

AI FOR GOOD / workshop

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Autonomous Network: Practice and Standardization

Xiaoou Liu

China Telecom Research Institute

China Telecom (JiangXi) AI research Institute

Speaker



Dr. Xiaoou Liu

China Telecom

China Telecom network AI Standardization

The core capabilities of China Telecom's CNOS - Autonomous Networks, are currently deployed in many SDOs such as ITU-T, ETSI, TMF, and GSMA. The standard system of CNOS - Autonomous Networks will be formed to lead technological innovation



ITU-T SG2, SG13, SG11, FG-AN

AI enhanced telecom operation and management
AI-assisted 5G network architecture and protocol



ETSI ENI

ENI use cases and requirements, intent-aware network autonomy, Network knowledge management enhanced large models for network OAM



AIOps and AN

E2E AIOps System Functional Architecture, AI Capability Management, Knowledge Center
Large Language Models

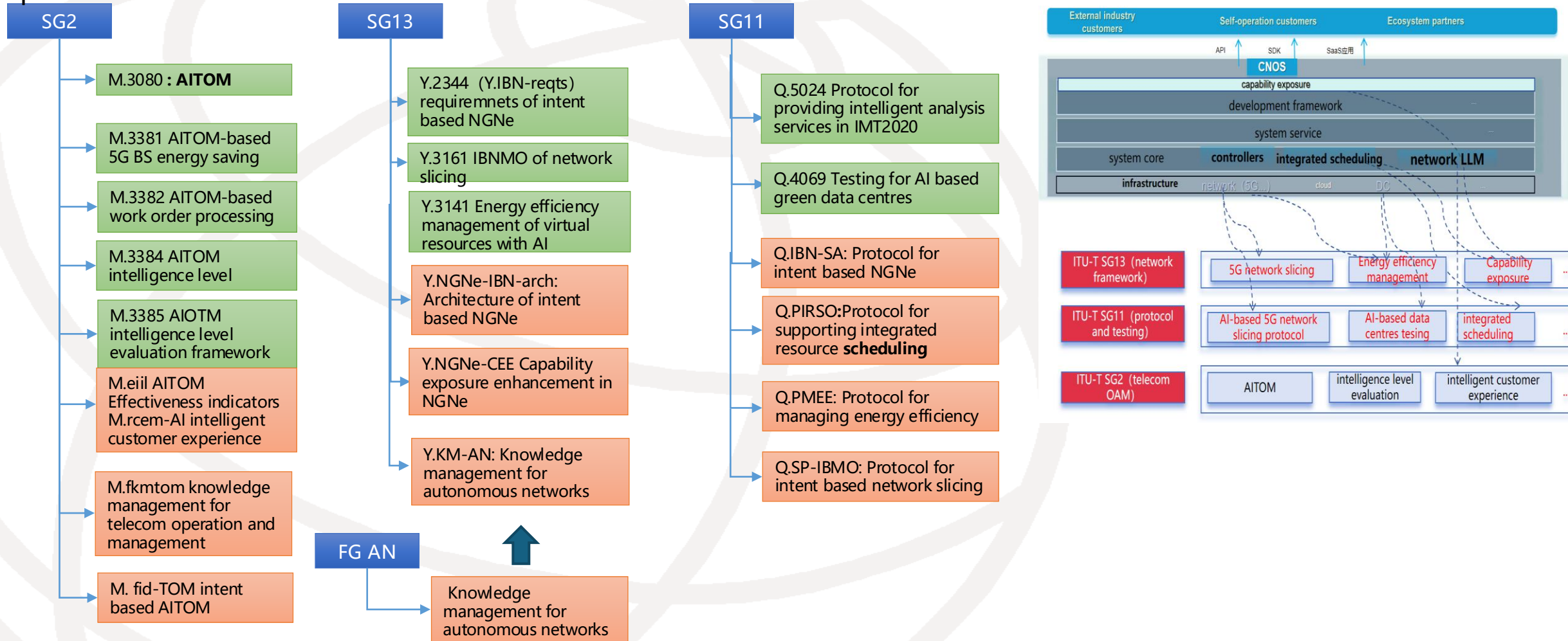


GSMA

AI in Network Use Cases in China, ChinaTelecom:
Network AI Development Strategy and development layout, OpenGateway: will promote MaaS

China Telecom network AI: ITU-T Standardization

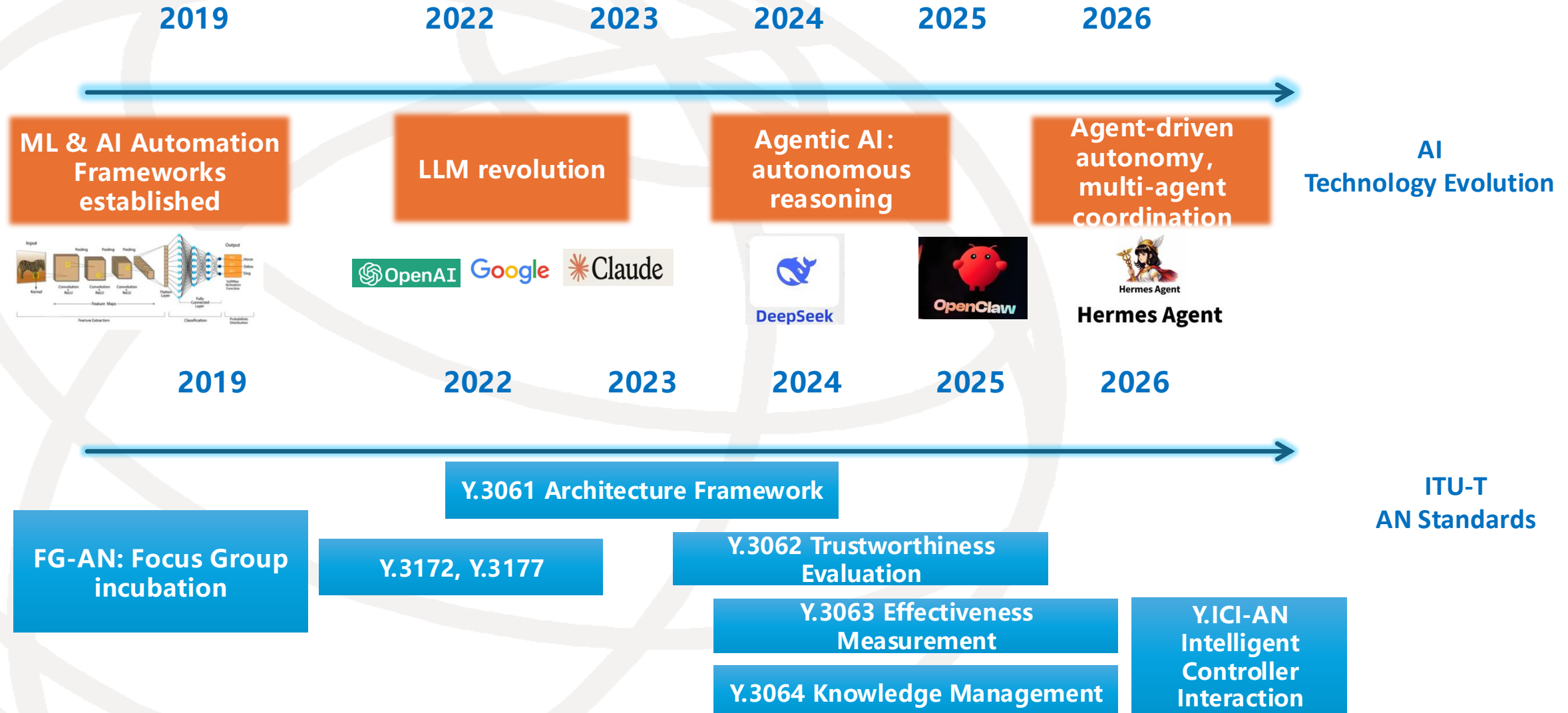
In ITU-T, China Telecom's layout of AN standards from the mandate of each SG, ex, develop AI-related Recommendations focusing on telecom operation and management in SG2, and AI-enabled networks in SG13 as well as protocols in SG11.



AI & Future Networks Standards Portfolio of China Telecom in SG13

AI Agent in Cloud	Y.aiaS-reqts AaaS / AI Agent as a Service (Under development) Y.AMLM-reqts Adaptation of ML Model Requirements (Under development) Y.3531-rev (Under development) Machine learning as a service (Under development) Y.MLaaS-arch Machine Learning as a Service Architecture (Under development)
AI for Network (Network Autonomy & Intelligence)	AN { Y.3061 Architecture Framework (Published 12/2023) Y.3062 Trustworthiness Evaluation (Published 02/2025) Y.3063 Effectiveness Measurement (Published 12/2025) Y.3064 Knowledge Management (Published 12/2025) Y.ICI-AN-reqts Intelligent Controller Interaction (Under development) Y.AINLB-req-fra AI/ML-based network load balancing in future networks (Under development) Y.AIEE-GN AI-based energy efficiency management for green infrastructure (Under development)
Network Agent / AI Agent in Future Networks	YSTR.CTNe Next Generation Network Evolution towards 2030 (Under development) Y.terms-AIAN: Term and definitions of AI Agent in future network
Network for AI (QoS, Semantic Communication)	Suppl. 94 to ITU-T Y.2300-series Network for supporting LLM distributed learning Y.NICE-ANMT NICE for access network to support model training (Under development) Y.Sup.IBN-nsa-fr intent-based network (Under development) YSTR.CTNe Next Generation Network Evolution towards 2030 (Under development) YSTR.SIC-DLT semantic information communication of NGNe (Under development)
Networking for AI Agents	YSTR.NGNe-AC NGNe to support AI agent communication (Under development) YSTR. NAC-roadmap Networking for AI Agent collaboration- standardization status and roadmap (Under development)

ITU-T Autonomous Network Standardization Roadmap: From Architecture to AI-Native Intelligence



Y.3061: Architecture Framework for Autonomous Networks (Dec 2023)

- **Foundation standard** of the ITU-T AN series; defines the overall architecture blueprint
- AN is a network capable of generating, adapting and integrating controllers at run-time
- Three core self-* capabilities:
 - Exploratory Evolution – auto-generate & update controller designs in response to network changes
 - Online Experimentation – continuous runtime monitoring and optimization of deployed controllers
 - Dynamic Adaptation – handle unseen network scenarios with real-time strategy adjustment
- Knowledge is introduced as a first-class architectural component (Knowledge Base Subsystem, KBS)
- Built upon Y.3172 (ML framework) and Y.3177 (AI-based network automation)

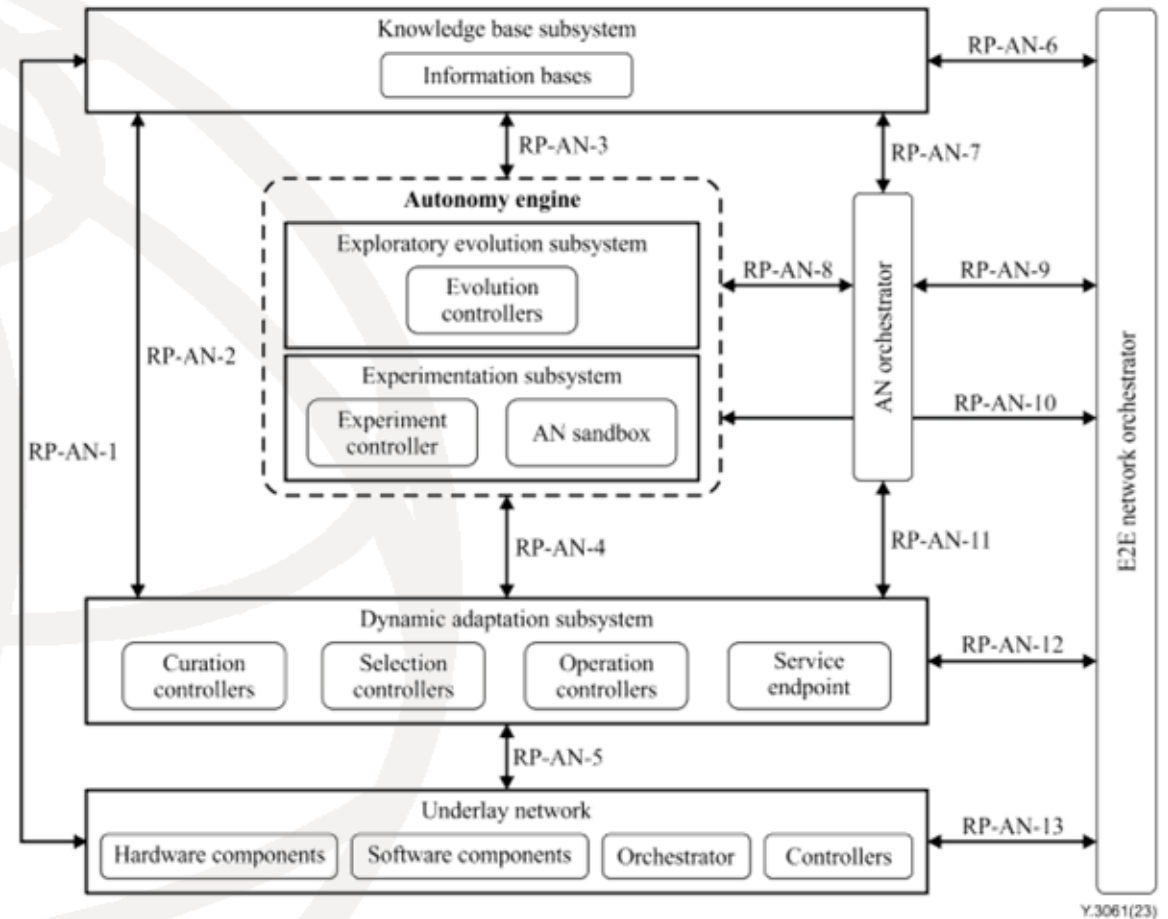


Figure 1 – High-level architecture framework for autonomous networks

Y.3062: Trustworthiness Evaluation for AN (Feb 2025)

- Addresses the trust gap introduced by AI/LLM "black-box" decision-making in networks
- Defines TiAN (Trust in Autonomous Networks): a quantitative scoring framework
- **Six evaluation metrics** based on core principles:
 - Dependability · Resilience · Controllability
 - Predictability · Transparency · Security
- **Five typical evaluation scenarios**: planning / deployment / maintenance / optimization / operation
- Enables operators to **certify and benchmark** the trustworthiness of AN implementations
- Complements Y.3061 by adding **an evaluation layer** on top of the architecture layer

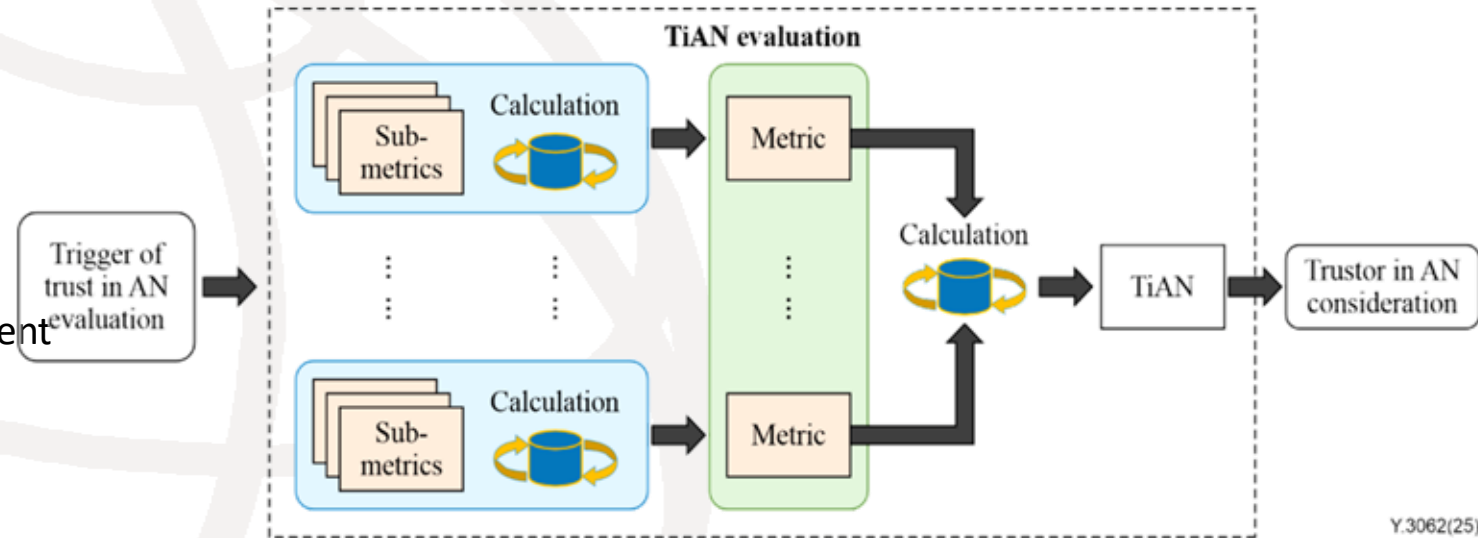


Figure 7-1 (General process of TiAN evaluation)

Y.3063: Measurement of Effectiveness of AN (Dec 2025)

What does it measure?

- Quantifies the **value delivered** by introducing autonomous capabilities into networks
- **Six categories of Effectiveness Indicators (Annex A):**
 - Service Delivery · Network Quality
 - Deployment Efficiency · Automation Improvement
 - Energy Saving · Resource Utilization

Why it matters?

- Provides **a standardized language** for operators to report AN ROI to regulators and partners
- Enables tracking of **AN Level progression (L1→L5)** through measurable KPIs
- *Example: China Telecom's AI-driven BS energy saving of **7 billion kWh/year** can now be reported using this standard framework*

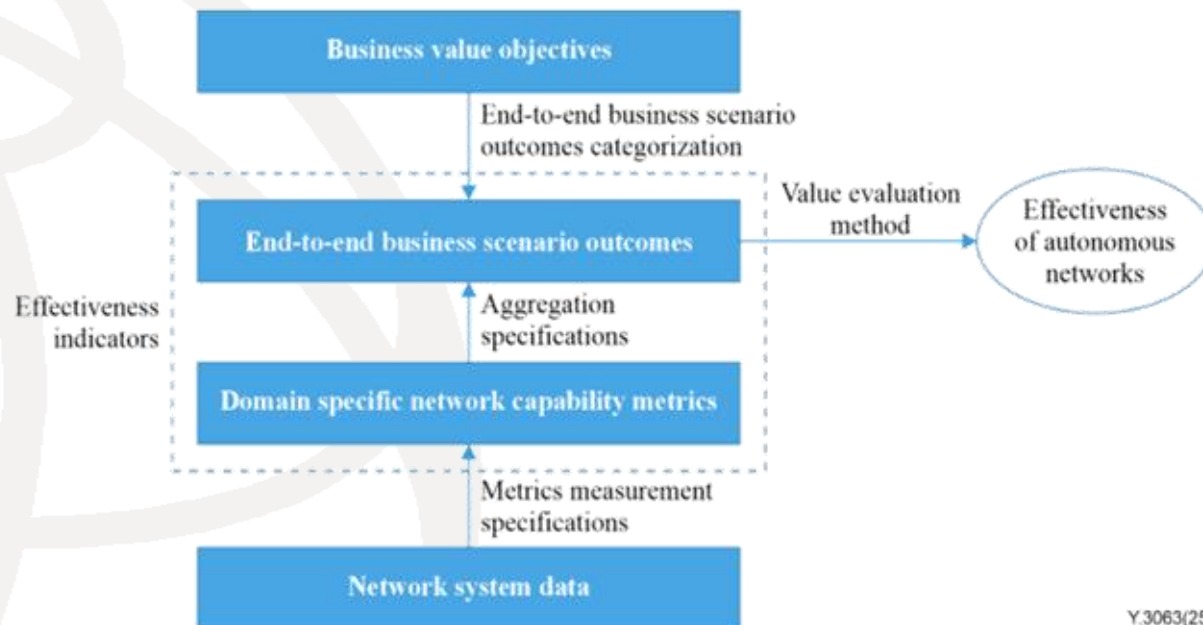
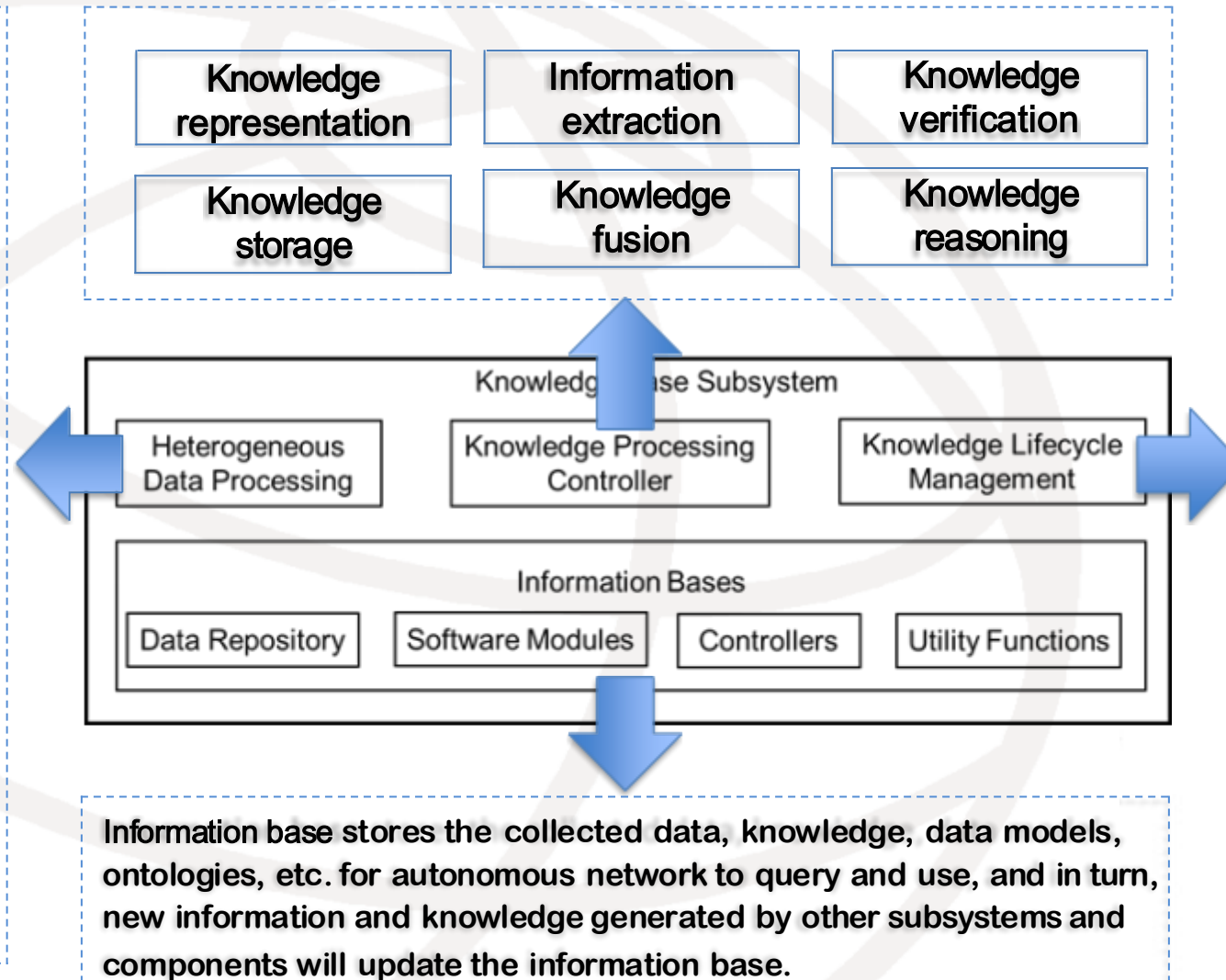


Figure 1 – Framework for measurement of effectiveness of autonomous networks

Y.3064: Knowledge Management for AN (Dec 2025)

- The multi-source and heterogeneous data cannot be directly used for subsequent analysis, reasoning, and decision-making.
- The data processing functionality pre-processes the data collected by the autonomous network (Data cleansing, data filtering, etc.) and converts to a unified format, and sends the processed available data to the knowledge processing agent.



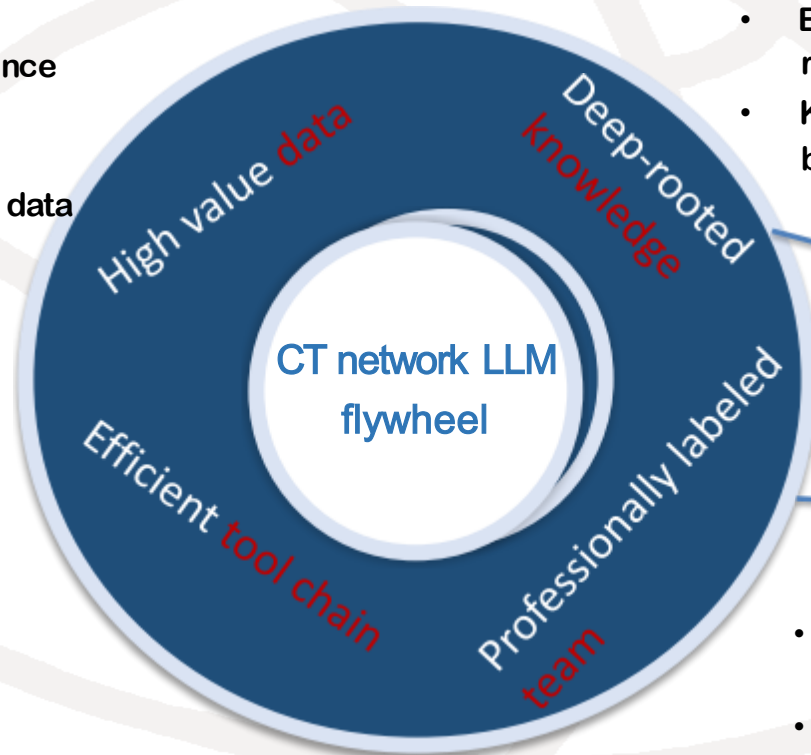
- This document will define the different states of the knowledge lifecycle and how to transform from one state to another. Knowledge lifecycle states may include: creation, activation, deactivation, termination, etc.

Y.3064: Knowledge Management for AN (Dec 2025)

Data flywheel fully revitalizes the value of knowledge

- Cloud network work order
- Alarm logs
- Expert experience knowledge
- Typical operation and maintenance cases
- Structured network data
- Unstructured service operation data

- Data cleaning and quality assessment tools
- Information extraction and data enhancement tools
- Data annotation tools, safety detection tools
- Knowledge processing tools, corpus quality testing tools

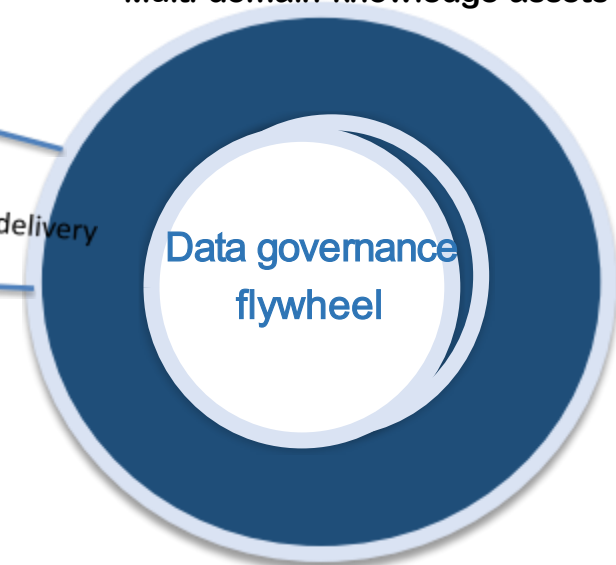


- Network operation plan and rules, expert experience
- Enterprise professional cases, reports, standards
- Knowledge graph + Knowledge base dual base

LLM feed data governance

Efficient generation and continuous delivery of high-value model training corpus

Network digital twin data analysis
Multi-domain knowledge assets



- Operation and maintenance personnel
- Data analyst
- AI engineer

Y.ICI-AN: Intelligent Controller Interaction for AN (Under Development)

The problem it solves:

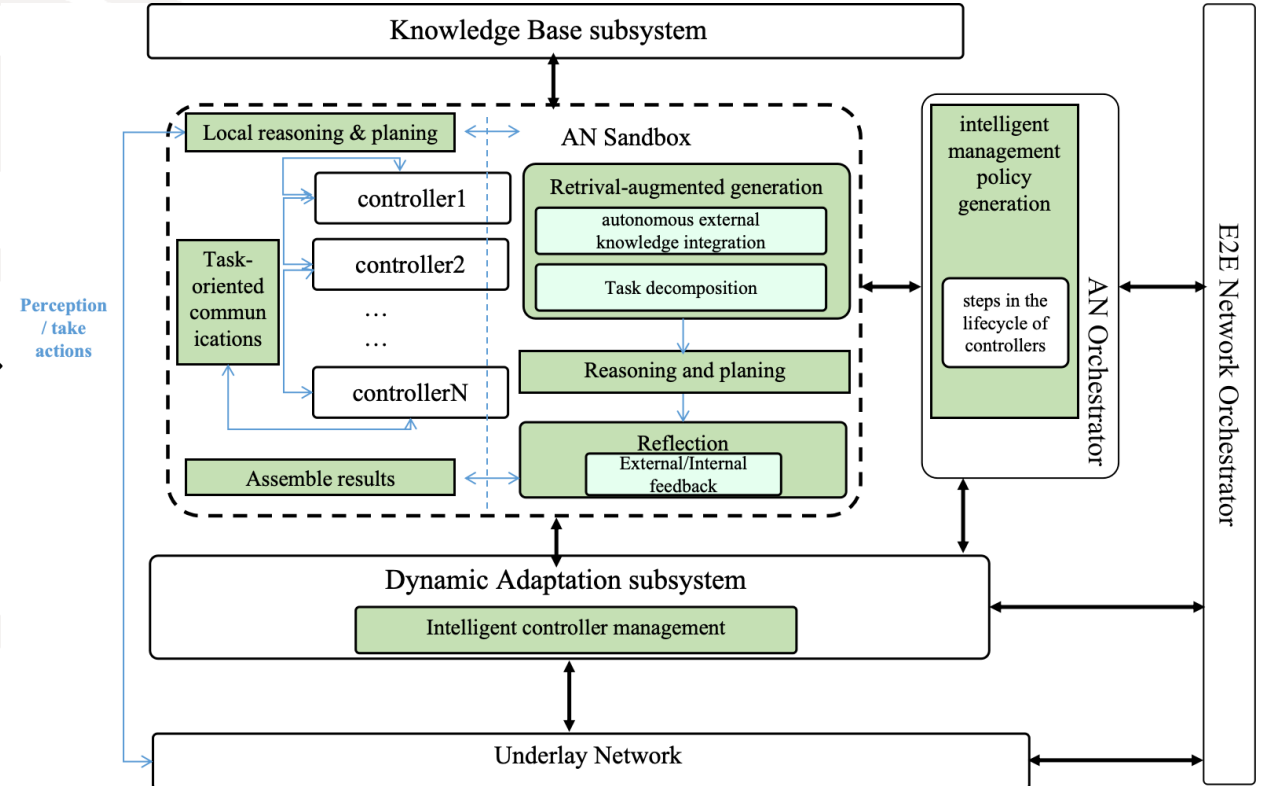
- Traditional inter-controller interaction relies on predefined rules and static ML models, unable to adapt to rapidly changing or unseen network scenarios

Scope:

- Framework of intelligent controller interaction for future networks incl. IMT-2020
- Requirements across the controller lifecycle: design → test → deploy → operate → evolve

Six requirement categories:

1. Controller lifecycle management
2. Lifecycle policy generation
3. Task-oriented controller communication
4. Autonomous external knowledge integration
5. Real-time intelligent interaction
6. Scalability & flexibility



- Source: Draft ITU-T Y.ICI-AN-reqts, TD-WP1-0148 (under development)

The shift: Rule-based → LLM/Agent-driven dynamic controller strategies and collaboration

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Thanks for listening!

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