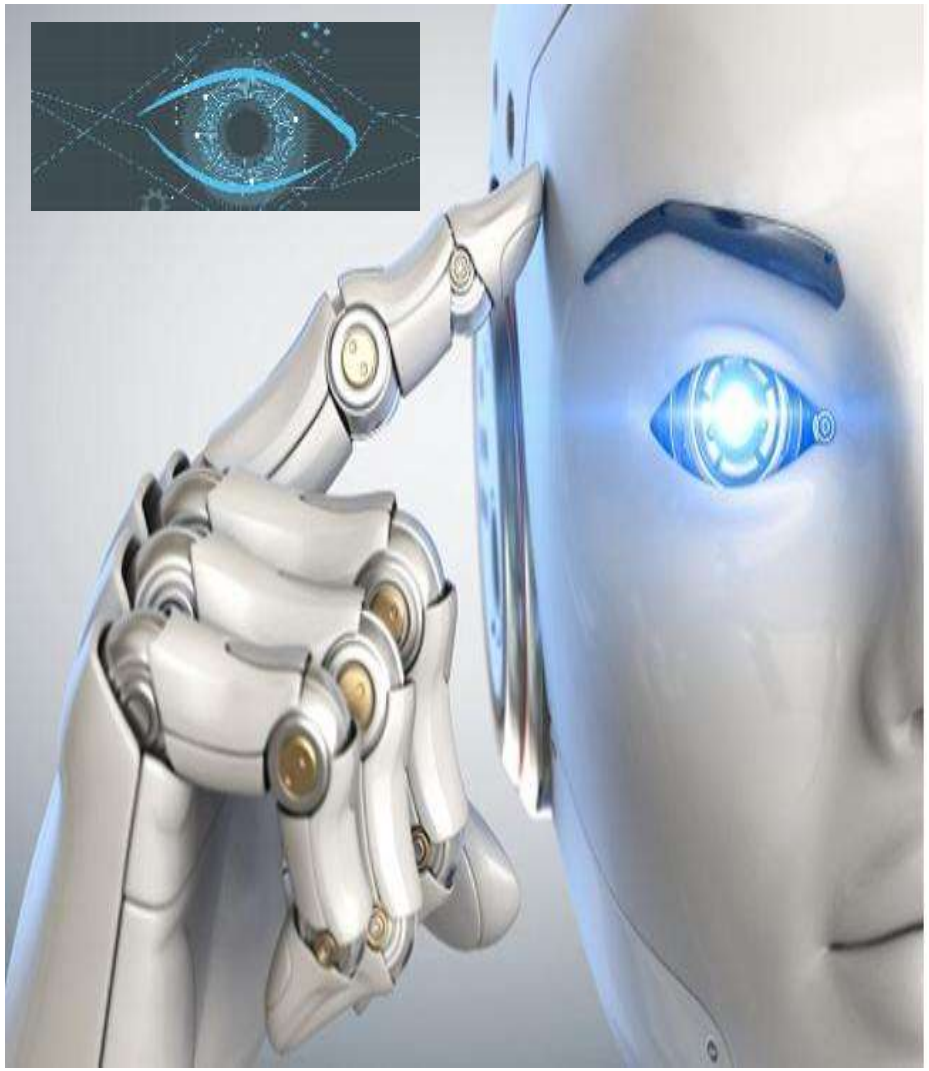
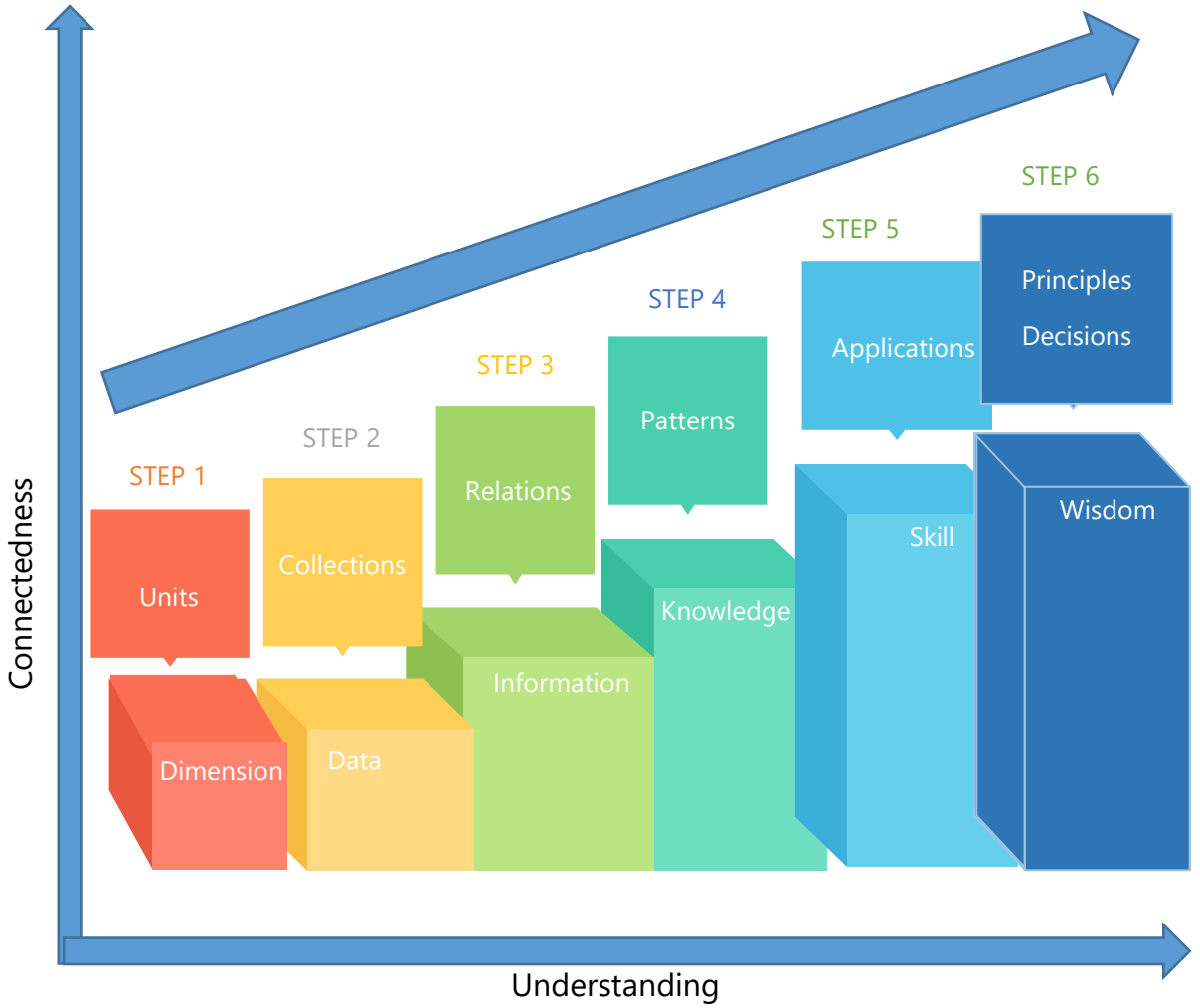
Use and Implementation of Computational Intelligence

- Agenda
  - Components of Computation Intelligence
  - Computation Intelligence-Data Analytics Maturity Path
  - Example Applications of Computation Intelligence
    - IoT
    - Healthcare
    - eCommerce
    - Finance
    - Cyber Security
    - Education
    - …and so on
  - Architecture to Implement
    - Business Component Architecture of Computation Intelligence
    - Connectivity Architecture of Computation Intelligence
    - Data Horizons
  - Implementation Approach
    - 9 Steps Approach

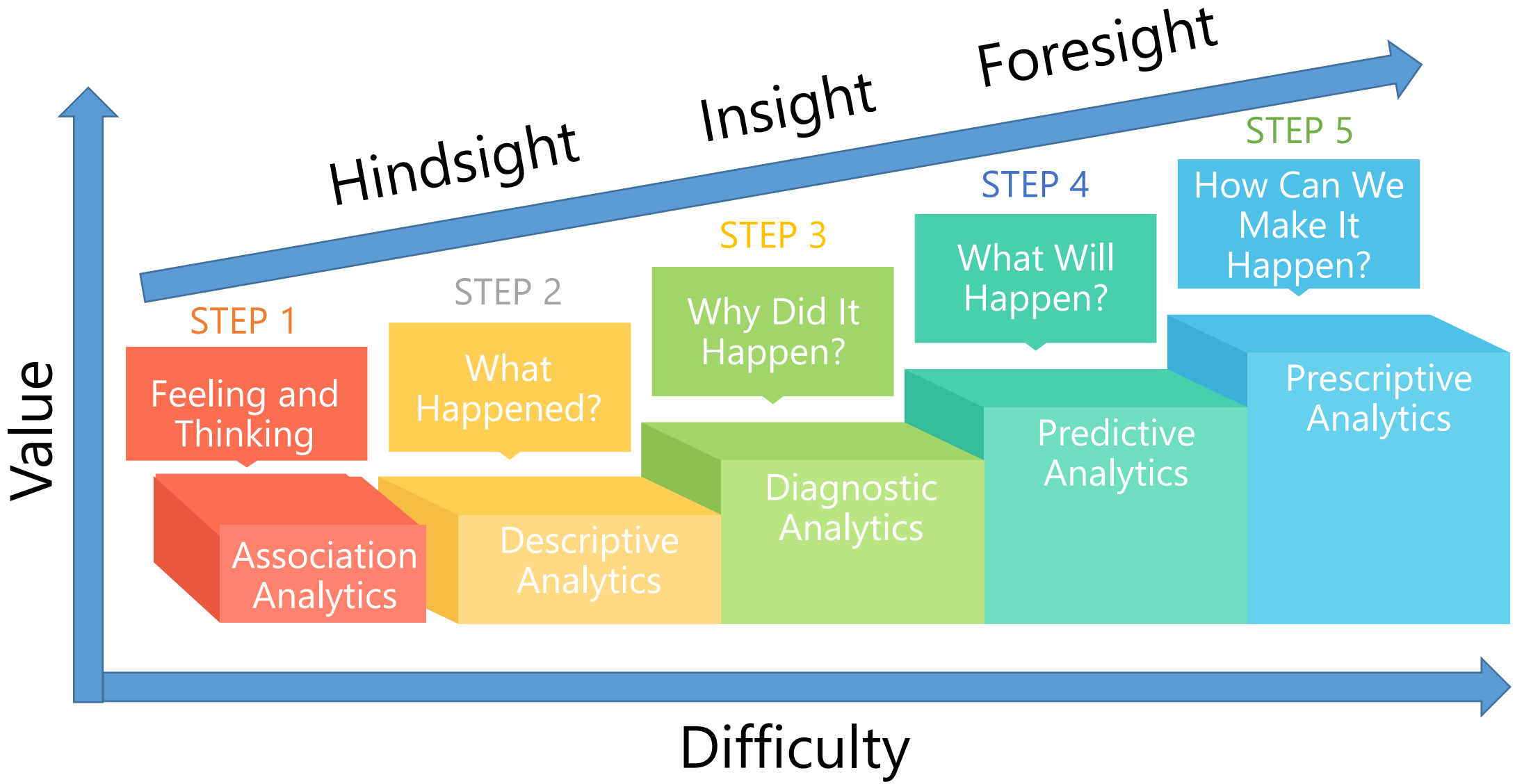


Computational Intelligence

- Fuzzy Logics
  - Approximate reasoning and Decision making
- Neural Networks
  - Data analysis, Classification, Associative memory, Clustering generation of patterns and Control of patterns
- Evolutionary Computation
  - Natural evolution to bring up new artificial evolutionary methodologies
- Learning Theory
  - Process of bringing together behaviorism, cognitivism, constructivism along with emotional and environmental effects
- Probabilistic Methods
  - Randomness to predict the problem and prescribe the solution combining mathematical relations



High Level Machine Intelligence - Data Analytics Maturity Path



Where Can be Used for IoT?

- Information – Diagnostic Analytics
  - Moving Speed Detections as well as oscillation frequencies
  - Removal of Data noise and Self Correctness
  - Growth/Decline rate – Support Cases, Manufacturing Defects rate, Devices Wear & Tear Rate, Financial Growth
- Knowledge – Activation Functions for AI/ML
  - Preventative Maintenance Schedule - modelling by sound and temperature in motors of fan, washing machine, fridge etc.
  - Prescriptive Methods - Auto switch on/off A/C based on temperature, products pair well together and how to price products

Where Can be Used for Healthcare?

- Information – Diagnostic Analytics
  - Clinical Document Quality Index
  - Growth/Decline rate – Support Cases, Recovery rate, Readmission rate, Financial Growth
- Knowledge – Activation Functions for AI/ML
  - Preventative and Corrective actions – Diagnosis data with Patient education materials
  - Predictive Methods- Number of patients visiting hospitals, Diseases seasonal patterns
  - Prescribing Methods – Number of resources needed like beds, pills, injections, nurses etc.

Where Can be Used for e-Commerce?

- Information – Diagnostic Analytics
  - Optimal Logistics Route planner
  - Decoration Pattern to connect irregular shapes
  - Product Grouping to maximize Buyers and to minimize stock
  - Growth/Decline rate – After sales support cases, Financial Growth
- Knowledge – Activation Functions for AI/ML
  - Predictive Method- Where to invest money, Which products can be retired, Customer segmentations
  - Prescribing Methods – Price response functions, Supply and Demand generating seasonal patterns

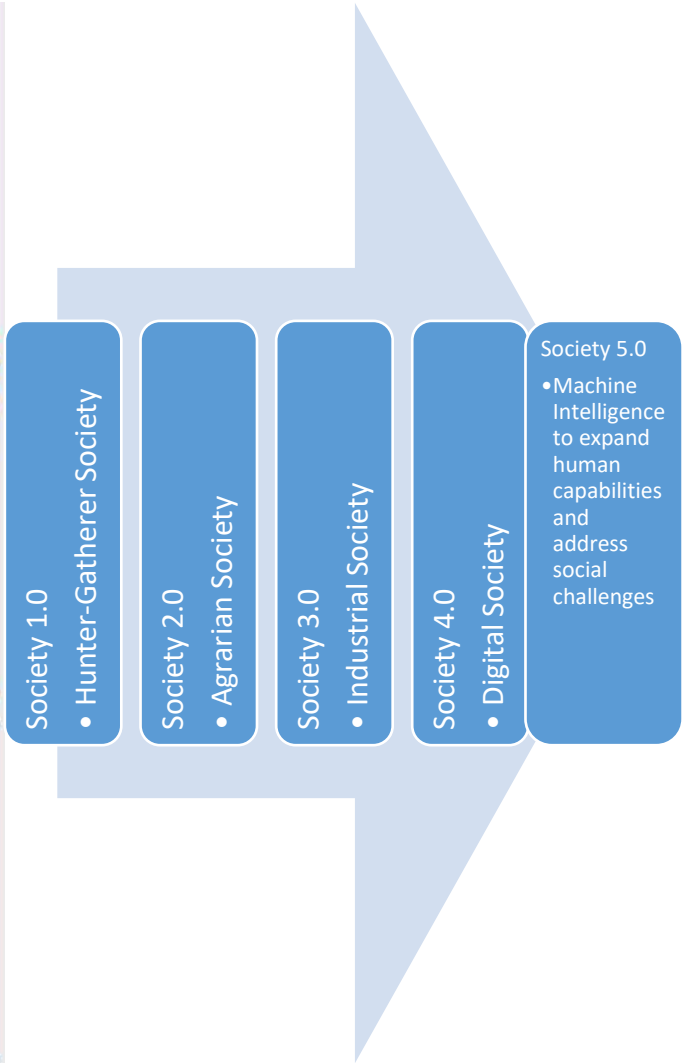
Where Can be Used for Cyber Security?

- Information – Diagnostic Analytics
  - Network (network traffic analysis and intrusion detection)
  - Endpoint (anti-malware)
  - Application, Users, Process (anti-fraud)
  - At Rest, At Transit or Historical
- Knowledge – Activation Functions for AI/ML
  - Prediction Methods – Anomalies, Forensic analysis
  - Prescribing Methods – Encrypted Blockchain

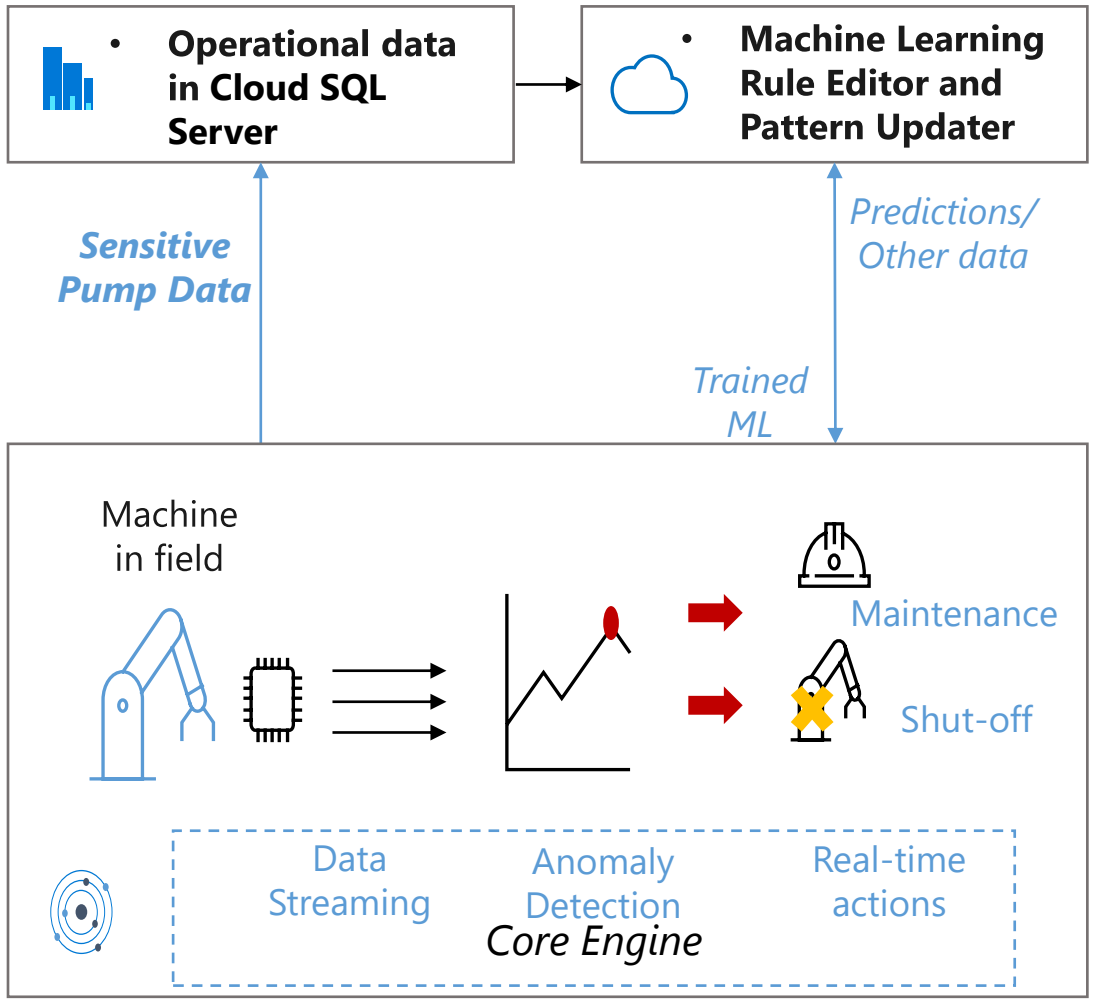
Where Can be Used for Education?

- Information – Diagnostic Analytics
  - Digital Library
  - Questions, Answers
  - Markings / Categorization as Easy to Difficult from Novice to Expertise
- Knowledge – Activation Functions for AI/ML
  - Prediction Methods – Most wanted materials, Attendance, Productive hours, teaching preferences
  - Prescribing Methods – Assigning Education Materials to overcome Weak Skills, Auto scheduler

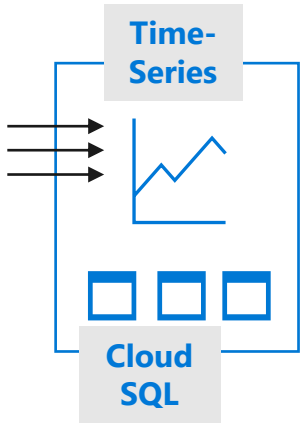
Where Can be Used …and So on…



High Level Example of Preventative and Maintenance System



Time-series built-in

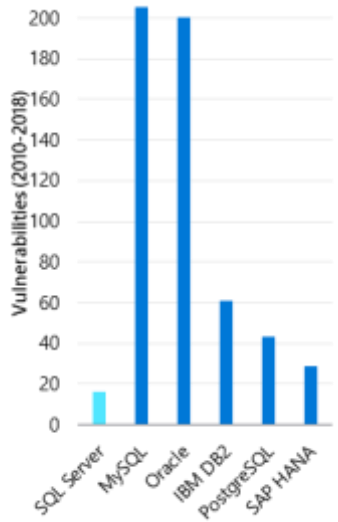


Built-In Time-Series Streaming and Analytics

AI built-in

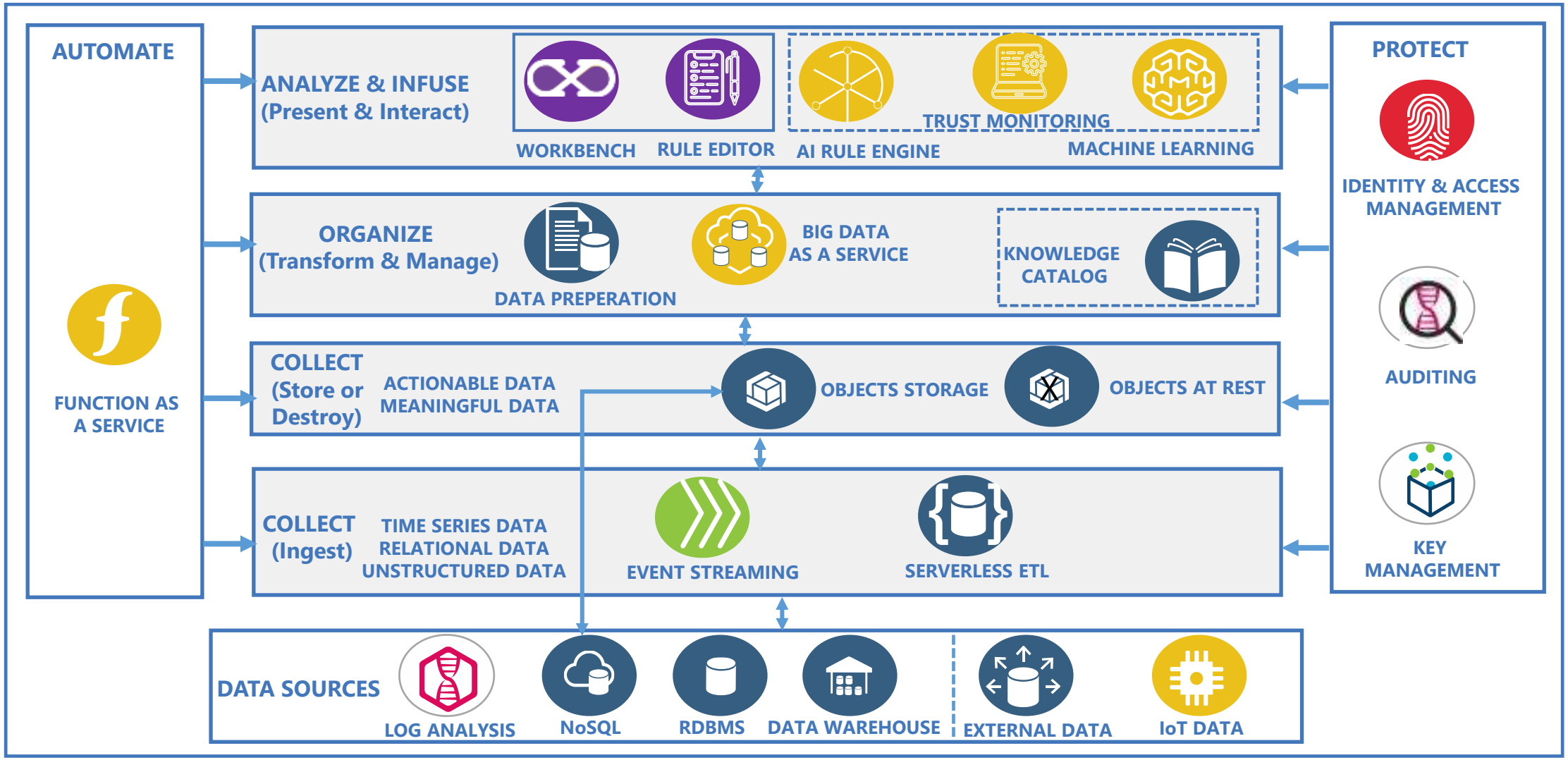
Machine learning for low-latency analytics

Unparalleled performance and security

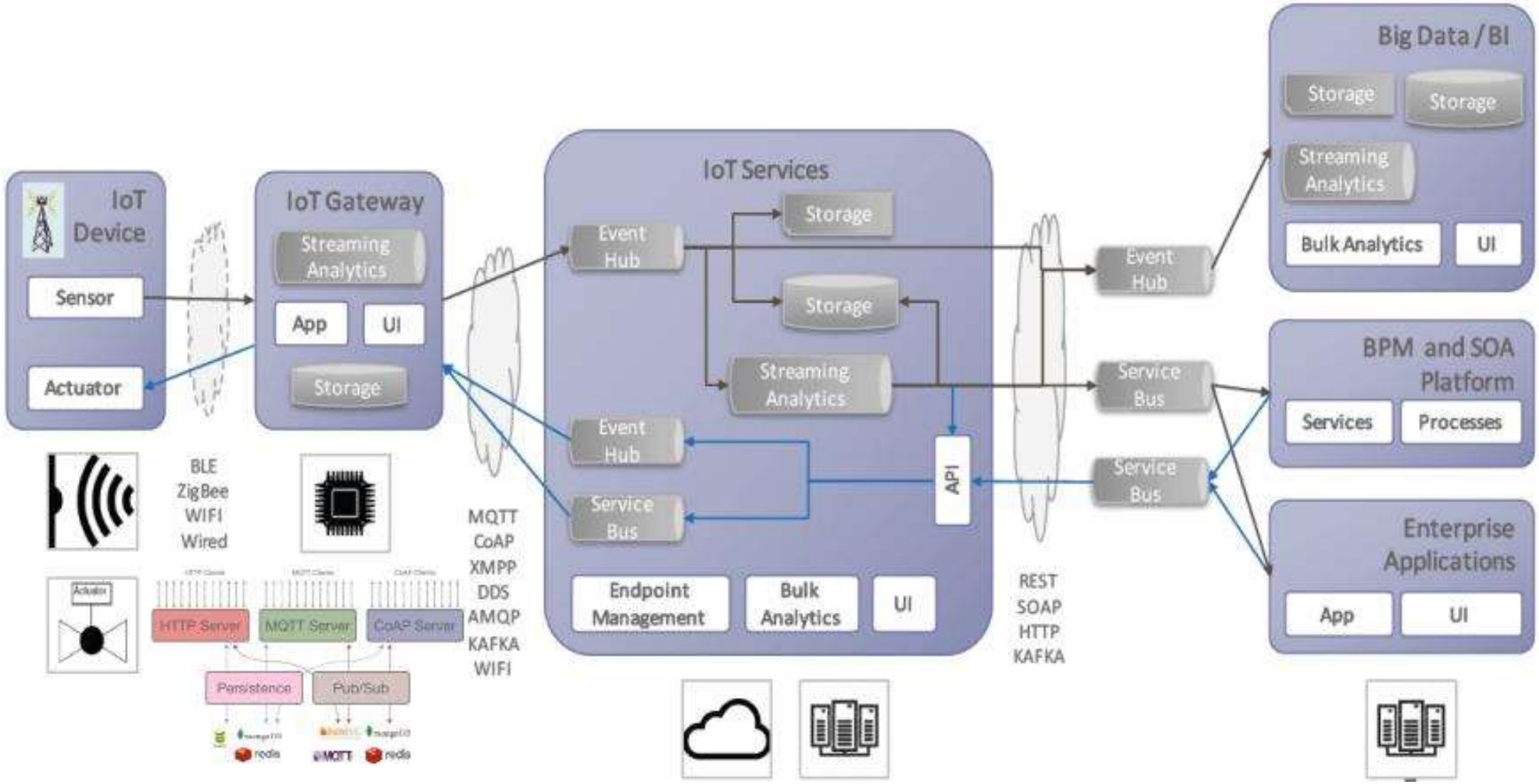


Most secure with industry leading performance

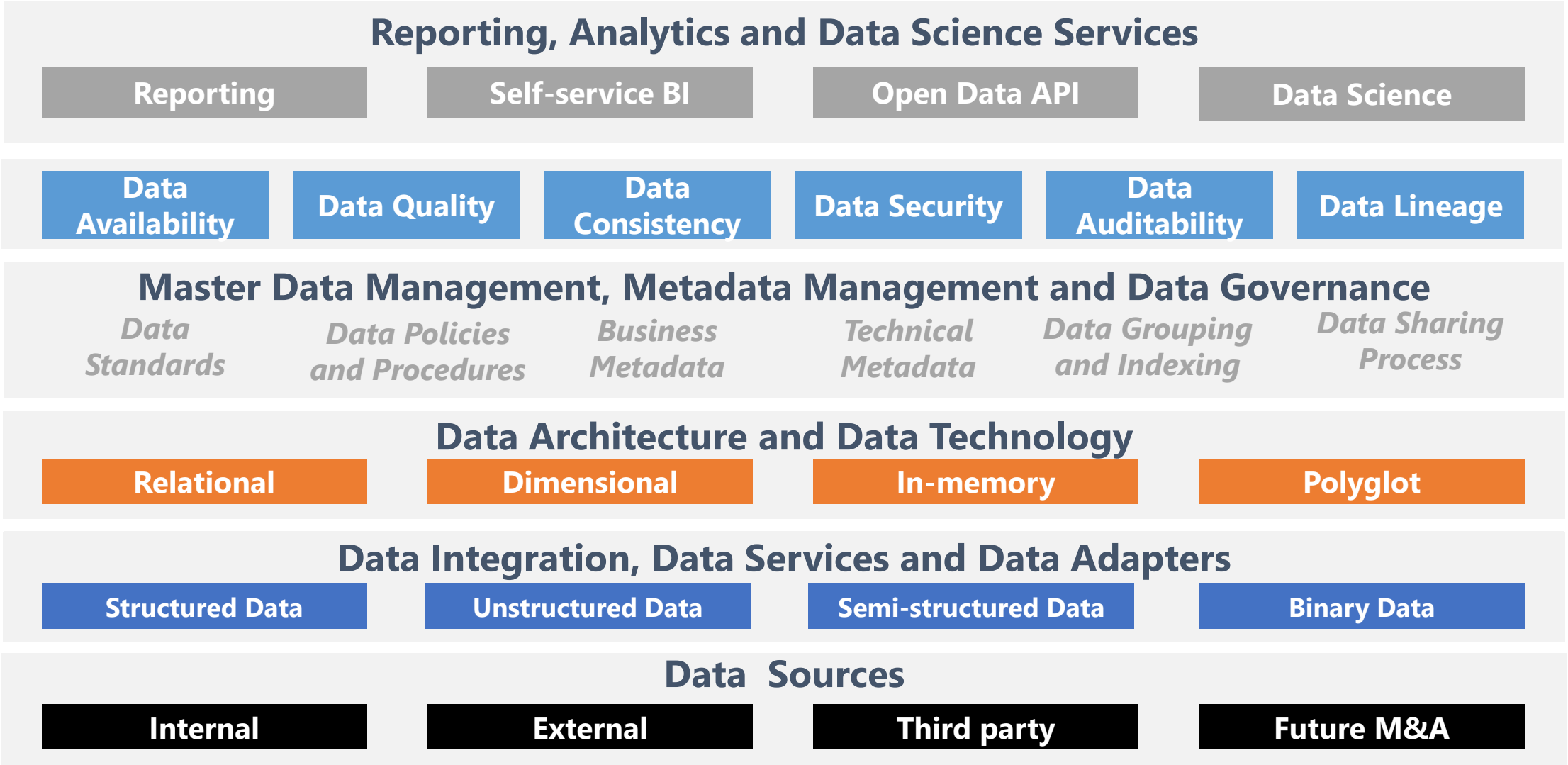
High Level Generic Business Components Architecture



High Level Generic Connectivity Architecture



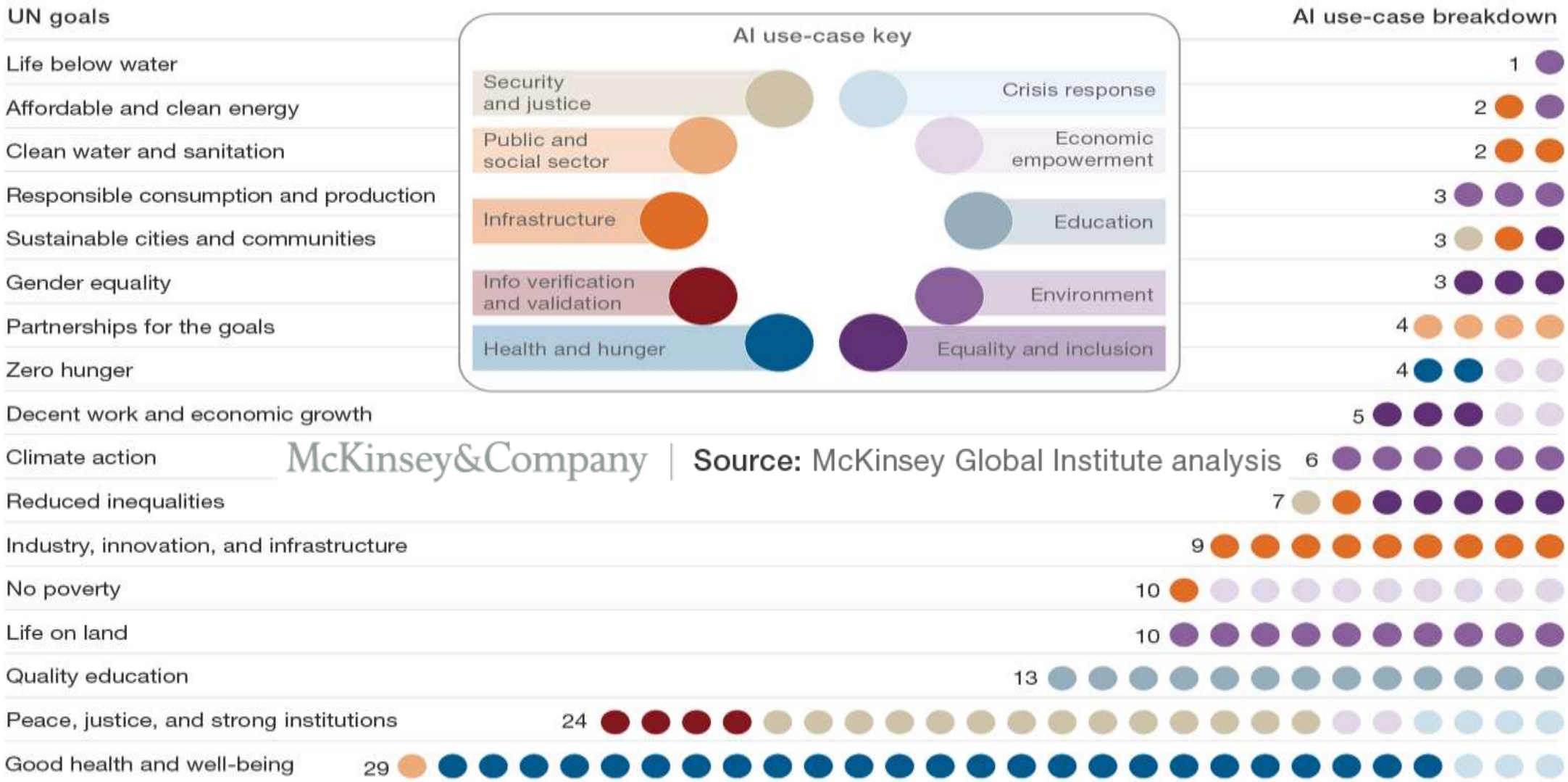
Data Horizons



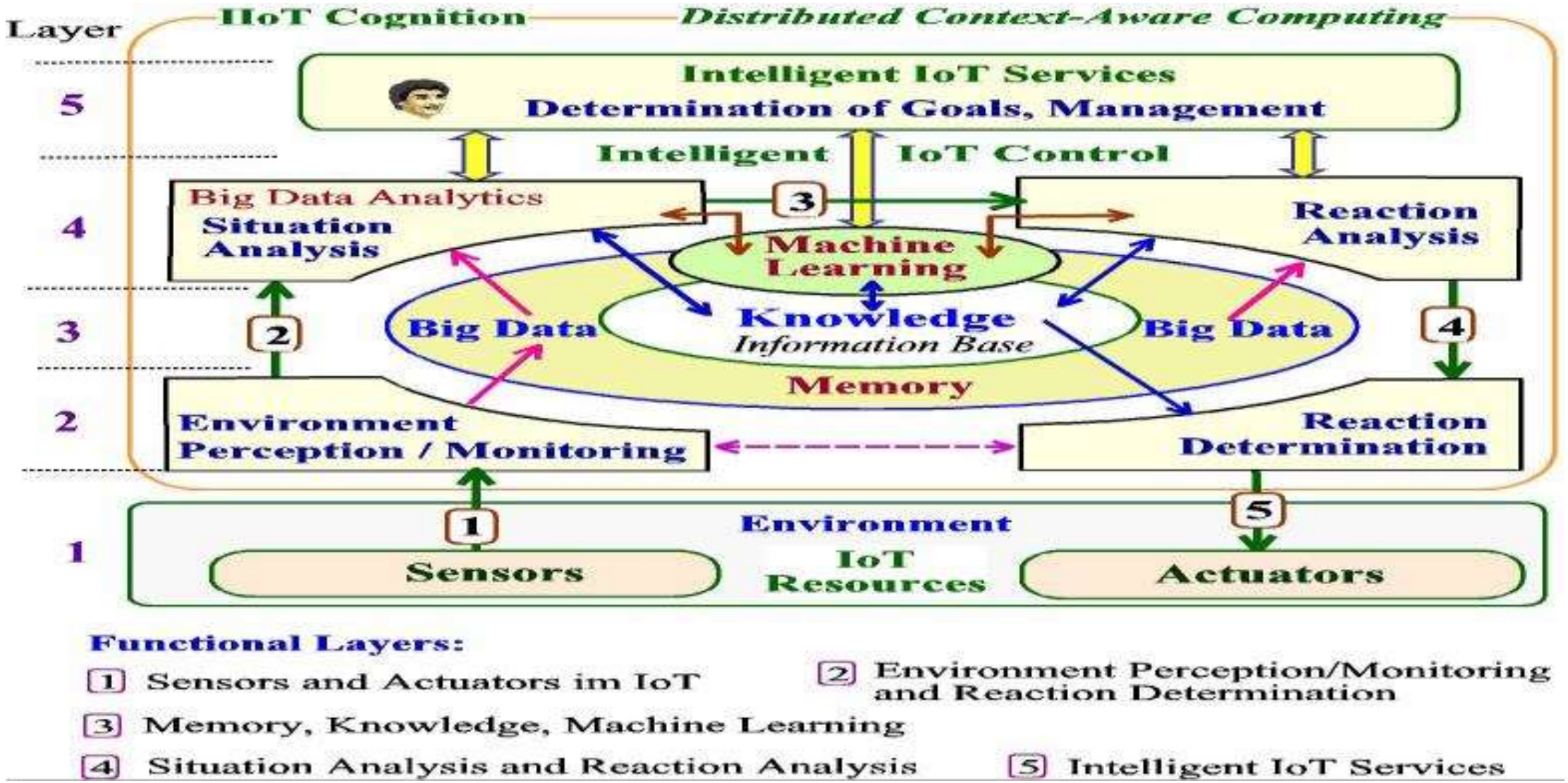
High Level Generic Data Analytics 9 Steps Approach

1. Identify the problem and the stakeholders
2. Identify what data are needed and where those data are located
3. Develop a plan for analysis and a plan for offline or periodic or real-time retrievals
4. Extract, transform, load the data
5. Check, clean and prepare the data for analysis and automate in minimizing time
6. Analyze and interpret the data
7. Visualize the data
8. Disseminate the new knowledge
9. Implement the knowledge in the organization

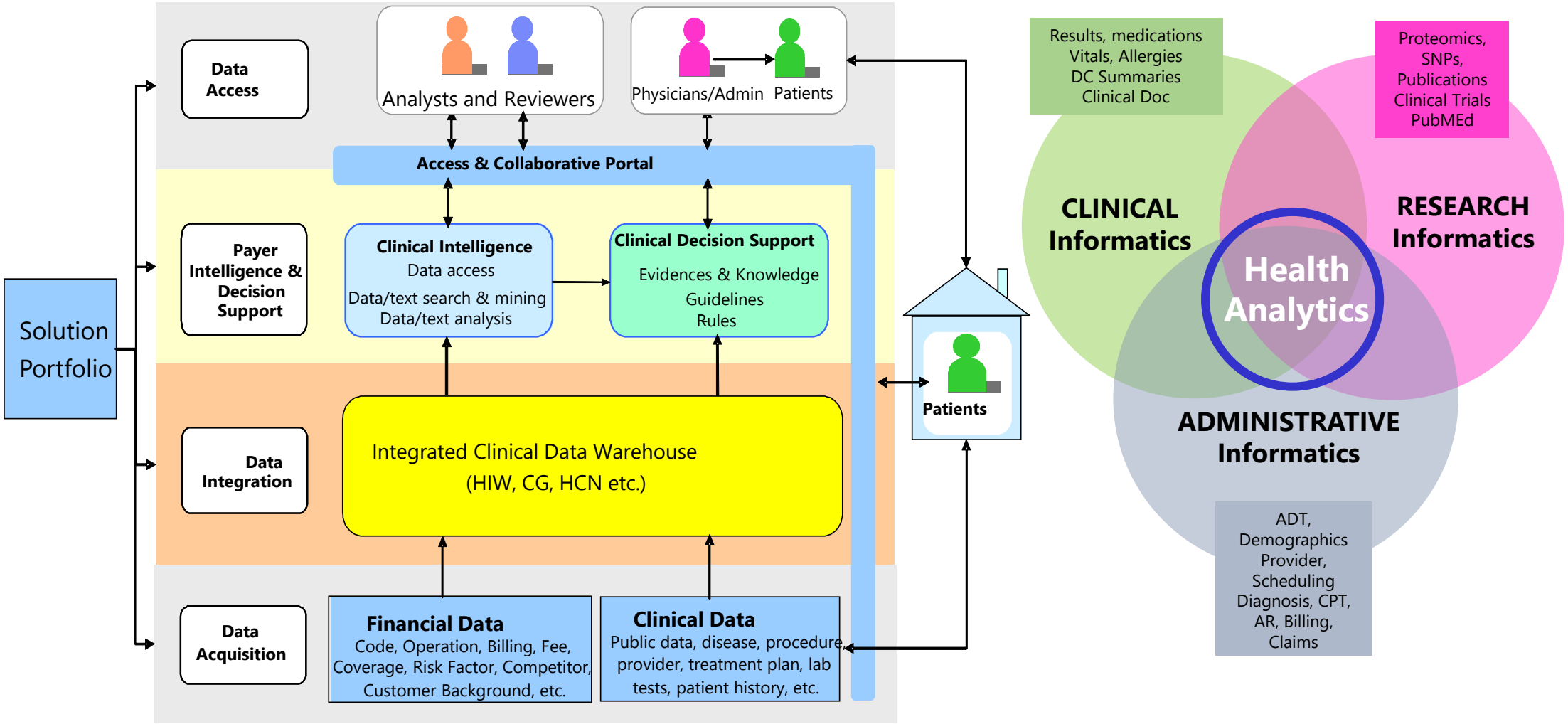
1st and 2nd Step Data Points for UN SDG Goals



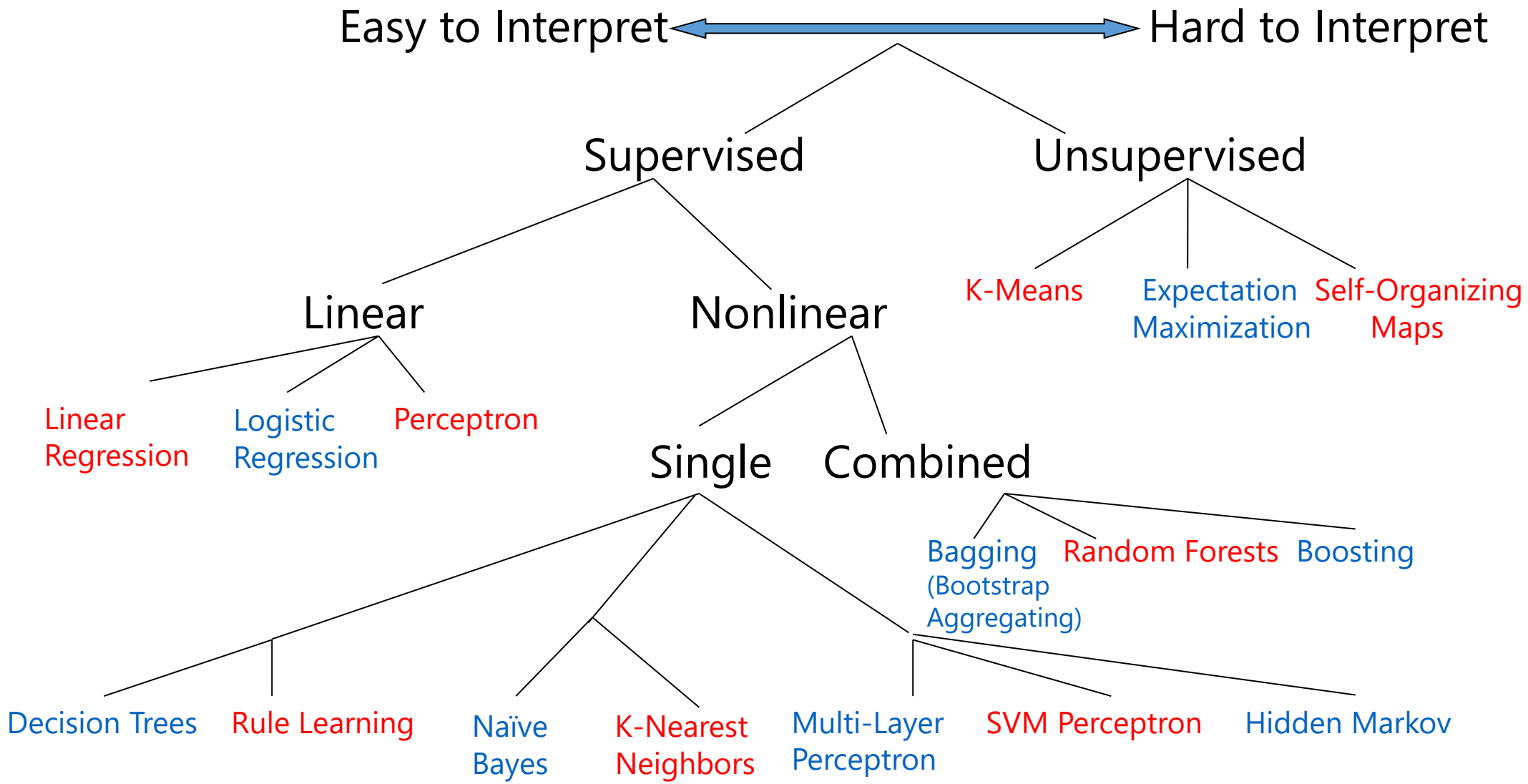
Data Analytics Initial 1st to 5th Steps - IoT



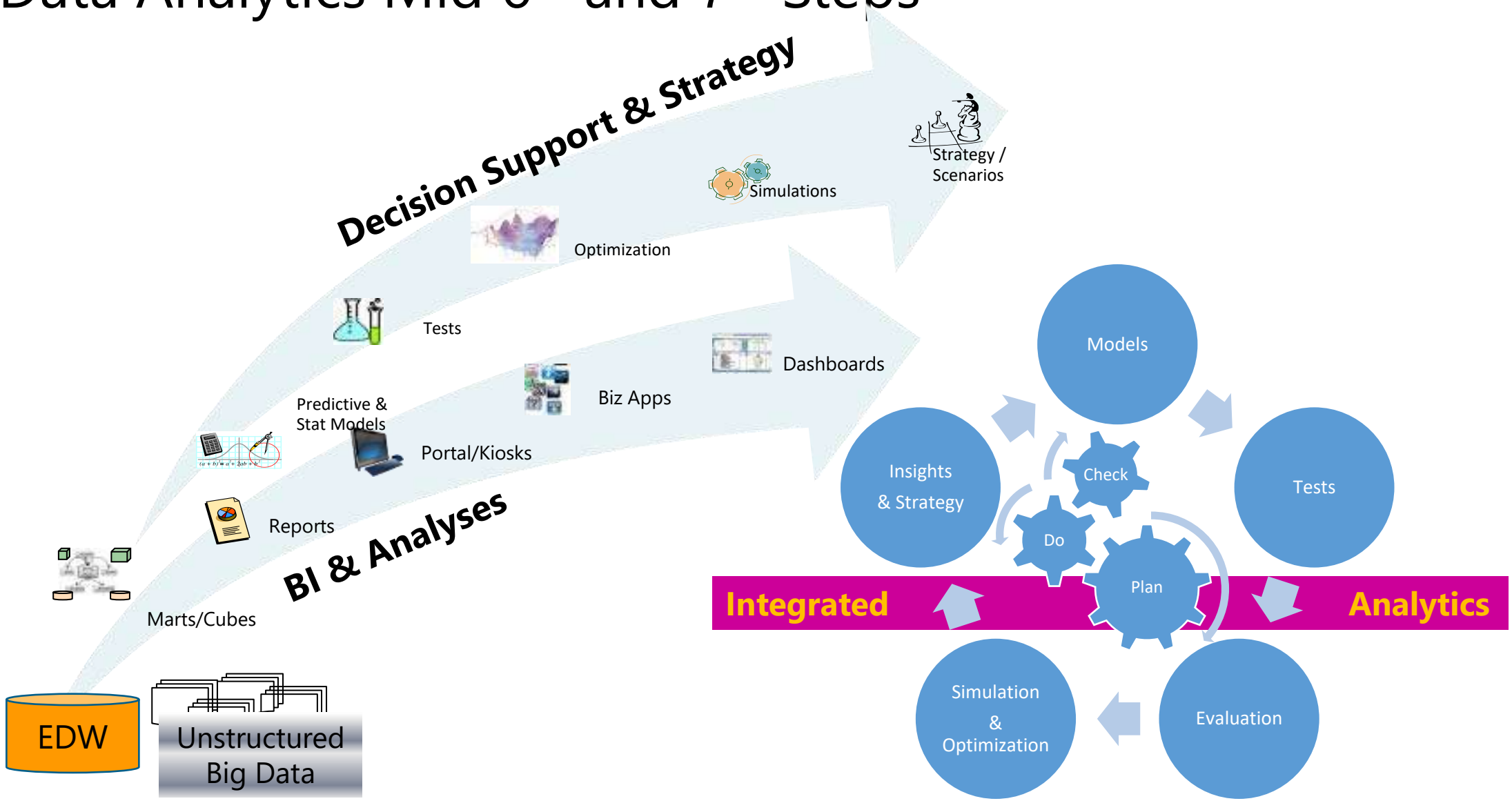
Data Analytics Initial 1st to 5th Steps - Healthcare



Data Analytics Algorithms Used in Step 6



Data Analytics Mid 6th and 7th Steps



AI/ML Initiatives for Step 7

01. Feature Elicitation
02. Structure Discovery
03. Meaningful compression
04. Big data Visualisation

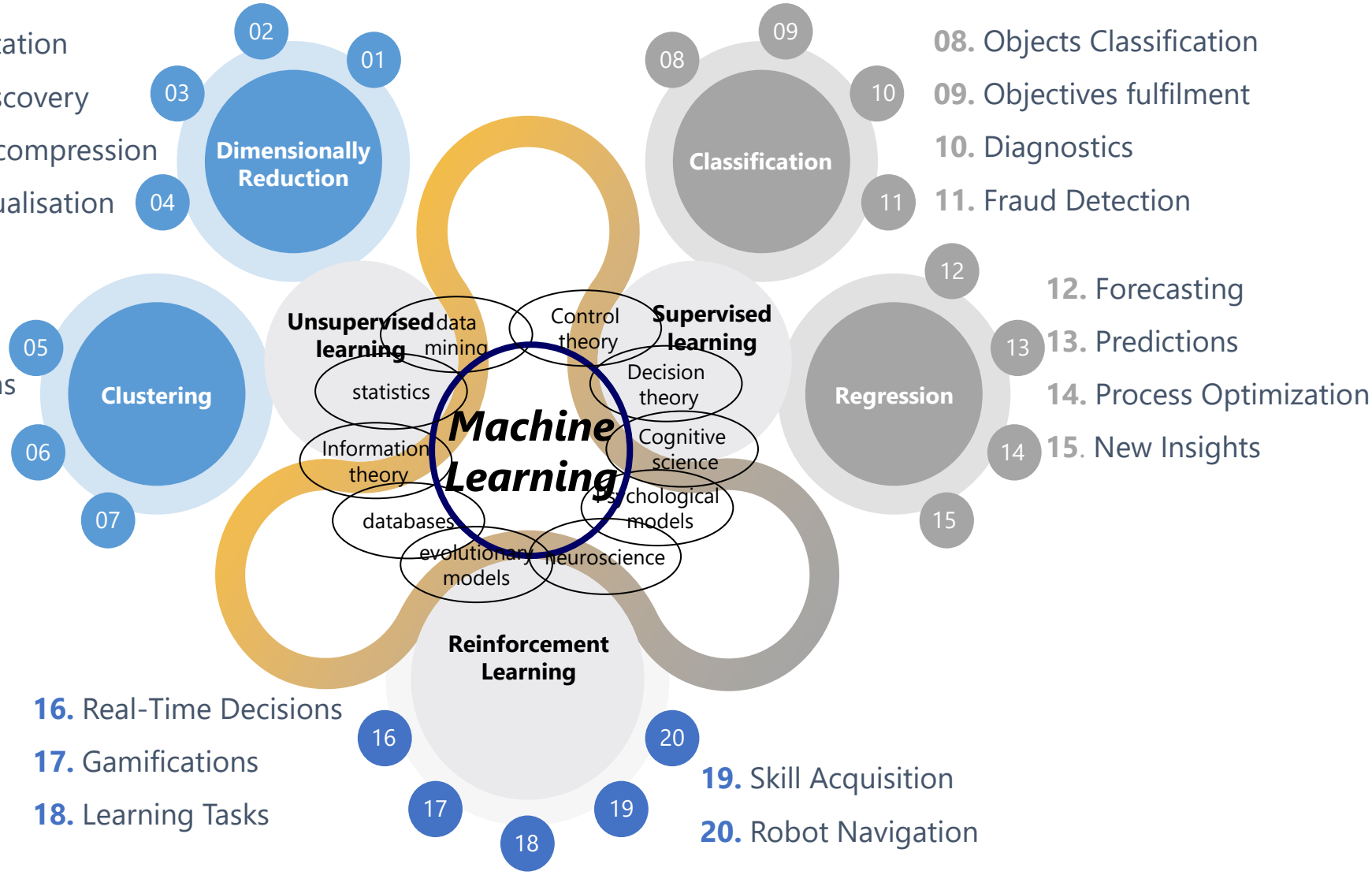
05. Recommended Systems
06. Targeted Systems
07. Segmented Systems

08. Objects Classification
09. Objectives fulfilment
10. Diagnostics
11. Fraud Detection

12. Forecasting
13. Predictions
14. Process Optimization
15. New Insights

16. Real-Time Decisions
17. Gamifications
18. Learning Tasks

19. Skill Acquisition
20. Robot Navigation



Data Analytics Final 8th and 9th Steps

- Disseminating the new knowledge
  - Write up the findings
  - Disseminate to the stakeholders
- Implementing the new knowledge
  - Requires participation of stakeholders

Final Thoughts… Any Questions?

For more information, my Concept AI/ML activation models are published in https://www.ijmttjournal.org/Volume-66/Issue-11/IJMTT-V66I11P502.pdf

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