Recommendation

ITU-T M.3385 (04/2023)

SERIES M: Telecommunication management, including TMN and network maintenance

Telecommunications management network

Intelligence levels evaluation framework of artificial intelligence enhanced telecom operation and management

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Recommendation ITU-T M.3385

Intelligence levels evaluation framework of artificial intelligence enhanced telecom operation and management

Summary

Recommendation ITU-T M.3385 provides a detailed evaluation framework, evaluation rating method and automatic evaluating process for intelligence levels of systems which follow the framework of artificial intelligence enhanced telecom operation and management (AITOM).

This Recommendation is included in the series of Recommendations about intelligence levels of artificial intelligence enhanced telecom operation and management (IL-AITOM).

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FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

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Intelligence levels evaluation framework of artificial intelligence enhanced telecom operation and management

1   Scope

This Recommendation is included in the series of Recommendations about intelligence levels of artificial intelligence enhanced telecom operation and management (IL-AITOM). [ITU-T M.3384] provides principles of IL-AITOM including the definition, classification rules, evaluated objects and the general evaluation implementation architecture of IL-AITOM. Based on [ITU-T M.3384], this Recommendation provides a detailed evaluation framework, evaluation rating method and automatic evaluating process for intelligence levels of systems which follow the framework of artificial intelligence enhanced telecom operation and management (AITOM) presented in [ITU-T M.3080]. This Recommendation is used to guide the evaluation implementation of IL-AITOM and is helpful in discerning the telecom operation and management weak points for improvement.

The scope of this Recommendation comprises:

–   Overall evaluation framework of IL-AITOM and detailed definitions;

–   Evaluation rating method of IL-AITOM;

–   Automatic evaluating process of IL-AITOM.

2   References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T M.3080]   Recommendation ITU-T M.3080 (2021), *Framework of artificial intelligence enhanced telecom operation and management (AITOM)*.

[ITU-T M.3384]   Recommendation ITU-T M.3384 (2023), *Intelligence levels of artificial intelligence enhanced telecom operation and management*.

3   Definitions

3.1   Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1   artificial intelligence (AI) [b-ITU-T F.749.13]: An interdisciplinary field, usually regarded as a branch of computer science, dealing with models and systems for the performance of functions generally associated with human intelligence, such as reasoning and learning.

3.1.2   operation stage [ITU-T M.3384]: General subsets for processes of telecom operation and management.

3.2   Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AHP   Analytic Hierarchy Process

AI   Artificial Intelligence

AITOM   AI enhanced Telecom Operation and Management

IL-AITOM   Intelligence Levels of AI enhanced Telecom Operation and Management

IMT   International Mobile Telecommunication

QoS   Quality of Service

SLA   Service Level Agreement

SOMM   Smart Operation Maintenance and Management

5 Conventions

In this Recommendation:

The keywords "is required to" indicate a requirement which must be strictly followed and from which no deviation is permitted, if conformance to this Recommendation is to be claimed.

The keywords "is recommended to" indicate a requirement which is recommended but which is not absolutely required. Thus, this requirement need not be present to claim conformance.

6 Background

Research is ongoing in standards development organizations (SDOs) on methods for intelligence levels evaluation in artificial intelligence enhanced telecom operation and management (AITOM). Currently [b-3GPP TS 28.100] studying intelligence level evaluation of IMT-2020 network is in progress. [b-ITU-T Y.3173] containing a framework for evaluating the intelligence levels of future networks is proposed. [b-TM Forum IG1252] describes the autonomous networks level methodology. The above studies are mainly focused on certain network fields. This Recommendation however specifies a detailed evaluation framework and evaluation rating method focusing on intelligence levels of AI enhanced telecom operation and management (IL-AITOM). Due to the numerous parameters in the method, the automatic evaluating process for IL-AITOM is further proposed to realise automatic evaluation and so improve evaluating efficiency.

7 Evaluation framework of IL-AITOM

7.1 Overview

The evaluation framework of IL-AITOM is proposed in Figure 7-1 and includes six parts:

–   Classification on the intelligence level of AITOM defined five generic levels ranging from Level 1 to Level 5.

–   The selection model of an evaluated object gives a three-dimensional model that considers the operation stage, system granularity, and service to identify an evaluated object.

–   Evaluation dimensions including intent mapping, data collection, analysis, decision and action implementation create a complete closed-loop from the requirement to the realization in operation and management activities.

–   Evaluation sub-dimensions are further fine-grained divisions of evaluation dimensions as a guide to break down the evaluation task.

–   Evaluation tasks are minimum evaluated units for an evaluated object.

– Evaluation rating gives the convergence calculation process from scores of evaluation tasks to the intelligence level of an evaluated object.
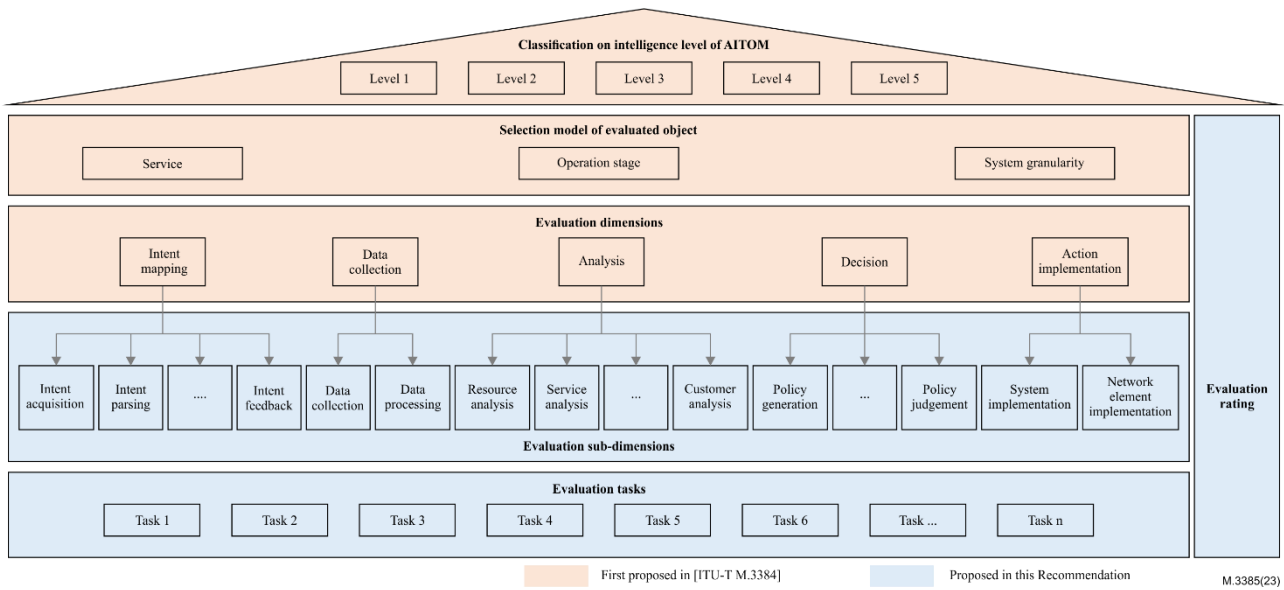

Figure 7-1 – Evaluation framework of IL-AITOM

7.2 Evaluated object

Referred to [ITU-T M.3384], the evaluated object of IL-AITOM is identified with three features namely: service, operation stage and system granularity. To refine evaluation granularity, the operation stages including planning and construction, operations readiness and support, fulfilment, assurance, billing and revenue are further expanded into multiple operation sub-stages.

a) Planning and construction includes but is not limited to the following sub-stages:

   i) Requirements assessment: the activities in this operation sub-stage are to understand, forecast and analyse cloud or network requirements.

   ii) Installation and deployment: the activities in this operation sub-stage are to import cloud or network design and complete deployment.

   iii) Configuration and test: the activities in this operation sub-stage are to complete cloud or network configuration, service test, etc.

b) Operations readiness and support includes but is not limited to the following sub-stages:

   i) Process support: the activities in this operation sub-stage are to design a process for other operation stages.

   ii) Staff support: the activities in this operation sub-stage are to manage staff assignments for other operation stages.

c) Fulfilment includes but is not limited to the following sub-stages:

   i) Service ordering: the activities in this operation sub-stage are to select customer services and place orders through different channels.

   ii) Service provision: the activities in this operation sub-stage are to complete automatic service configuration, activation and testing on completion.

d) Assurance includes but is not limited to the following sub-stages:

   i) Troubleshooting: the activities in this operation sub-stage are to implement monitoring, diagnosis and analysis of network and service faults, deal with complaints, generate fault recovery solutions, etc.

ii) Quality optimization: the activities in this operation sub-stage are to implement monitoring of customer experience quality, service quality and network performance, analyse the deterioration issues, generate optimization solutions, etc.

iii) Cutover maintenance: the activities in this operation sub-stage are to implement cutover, upgrade and maintenance operations for network equipment, pipeline resources or services.

iv) Daily inspection: the activities in this operation sub-stage are to implement patrolling, and find and eliminate hidden trouble in a timely manner.

e) Billing and revenue include but are not limited to the following sub-stages:

i) Bill management: the activities in this operation sub-stage are to manage the bill process, manage the lifecycle of bills, and perform bill trend analysis.

ii) Payment management: the activities in this operation sub-stage are to manage methods to make payments, manage payment plans, handle payments, and collect debt.

7.3 Evaluation dimensions

The five evaluation dimensions given in [ITU-T M.3384] create a complete closed-loop from the requirement to the realization, covering intent mapping, data collection, analysis, decision, and action implementation.

7.4 Evaluation sub-dimensions

Based on actual operation conditions, evaluation dimensions are recommended to be broken down into multiple sub-dimensions. An overview of evaluation dimensions and sub-dimensions is presented in Table 7-1.

Table 7-1 – Evaluation dimensions and sub-dimensions

Evaluation dimensions	Evaluation sub-dimensions	Description
Intent mapping	Intent acquisition	Obtain different sources, types and forms of intent
	Intent parsing	Parse the intent, get the parameters of the specific requirements
	Intent scheduling	Carry out the process scheduling according to intent
	Intent feedback	Feedback the results of the intent execution
Data collection	Data collection	Collect the corresponding data from the network side and system side
	Data processing	Simply process the collected data and verify necessary data
Analysis	Resource analysis	Perform the resource analysis according to the intent, such as verification and analysis of port resources, IP resources, bandwidth resources, etc.
	Service analysis	Perform end-to-end or segmented service analysis, such as service quality analysis, routing analysis, etc.
	Fault analysis	Perform fault analysis including root cause analysis, fault delimitation analysis, potential risk prediction analysis, etc.
	Customer analysis	Perform analysis on customer perception
Decision	Policy generation	Generate policy to meet the intent
	Policy verification	Verify the feasibility and effectiveness of the generated policy through simulations

Table 7-1 – Evaluation dimensions and sub-dimensions

Evaluation dimensions	Evaluation sub-dimensions	Description
	Policy judgment	Judge whether to immediately execute the policy
Action implementation	Network element implementation	Execute the policy by network element system
	Operation system implementation	Execute the policy by operation system

7.5 Evaluation tasks

Each evaluation task as a minimum evaluation unit is recommended to cover the following 6 attributions:

– Service.

– Operation sub-stage.

– Evaluation dimension.

– Evaluation sub-dimension.

– Task descriptions which indispensably interpret the operational activity.

– System.

Based on the above attributions, each evaluation task is defined atomically and distinctly. The principles for determining whole evaluation tasks are required to follow:

– Independence: The granularity of each evaluation task is consistent and there is no repetition or intersection. All the evaluation tasks are independent and unique.

– Completeness: The evaluation tasks are required to cover all activities in the operation and management process.

8 Evaluation rating method of IL-AITOM

8.1 Criteria of evaluation task evaluation

Referring to classification on intelligence levels of AITOM, the evaluation score of each evaluation task is required to range from 1 to 5. The detailed criteria used to classify the five levels are recommended to consider the AI applications provided by an AI engine:

– To score 1: Operations are implemented manually and off-line based on existed templates or experience, the AITOM-followed system assists in recording the results.

– To score 2: The AITOM-followed system automatically implements operations based on the statically programmed rules.

– To score 3: The AITOM-followed system automatically implements operations based on the dynamically configurable policies.

– To score 4: The AITOM-followed system automatically implements operations based on flexibly intelligent policies that are assisted by AI engine.

– To score 5: The AITOM-followed system automatically implements operations based on self-evolution policies that are generated and iterated autonomously by AI engine.

8.2 Evaluation rating method of evaluated object

As evaluation dimensions, evaluation sub-dimensions and evaluation tasks have different levels of difficulty, importance and some potential factors, weight distribution is recommended to be taken into consideration. According to the evaluation criteria and weight, it takes the weighted summation to get aggregation results of evaluation tasks and this rating method is shown in Figure 8-1.
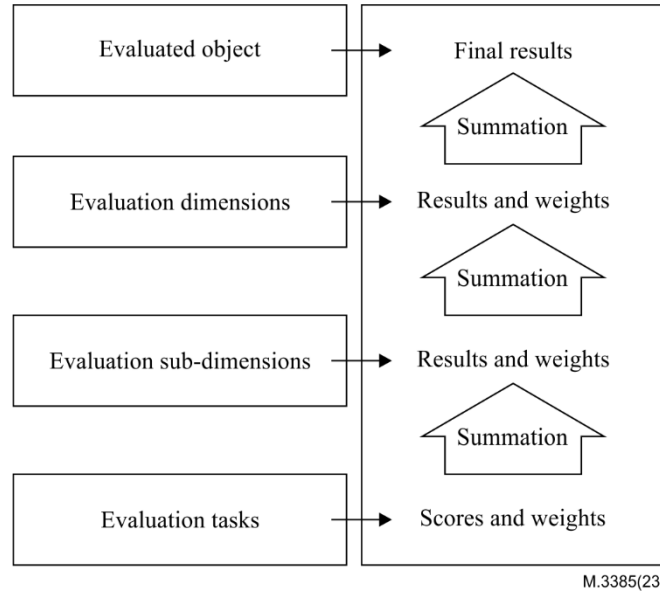

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Figure 8-1 – Evaluation rating method of evaluated object

The calculation method is described in Equation 8-1.

$$L_o = \sum_{k=1}^{n} d_k \sum_{j=1}^{k,m} s_{k,j} \sum_{i=1}^{j,q} t_{j,i} S_i \tag{8-1}$$

Where:

L_o Intelligence level of evaluated object

d_k Weight of k_{th} evaluation dimension, n denotes the number of evaluation dimensions

$s_{k,j}$ Weight of j_{th} evaluation sub-dimension of k_{th} evaluation dimension, m denotes the number of evaluation sub-dimensions

$t_{j,i}$ Weight of i_{th} evaluation task of j_{th} evaluation sub-dimension, q denotes the number of evaluation tasks

S_i The score of i_{th} evaluation task

$\sum$ Weighted summation notation.

Finally, the overall evaluation rating method of IL-AITOM is presented in Figure 8-2, which includes the following 4 steps:

i)   Identify the evaluated object with three features including service, operation stage and system granularity.

ii)   Determine evaluation dimensions, evaluation sub-dimensions, evaluation tasks and the weight of each.

iii)   Access the scores of all evaluation tasks based on evaluation criteria.

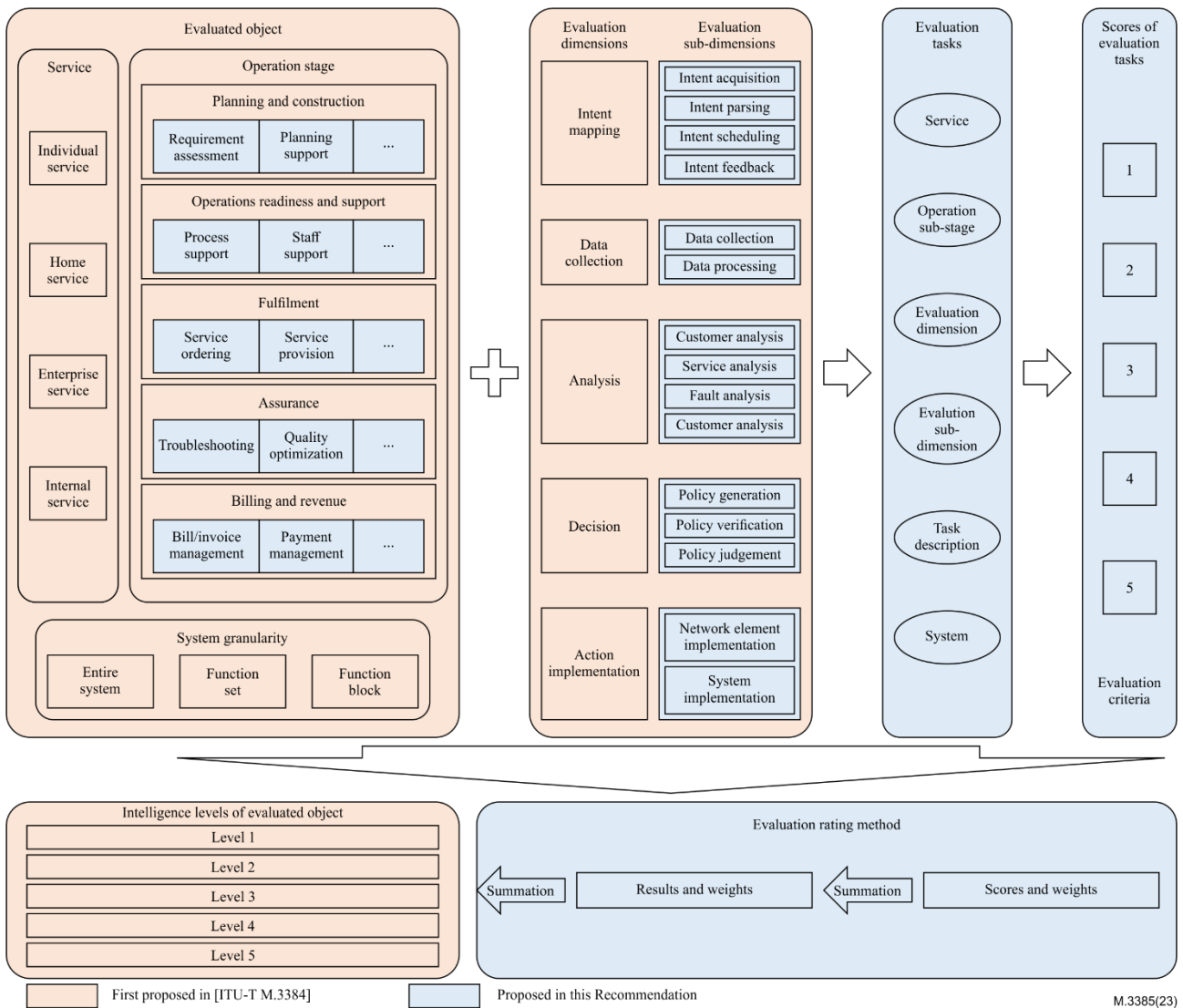iv)   Aggregate the overall evaluation results according to the scores of evaluation tasks and weights.

Figure 8-2 – Evaluation rating method of IL-AITOM

9 Automatic evaluating process of IL-AITOM

The automatic evaluating process comprises necessary orderly activities to implement automatic evaluating consisting of evaluation requirement input, evaluation session creation, evaluation session management, evaluation results management and evaluation report generation. These activities of the automatic evaluating process are shown in Figure 9-1.

– Evaluation requirement input is responsible for importing evaluation requirements from an external system and identifying the evaluated object. The requirements can be in any form such as natural language or configuration files.

– Evaluation session creation is responsible for determining evaluation dimensions, evaluation sub-dimensions, evaluation tasks and the weight of each based on the results of the evaluation requirement input block and subsequently creating a session.

– Evaluation session management is responsible for the monitors distribution, session life circle management, session suspend and session termination.

The monitors are distributed to AITOM-followed systems in line with the evaluated tasks.

– Evaluation result management is responsible for the evaluation data collection, processing, analysis and evaluation results calculation. The multiple and numerous data is collected

from monitors and evaluation results are then calculated based on the evaluation rating method.

– Evaluation report generation is responsible for generating a visualized evaluation report to users which involves evaluated objects, evaluation dimensions, evaluation sub-dimensions, evaluation tasks, evaluation time and place, evaluation rating method and evaluation results.
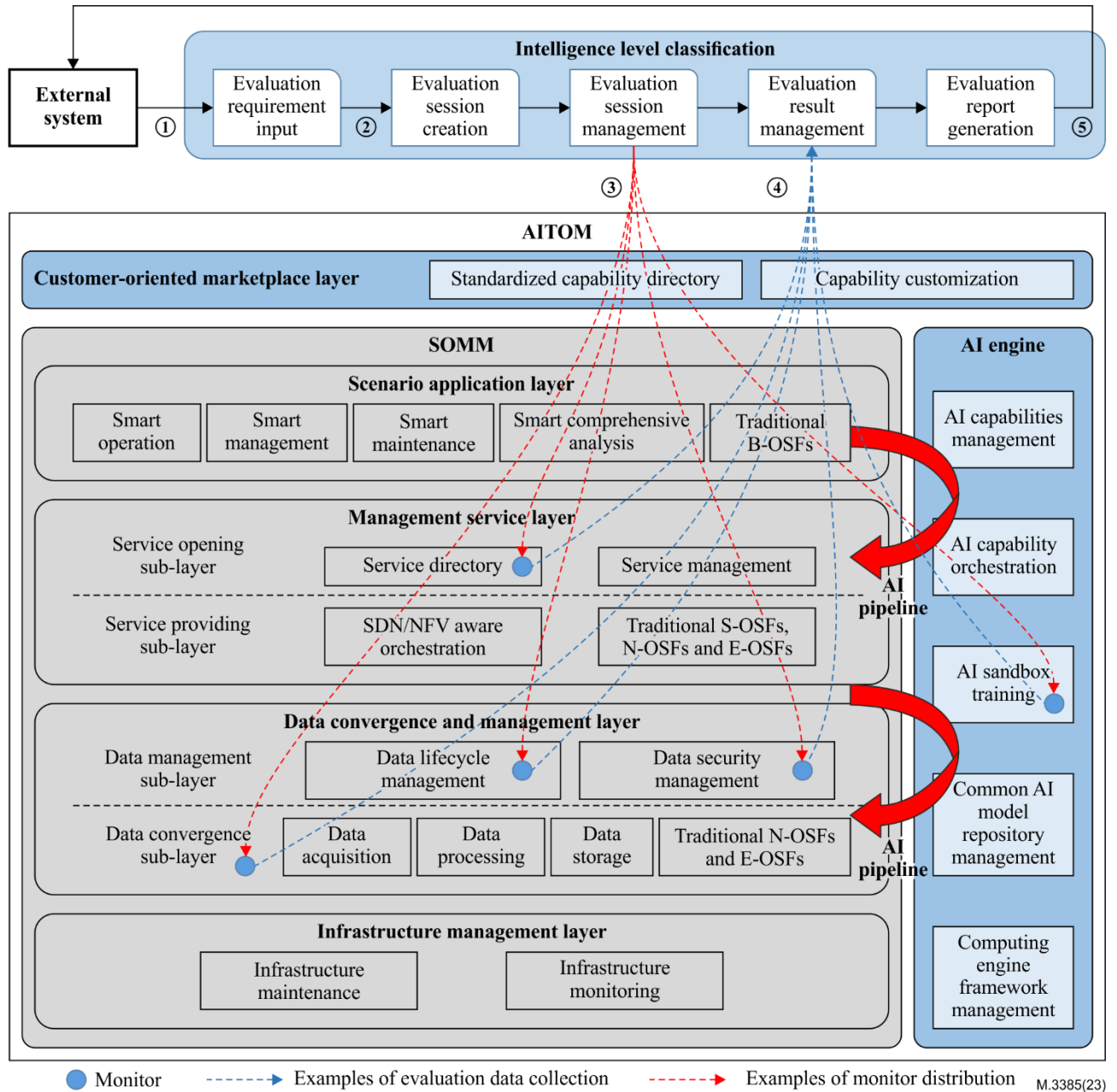

Figure 9-1 – Automatic evaluating process of IL-AITOM

Appendix I

An evaluation use case of intelligence levels about quality assurance capability for IMT-2020 and beyond network operation and management system

(This appendix does not form an integral part of this Recommendation.)

Title	**Evaluation of intelligence levels about quality assurance capability for IMT-2020 and beyond network operation and management system**
Description	Scenario: quality assurance is a typical application of AITOM framework [ITU-T M.3080]. The AITOM-followed IMT-2020 and beyond network operation and management system supports the quality assurance for enterprise services. AI-based quality assurance technologies are applied in the assurance stage to ensure that services delivered to customers are continuously available and performing to service level agreement (SLA) or QoS performance levels.
Evaluation rating method	Referring to the evaluation rating method provided in clause 8.2, the final intelligence level of quality assurance for IMT-2020 and beyond network operation and management system is the weighted summation for all evaluation dimensions. The conducted evaluation method for quality assurance for IMT-2020 and beyond network operation and management system is shown as:

Title	**Evaluation of intelligence levels about quality assurance capability for IMT-2020 and beyond network operation and management system**
	Start **Identify the evaluated object:** Entire system at operation stage which provide service for quality assurance **Determine dimensions, sub-dimensions and evaluation tasks:** Decomposing the evaluation at different levels **Determine weights:** 1) Compare the comparative importance to form the judgement matrix at evaluation task level, sub-dimension level, and dimension level, respectively **Determine weights:** 2) construct weights at evaluation task level, sub-dimension level and dimension level, respectively **Determine weights:** 3) Matrix is consistent Adjust the judgement matrix Yes **Access intelligence level for evaluation tasks** Identify the score for all quality assurance evaluation tasks based on evaluation criteria **Aggregate intelligence level of evaluated object** Aggregate final results of evaluated entire system based on determined weights and evaluation task scores End M.3385(23)
Evaluated object	The AITOM-followed entire system of quality assurance for IMT-2020 and beyond network operation and management system includes related function sets of customer-oriented marketplace layer, smart operation maintenance and management (SOMM) comprising scenarios application layer, management service layer, data convergence and management layer and infrastructure management layer, and AI engine. The evaluated object for IL-AITOM consists of: Service: service for IMT-2020 and beyond network operation and management quality assurance Operation stage: assurance – troubleshooting System granularity: entire system

Title	Evaluation of intelligence levels about quality assurance capability for IMT-2020 and beyond network operation and management system
Determine evaluation dimensions, evaluation sub-dimensions and evaluation tasks	The entire system aims to provide accurate perception of quality assurance, at the same time to improve system efficiency. The evaluation covering the process of monitoring and analysis various indicators of system operation, such as system scale, business logic, connectivity performance and frequency, so that the potential operation problems can be found and handled in a timely manner. The determined evaluation dimensions and evaluation sub-dimensions are provided in Table 7-1 in clause 7.3. The determined evaluation tasks are shown in Column "Evaluation task" of Table I.1.
Determine weights	The weights determination in this use case is based on the analytic hierarchy process (AHP) [b-Saaty]. For genericity, "factor" is used to represent different elements in each evaluation hierarchy level, i.e., dimension level, sub-dimension level and evaluation task level. For each level, the comparative importance for factor i and factor j is noted as a_{ij}, then the judgement matrix A is $$A(a_{ij})_{n \times n} = \begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{pmatrix}$$ where n is the number of factors. Taking geometrically average for the row vectors of matrix A, after normalisation, the weight w_i of factor i and eigenvector W can be obtained as $$w_i = \overline{W}_i \Big/ \sum_{i=1}^{n} \overline{W}_i, W = \begin{Bmatrix} w_1 \\ w_2 \\ \vdots \\ w_n \end{Bmatrix}$$ To test the consistency of the judgement matrix, first calculate the max feature root $\lambda\max$ as $$\lambda\max = \frac{1}{n} \sum_{i=1}^{n} \frac{(AW)_i}{w_i}$$ then, the consistency index (CI) is: $$CI = \frac{\lambda\max - n}{n - 1}$$ The Consistency Ratio (CR) is $$CR = \frac{CI}{RI}$$ where the statistical Random Index (RI) can be found in [b-Saaty]. If $CR < 0.1$, the consistency of matrix is satisfied, otherwise, the matrix needs to be adjusted. The calculated weights for each dimension, sub-dimension and evaluation task are shown in Table I.2.
Scores of evaluation tasks	Based on clause 8.1, the scores for evaluation tasks are shown in Table I.2.
Intelligence levels of evaluated object	Based on Equation (8-1) provided in clause 8.2, then intelligence level of evaluated object is calculated based on weights, scores of evaluation tasks in Table I.2.

Table I.1 – Evaluation tasks

Evaluation task	Service	Operation sub-stage	Evaluation dimension	Evaluation sub-dimension	System	Task description
Task 1: Collection of intent based on customer side requirements	IMT-2020 and beyond network operation and management quality assurance	assurance – troubleshooting	Intent mapping	Intent acquisition	IMT-2020 and beyond network operation and management system	The enterprises can provide various services, such as Vehicle to everything assisted driving services, live video streaming services, cloud gaming services with IMT-2020 and beyond networks. The collected intent from the enterprise side can be expected system operation status, including requirements, objectives or limitations of the system.
Task 2: Based on collected intent information to extract network operation parameters or service performance indicators to ensure the service quality	IMT-2020 and beyond network operation and management quality assurance	assurance – troubleshooting	Intent mapping	Intent parsing	IMT-2020 and beyond network operation and management system	To fulfil services requirements, the network operation and management system should support low latency, high-definition video backhauling, super uplink rate, etc. The operation parameters and service performance indicators are extracted based on manual defined parsing policies, such as regular expression parsing, key-value parsing, separator parsing and so on.
Task 3: Intent scheduling management to fulfil different scenario requirements	IMT-2020 and beyond network operation and management quality assurance	assurance – troubleshooting	Intent mapping	Intent scheduling	IMT-2020 and beyond network operation and management system	Based on priority of intents in different scenario, network conditions, taking system operation status into account, intents can be scheduled to perform intent management.
Task 4: Performance feedback related with intent objectives, system/network performance and user experience	IMT-2020 and beyond network operation and management quality assurance	assurance – troubleshooting	Intent mapping	Intent feedback	IMT-2020 and beyond network operation and management system	Based on monitored network operation and management performance, feedback is provided in terms of intent scheduling impact/achievements, such as coverage of system operation, network feature data, business feature data, monitored KPIs and so on.

Table I.1 – Evaluation tasks

Evaluation task	Service	Operation sub-stage	Evaluation dimension	Evaluation sub-dimension	System	Task description
Task 5: System operation data collection	IMT-2020 and beyond network operation and management quality assurance	assurance – troubleshooting	Data collection	Data collection	IMT-2020 and beyond network operation and management system	System operation and management data can be collected from various sources, including network side, business side and system side. The standard data collection methods can be formalised based on data features such as data volume, data format, generation frequency and so on.
Task 6: Data cleaning, data storage, data correlation and so on	IMT-2020 and beyond network operation and management quality assurance	assurance – troubleshooting	Data collection	Data processing	IMT-2020 and beyond network operation and management system	Data pre-processing, data storage, and data association between network element alarms, network element performance alarms, service performance, and services linkage with network element performance alarms.
Task 7: Resource analysis, such as verification and analysis of port resources, IP resources, bandwidth resources, etc	IMT-2020 and beyond network operation and management quality assurance	assurance – troubleshooting	Analysis	Resource analysis	IMT-2020 and beyond network operation and management system	Analysis for monitoring data of core network, wireless access network, other resources and their performance data, and alarm data. Analysis results including the resource utilization rate, abnormal information and so on. Resource analysis type including offline resource analysis, near real-time resource analysis, history resource usage analysis, energy saving analysis and so on.
Task 8: End-to-end service analysis, such as service quality analysis, routing analysis, etc	IMT-2020 and beyond network operation and management quality assurance	assurance – troubleshooting	Analysis	Service analysis	IMT-2020 and beyond network operation and management system	Service analysis based on terminal data, user signalling data, connection quality data and end-to-end business assurance data.
Task 9: Fault analysis for system operation	IMT-2020 and beyond network	assurance – troubleshooting	Analysis	Fault analysis	IMT-2020 and beyond network operation and	Discovery of failures that have occurred at network device/performance based on data such as alarms, performance, and configuration. Fault analysis including

Table I.1 – Evaluation tasks

Evaluation task	Service	Operation sub-stage	Evaluation dimension	Evaluation sub-dimension	System	Task description
	operation and management quality assurance				management system	root cause analysis (e.g., coverage, interference, capacity, equipment, etc.), fault delimitation analysis, potential risk prediction analysis, etc.
Task 10: Customer perception analysis	IMT-2020 and beyond network operation and management quality assurance	assurance – troubleshooting	Analysis	Customer analysis	IMT-2020 and beyond network operation and management system	Evaluation and analysis for user perception in terms of service quality, connection quality, business satisfaction and so on.
Task 11: Policy generation for operation troubleshooting	IMT-2020 and beyond network operation and management quality assurance	assurance – troubleshooting	Decision	Policy generation	IMT-2020 and beyond network operation and management system	Generate operation troubleshooting policies (e.g., network configuration parameter adjustment, hardware restart, software re-boot/fall-back/upgrade, etc.) and required related actions (e.g., point-of-failure isolation scheme, etc.)
Task 12: Verify the feasibility and effectiveness of the generated policy through simulations	IMT-2020 and beyond network operation and management quality assurance	assurance – troubleshooting	Decision	Policy verification	IMT-2020 and beyond network operation and management system	Execute potential troubleshooting rulesets in a sandbox environment to simulate impact of the potential troubleshooting policies and actions.
Task 13: Decision for policy execution	IMT-2020 and beyond network operation and management quality assurance	assurance – troubleshooting	Decision	Policy judgment	IMT-2020 and beyond network operation and management system	Provide recommendations on troubleshooting policy selection based on sandbox simulation results.

Table I.1 – Evaluation tasks

Evaluation task	Service	Operation sub-stage	Evaluation dimension	Evaluation sub-dimension	System	Task description
Task 14: Execute the policy by network element	IMT-2020 and beyond network operation and management quality assurance	assurance – troubleshooting	Action implementa-tion	Network element implementation	IMT-2020 and beyond network operation and management system	Execute selected troubleshooting policy at one or more network elements.
Task 15: Execute the policy by system	IMT-2020 and beyond network operation and management quality assurance	assurance – troubleshooting	Action implementation	System implementation	IMT-2020 and beyond network operation and management system	Execute the selected troubleshooting policy at system.

Table I.2 – Weights and evaluation results

Evaluation task			Evaluation sub-dimension			Evaluation dimension			Evaluation object
Name	**Weight under sub-dimension**	**Score**	**Name**	**Weight under dimension**	**Result**	**Name**	**Weight**	**Result**	**Result**
Task 1: Collection of intent based on customer side requirements	1	Based on the criteria of clause 8.1, the score of this evaluation task is 3.	Intent acquisition	0.39	3*0.39*1 =1.17	Intent mapping	0.10	(1.17 + 0.60 + 0.42 + 0.30) * 0.10 = 0.249	0.249 + 1.04 + 1.728 + 0.2849 + 0.17 = 3.4719
Task 2: Based on collected intent information to extract network operation parameters or service performance indicators to ensure the service quality	1	Based on the criteria of clause 8.1, the score of this evaluation task is 2.	Intent parsing	0.30	2*0.30*1 =0.60				
Task 3: Intent scheduling management to fulfil different scenario requirements	1	Based on the criteria of clause 8.1, the score of this evaluation task is 2.	Intent scheduling	0.21	2*0.21*1 =0.42				
Task 4: Performance feedback related with intent objectives, system/network performance and user experience	1	Based on the criteria of clause 8.1, the score of this evaluation task is 3.	Intent feedback	0.10	3*0.10*1 =0.30				

Table I.2 – Weights and evaluation results

Evaluation task			Evaluation sub-dimension			Evaluation dimension			Evaluation object
Name	**Weight under sub-dimension**	**Score**	**Name**	**Weight under dimension**	**Result**	**Name**	**Weight**	**Result**	**Result**
Task 5: System operation data collection	1	Based on the criteria of clause 8.1, the score of this task is 4.	Data collection	0.5	4*0.5*1= 2	Data collection	Weight: 0.26	(2+2)* 0.26 =1.04	
Task 6: Data cleaning, data storage, data correlation and so on.	1	Based on the criteria of clause 8.1, the score of this evaluation task is 4.	Data processing	0.5	4*0.5*1= 2				
Task 7: Resource analysis, such as verification and analysis of port resources, IP resources, bandwidth resources, etc.	1	Based on the criteria of clause 8.1, the score of this evaluation task is 4.	Resource analysis	0.21	4*0.21*1 =0.84	Analysis	Weight: 0.48	(0.84 + 0.9 + 1.56 + 0.3) * 0.48 =1.728	
Task 8: End-to-end service analysis, such as service quality analysis, routing analysis, etc	1	Based on the criteria of clause 8.1, the score of this evaluation task is 3.	Service analysis	0.30	3*0.30*1 =0.9				

Table I.2 – Weights and evaluation results

Evaluation task			Evaluation sub-dimension			Evaluation dimension			Evaluation object
Name	**Weight under sub-dimension**	**Score**	**Name**	**Weight under dimension**	**Result**	**Name**	**Weight**	**Result**	**Result**
Task 9: Fault analysis for system operation	1	Based on the criteria of clause 8.1, the score of this evaluation task is 4.	Fault analysis	0.39	4*0.39*1 =1.56				
Task 10: Customer perception analysis	1	Based on the criteria of clause 8.1, the score of this evaluation task is 3.	Customer analysis	0.10	3*0.10*1 =0.3				
Task 11: Policy generation for operation troubleshooting	1	Based on the criteria of clause 8.1, the score of this evaluation task is 3.	Policy generation	0.59	3*0.59*1 =1.77				
Task 12: Verify the feasibility and effectiveness of the generated policy through simulations.	1	Based on the criteria of clause 8.1, the score of this evaluation task is 2.	Policy verification	0.34	2*0.34*1 =0.68	Decision	Weight: 0.11	(1.77 + 0.68 + 0.14) * 0.11= 0.2849	
Task 13: Decision for policy execution	1	Based on the criteria of clause 8.1, the score of this evaluation task is 2.	Policy judgment	0.07	2*0.07*1 =0.14				

Table I.2 – Weights and evaluation results

Evaluation task			Evaluation sub-dimension			Evaluation dimension			Evaluation object
Name	**Weight under sub-dimension**	**Score**	**Name**	**Weight under dimension**	**Result**	**Name**	**Weight**	**Result**	**Result**
Task 14: Execute the policy by network element	1	Based on the criteria of clause 8.1, the score of this evaluation task is 4.	Network element implementation	0.7	4*0.7*1= 2.8	Action implementation	Weight: 0.05	(2.8 + 0.6) * 0.05= 0.17	
Task 15: Execute the policy by system	1	Based on the criteria of clause 8.1, the score of this evaluation task is 2.	System implementation	0.3	2*0.3*1= 0.6				

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