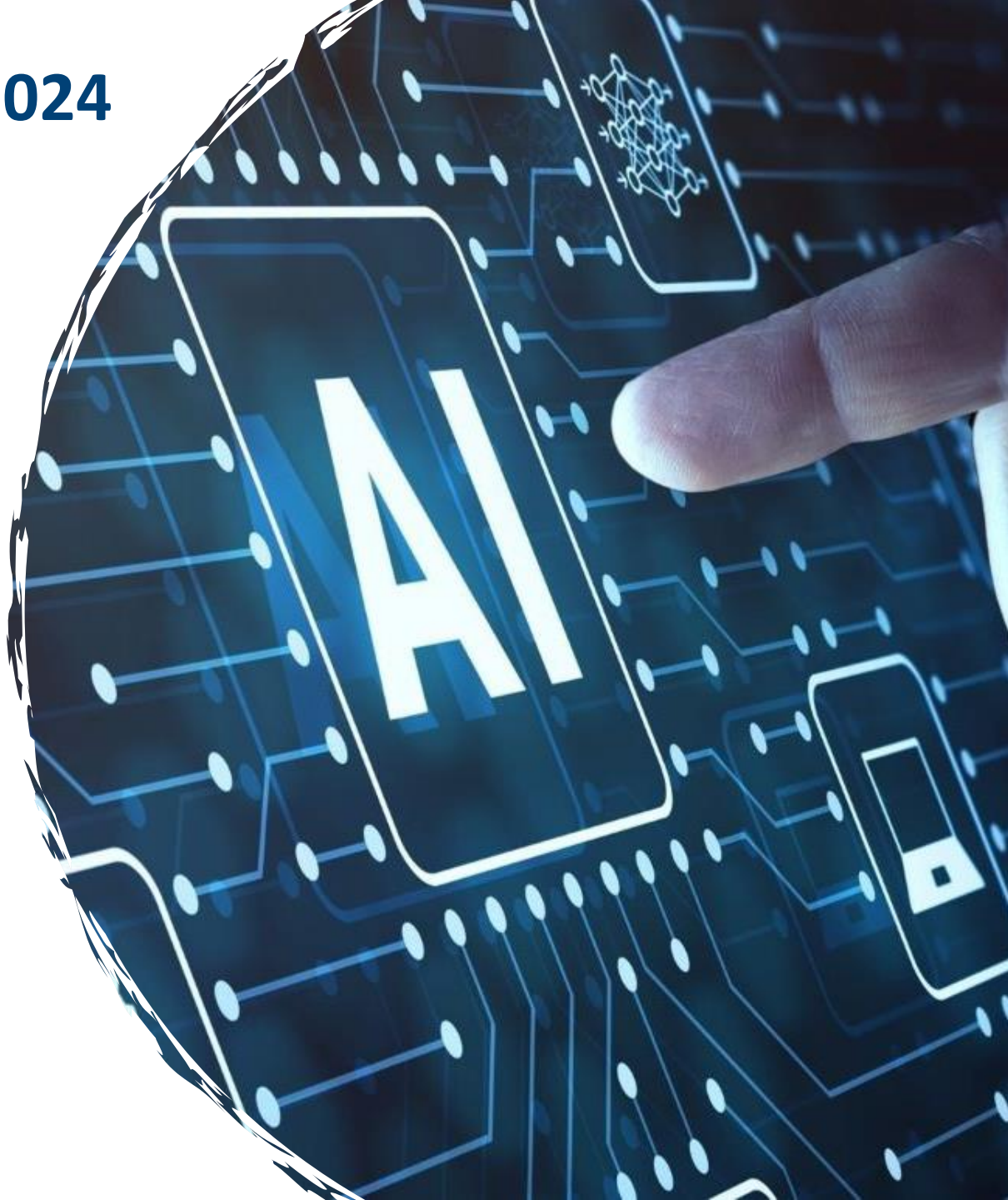
ETSI AI Conference 2024



The role of AI in Network Automation - The ZSM Case

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Why We Are on It

AI technologies are and will become ever more integral part of service and network management

- **Integrate AI technologies into automation/management frameworks and functions**

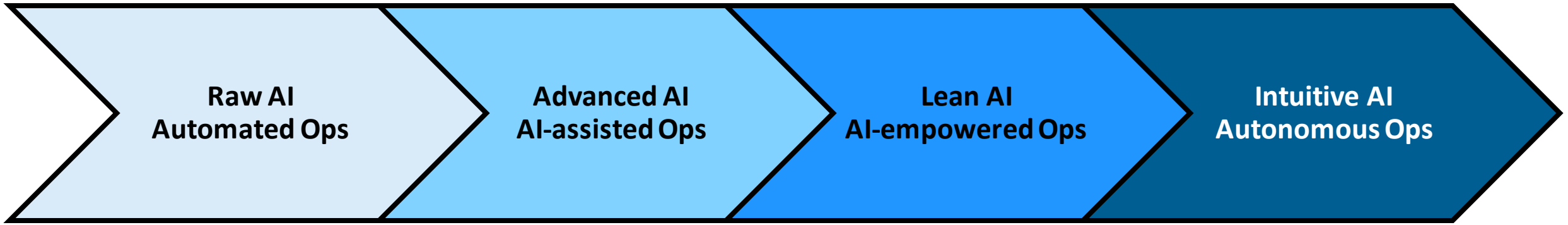
AI technologies integration is still manually intensive and case-tailored

- **Support portability and re-usability, addressing automation of AI technology applications**

The AI standardization challenge

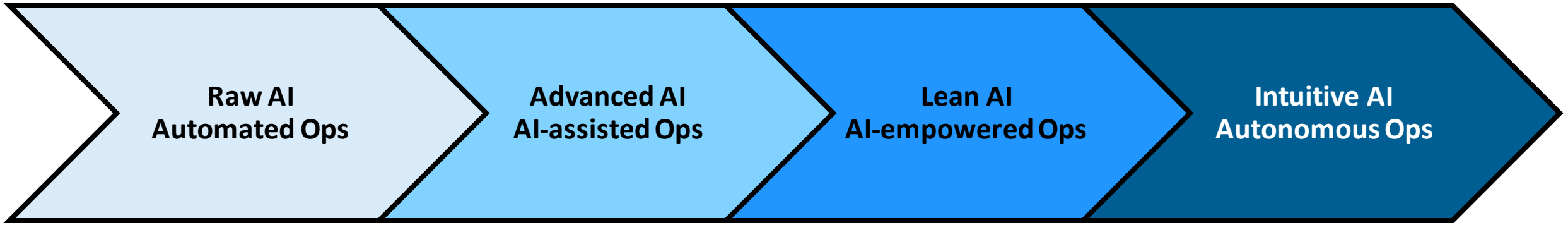
- **Enable AI-based operations across use cases, domains, technology providers…**

AI and Network Ops. An Evolutionary Forecast



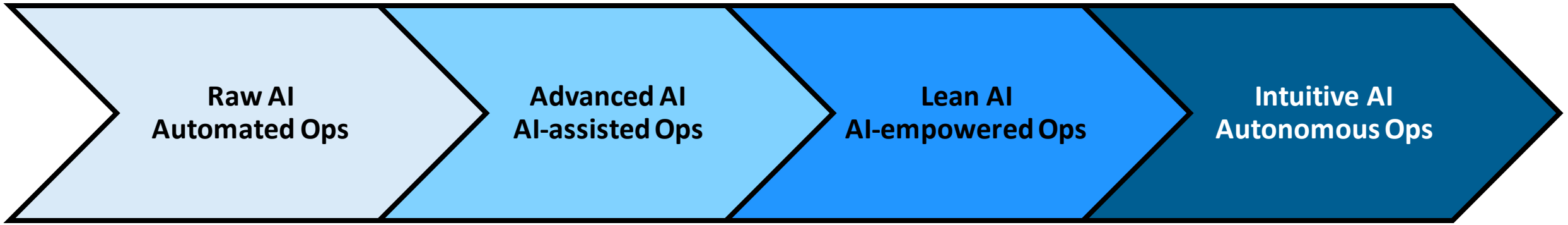
Limited view and use of AI potential
Big (dumb) data
Isolated, small-scale solutions with limited re-use
Retrofit ML technologies for N&S automation
Manually-intensive integration
Controlled autonomy and confined in scope
No AI-specific security measures
Lack of standards

AI and Network Ops. An Evolutionary Forecast



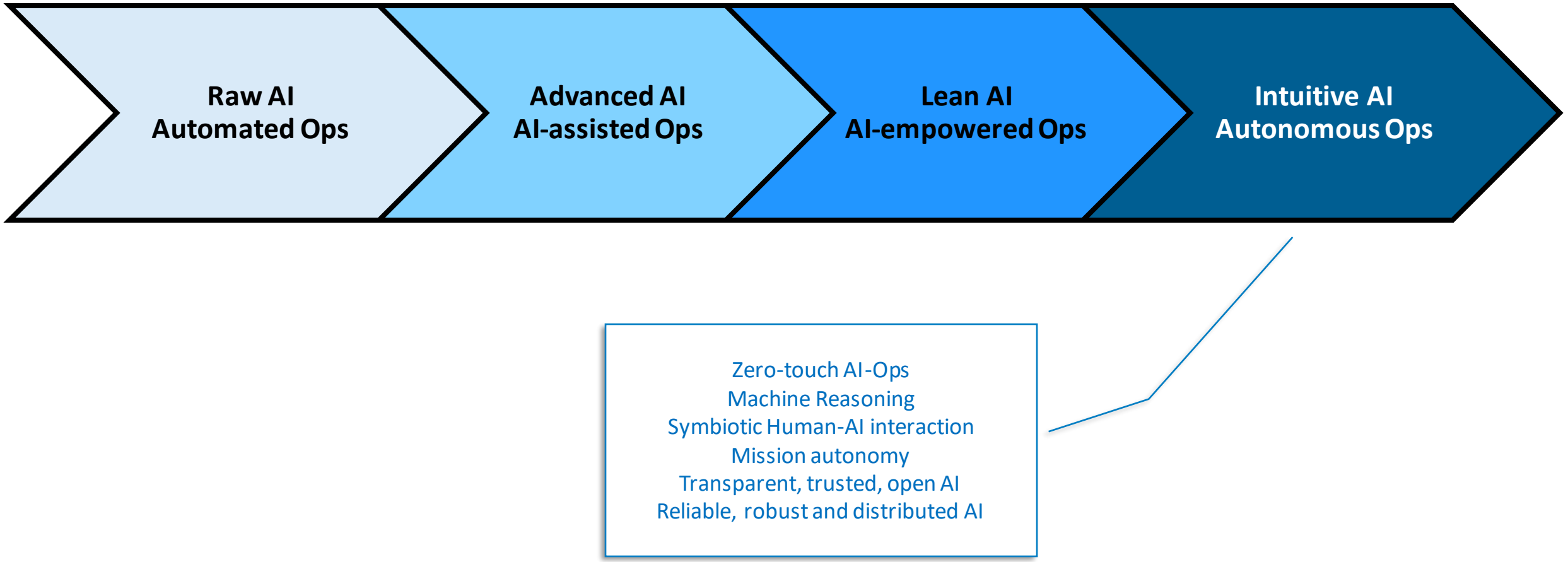
Network-adapted AI techniques
Smarter data
Cross use cases
Large scale application and penetration of AI-based solutions
AI know-how is leveraged for N&S automation
AI-specific security techniques protect N&S operations
Emerging standards and basic interoperability

AI and Network Ops. An Evolutionary Forecast

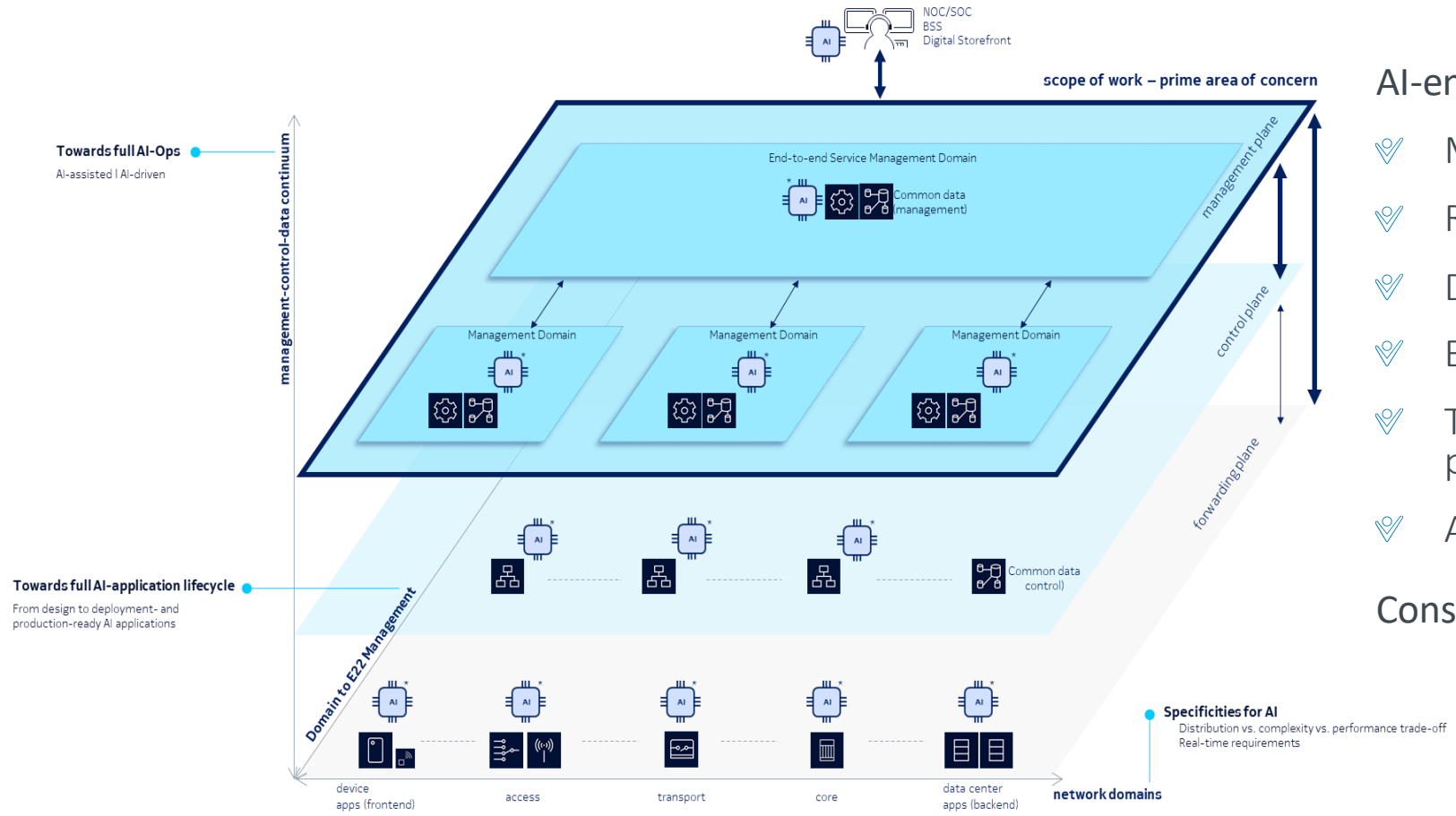


Broad set of AI techniques
Intelligent data
AI-as-a-Service
Full scale deployment and applicability of AI-enabled
Seamless design and integration
Guaranteed AI functional safety
Comprehensive standards and increased interoperability

AI and Network Ops. An Evolutionary Forecast



AI Can Be Everywhere in the Network…



AI-enabled applications deployed according to:

- Management and operational scope
- Response time
- Data availability and privacy implications
- Business opportunities
- Tradeoffs: distribution vs. complexity vs. performance vs. usability vs. security vs…
- AI integration maturity

Consider a management-control-data continuum

… And Applied to Many Potential Objectives

- Network planning and optimization
- Service provisioning and assurance
- Extending operational capabilities via direct human/AI interaction
- Security aspects: AI-based threat detection and mitigation
- Intent fulfilment, directly connected to provisioning and assurance
- Direct support to vertical applications: AI-as-a-Service

The ZSM Standardization Scope

Structured around the identification and definition of AI enablers

- Elements to support AI application execution requirements and constraints

Access to the right data

- From the right source(s), and at the right time

Support for higher level abstractions

- When expressing the requirements and goals of AI applications

Governance

- Address business and regulatory requirements

Integration

- Among AI elements and with the rest of the automation framework

Enabling Areas

An enabling area defines a set of enablers related to a given facet of AI-empowered management and automation

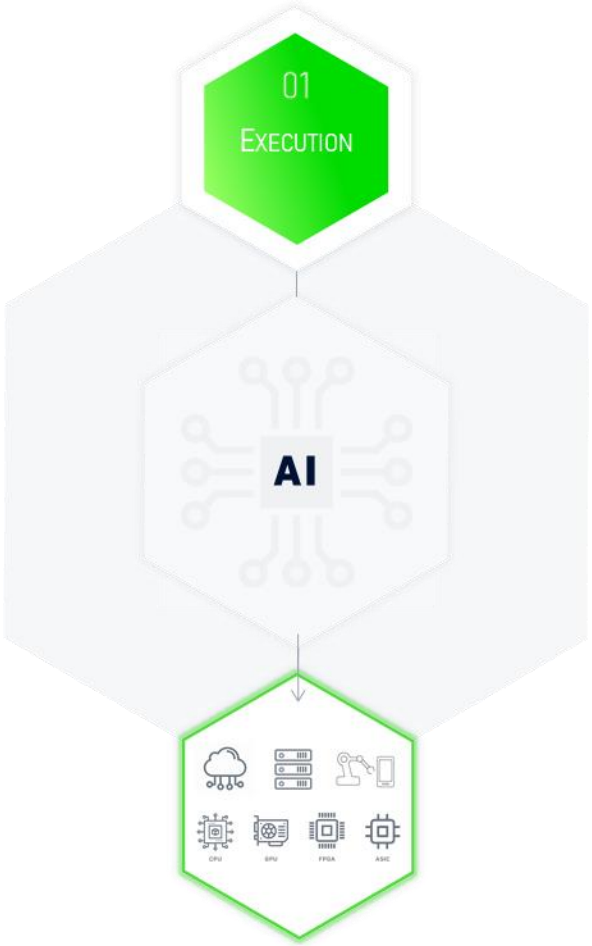
- Execution environments
- Accessing data
- Inter-AI interactions
- Performing actions
- Governance

They define the scope of activity for AI-based Network and Service Automation in ZSM

- Identify specific requirements
- Supporting management services, in complement to already identified ones
- Deployment scenarios involving multiple AI components and their interaction

ZSM012 is the main reference, but see also ZSM002, ZSM005, ZSM008, ZSM009, ZSM011 and ZSM015

Enabling Areas - Execution

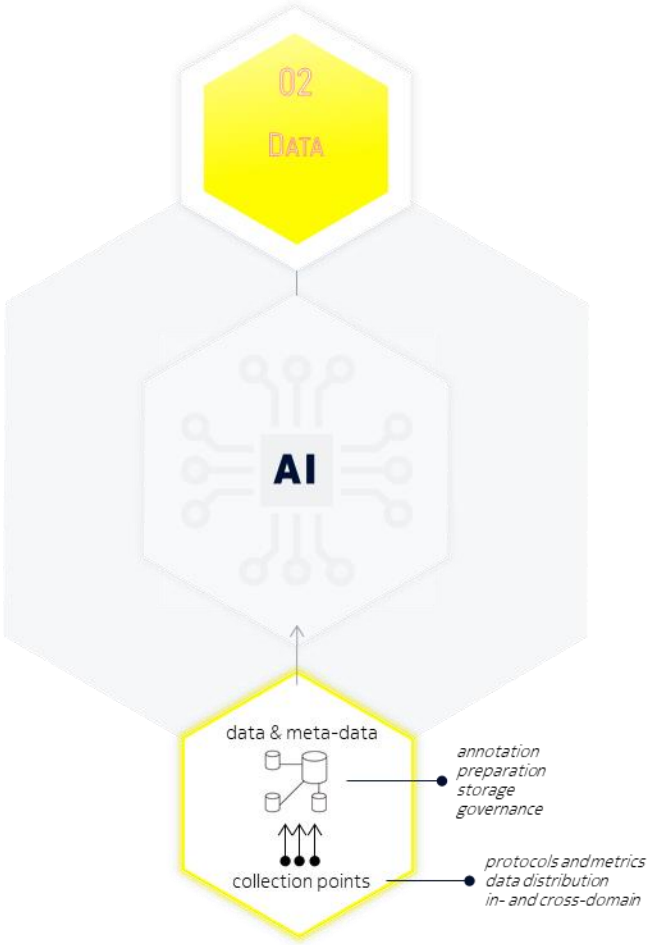


Support the deployment and operation of AI/ML applications

- Addressing requirements such as computational or time constraints
- Deploy AI models in a controlled testing environment (sandbox)
  - Model validation
  - Sandbox configuration service
- Validate seamless integration and LCM
- Dynamically orchestrate and manage data/action pipelines

Connected to current ZSM activity on NDT

Enabling Areas - Data



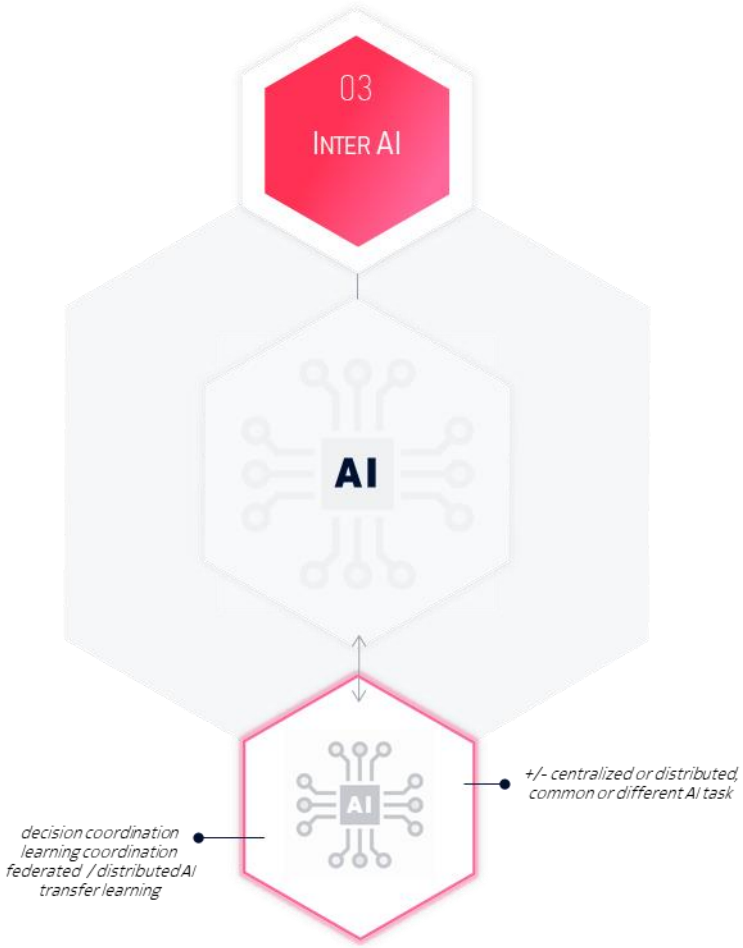
The lifeblood of AI-empowered automation

- Data access across domains
  - Supporting data infrastructure
  - Sources, aggregators, consumers
  - Data and metadata models
- Integrity and trustworthiness of the data
  - Including privacy concerns
- Required training and inference needs
  - Data pre-processing according to model specific requirements

A broad field for further research and standardization

- Beyond AI applicability
- Deserving the consideration of a specific ETSI TC on data infrastructures

Enabling Areas - Inter AI



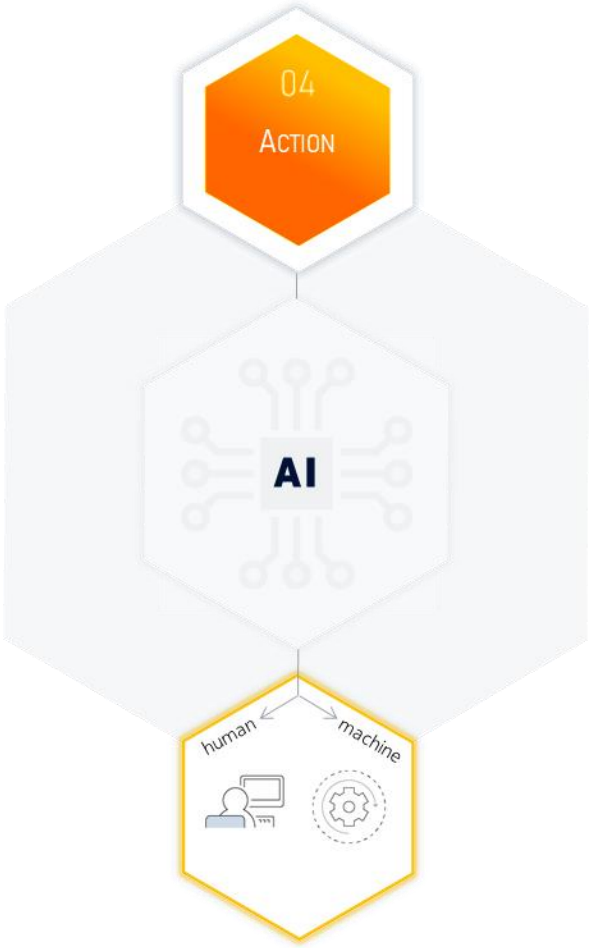
Support interactions among AI applications and their components

- Cross-domain training schemes ranging from fully centralized to fully distributed
- Manage and orchestrate cross-domain AI applications
- Automate workflow across different types of AI solutions
- Transfer learning across tasks or domains

Federated learning on the ZSM integration fabric

- Including the balance between privacy and security
- And how to exchange models and knowledge in an open way
- Implying a second call for a specific ETSI TC on data infrastructures

Enabling Areas - Action



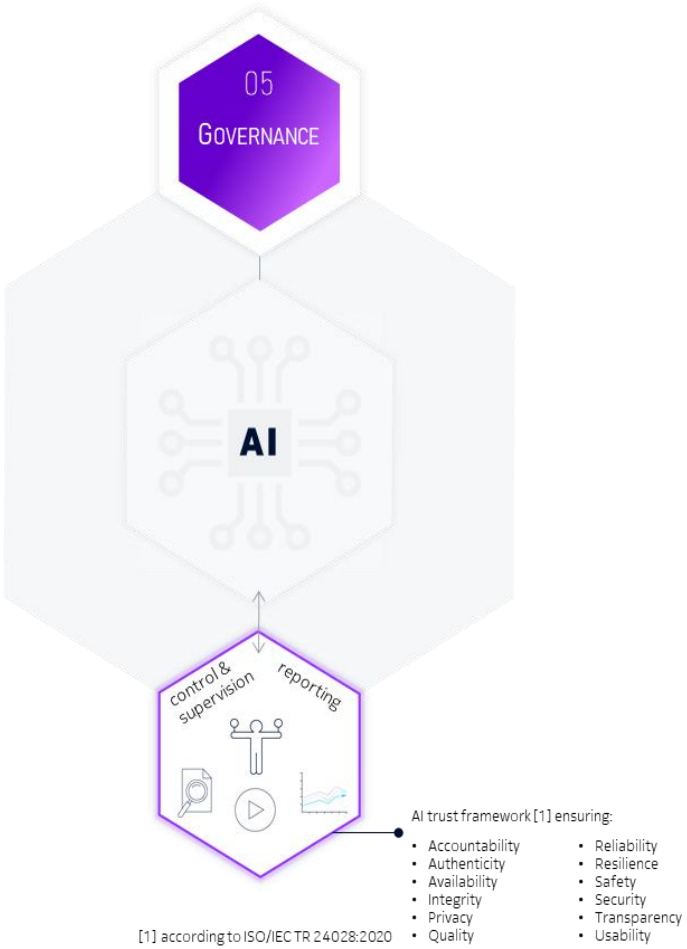
AI plays a crucial role in providing optimal control decisions

- Make these outputs translatable into direct actions
  - Devices
  - Network entities
  - Management domains
  - Other management functions
- Enhance recommendations through the AI/human interface

Another broad field for further research and standardization

- Action flows are another kind of data flows
- Hence this third call for a specific ETSI TC on data infrastructures

Enabling Areas - Governance



Crucial for ensuring trustworthiness of AI applications, in all senses

- Applicable laws and regulations
- Ethical principles and values
- Technical robustness
- Address trust issues in general
  - Accountability and explainability
  - Fairness
  - Defence against adversarial attacks
  - Fallback mechanisms

Collaboration with existing activities and new facets

- TC SAI
- And a fourth call for a specific ETSI TC on data infrastructures

Concluding

AI is gaining momentum in network transformation

- Automation
- Operational extension
- Intent fulfillment
- Direct service to verticals

ZSM has been analysing its implication in cross-domain automated management

- Lifecycle management
- Operational integration
- Highlighting the relevance of data flows

So let me make a final call for a specific ETSI TC on data infrastructures