TM Forum Guidebook

Autonomous Operations Maturity Model

GB1042

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Notice

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Executive Summary

New and emerging technologies (such as 5G, IoT, extended reality, networks, and services) have become increasingly complex to manage and operate. This has shifted the focus of value to the management and operations of the networks and infrastructure supporting the business. Management and operations bottlenecks are seen as the primary frontier to manage business value, and to do so, means to assess key performance requirements that support the delivery of business outcome(s).

Executing digital transformation strategies to grow business continues to actively explore methods to improve the effectiveness and efficiency of management and operations capabilities. Measuring and improving, as part of management of organizational capabilities, processes and/or targeted outcomes is a significant undertaking amidst the growing complexity in technology, sophisticated expectations of customers and the skills required to bring it altogether.

Enterprises are inundated with many assessment and maturity models, and where a model is applied voluntarily towards evaluation of performance, enterprises aren't confident how to match assessment outcomes with business value. The question of utilizing the right model to identify value proposition-delivery across all management and operations is a requirement to fill the gap left with specific models. Also, the proposition of specific models is key for organizations that are advanced and seeking assessment tools that offer surgical treatment of specific identified capability concerns.

Autonomous Operations Maturity Model (AOMM) brings a unique approach to performance assessment by applying a maturity grid assessment framework that is underscored by the TM Forum's DMM, as well as input from other capability assessment models. AOMM maturity grid assessment framework uses learnings from the different maturity model types, their focal points, and their attribution to "levels of maturity" to establish taxonomy, assessment dimensions and level criteria for when an organization is planning/adopting or executing autonomous operations initiative.

AOMM is leveraging the hybrid of a process-, capability- and outcome- based approach to define its assessment framework. The assessment framework is formulated to describe characteristics of implemented processes, autonomy capabilities, behaviors and outcomes. This approach is to provide organizations with a best practice assessment framework and methodology that enables take advantage of strategies for AO by assessing AS-IS capabilities and behaviors, and setting targets across the core, supporting and enabling business domains.

With are over sixty maturity models out there for service providers to use, AOMM is focused on autonomous operations and helps members to navigate AO initiatives, benchmark business investments with outcomes, and to understand and effectively implement performance insights into operations capability gaps.

Under the Autonomous Operations initiative, AOMM is established to make sense of all the existing maturity models, such as Digital Maturity Model (DMM), Customer Experience Maturity Model (CEMM), Autonomous Network Levels (ANL), Data Governance Maturity Model, Closed Loop Automation Maturity Model (CAMM) etc., and provide a model that leverages across these existing models, characteristics that apply to improving autonomous operations project/program assessment and steering.

1. Introduction

Autonomy, the right to self-governance, and bounded regions possessing the freedom to govern themselves have become new information and communications technology objectives for automation. The term, however, is used in the MAMA project to equally bring into context a management and operations dimension to an enterprise's business. In the context of the enterprises business, it addresses all the underlying capabilities, and behaviors about how such capabilities and behaviors result in better control and coordination of business activities and of course outcomes that enable realize business value.

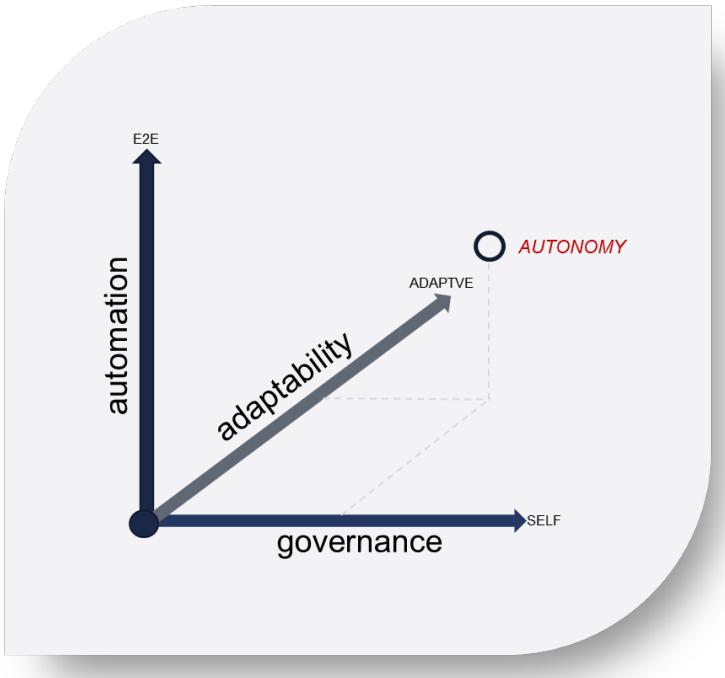

Figure 1. ***Contexts bounding autonomy in ICT realm***

Autonomous Operations is a realization of business operations for zero-touch operations. As time progresses, operations, and maintenance (O&M) procedures evolve in complexity due to introduction of new technologies, need to realize better customer value delivery and the ramifications on organization and skills. This is resulting in long cycle-times, negative customer experience and operating costs. Experience by members providing managed services, system integration and operational consulting show rising cost in handling trouble tickets based. The negative impact on customer experience is driving members to become more responsive to the use of automation to eliminate the negative trends in business operations.

By embracing initiatives and projects in Autonomous Operations, service providers are able to establish new business targets that positively affect customer experience and directly improve top-line and bottom line. Service providers establishing bold projects under the autonomous operations ambition integrate proactive prevention and closed loop automation capabilities into their business. These carriers are now able to automatically predict operational concerns in advance, and pre-emptively act with little or no-human interventions.

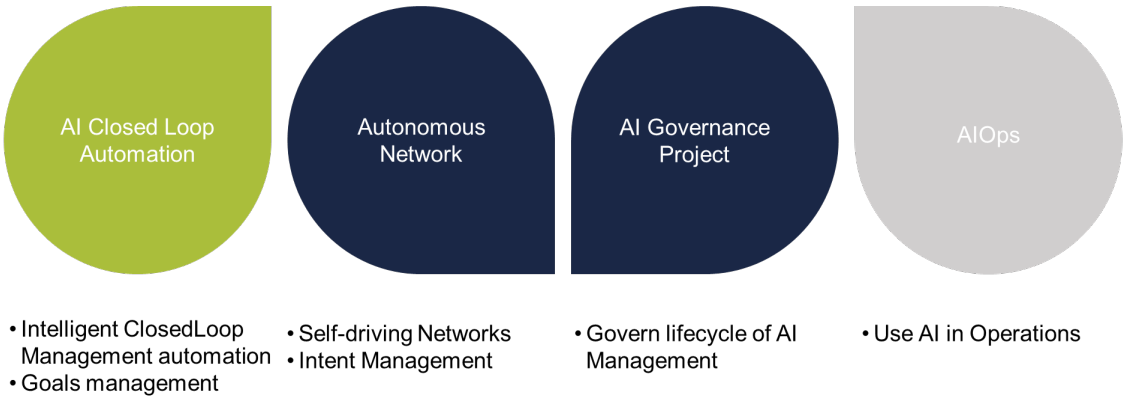

Figure 2. ***TM Forum Autonomous Operations initiative***

Autonomous Operations Maturity Model (AOMM) supports AO project sponsorship and management to understand process improvements, performance improvements and behavioral characteristics relevant for a successful AO initiative. AOMM provides an enterprise with a structure to assess as-is AO processes, capabilities, and outcomes, and enables define goals and improvement targets anchored on business value. By combining capability maturity models with maturity grids, a balance is arrived at between being prescriptive and descriptive about the organization's intent.

2. Maturity in Autonomous Operations

Evolution of operations practices stem at inherent concerns and failures of current practices in the enterprises' ability to manage day-to-day business to align with growth or market trends, or challenges in engagements with suppliers and partners for "managed services" and traditional outsourcing (ITO, Network Outsourcing etc.). Hints to failures include:

- Poor objectives and analysis defined from onset -
- Poor definition of expected mandates
- Poor sense of partnership - lack of follow-through with contracts,
- Poor service transition -
- Poor adoption of "claimed" services - pricing model for managed services is not able to reflect the ongoing state of the enterprise as the business experiences volatile growth.

Transitioning from traditional managed services and outsourcing engagements to Autonomous Operations implies an evolution in the measures, value propositions and operating models.

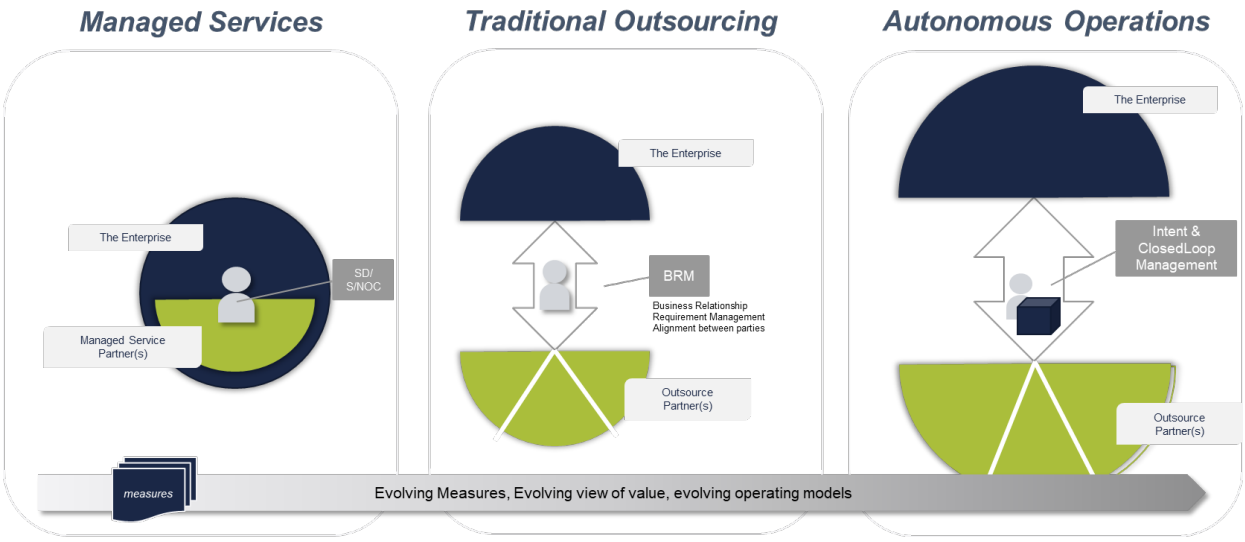

Figure 3. ***Evolving to outcome-based engagement and operating models***

The following characteristics in IG1301 have been identified to help guide the selection and correlation of autonomous operations assessment against performance metrics. These qualitative characteristics can be managed through the assessment model of AOMM in order to position quantitative measures. The characteristics are recapped here as including:

- Desirability: measurements collected are required for the design or operation
- Feasibility: measurements have to be collected as often as desired
- Validity: measurements and their evaluations need to be checked for correctness

- Viability: measurements being collected can clearly provide the measurable benefits
- Robustness: measurement quality must not be affected by changing conditions
- Accuracy: measurement errors and biases need to be within acceptable limits
- Efficiency: measurements should not consume too much of the system resource

These characteristics are reflected in the AOMM dimensions and in creating the criteria statements. Altogether with the quantitative measures defined based on the value streams, they help to address the different business domains based and reflect the implication defined in the guidelines in GB1040 for defining, improving, or enhancing metrics.

2.1. Background

Autonomy through hyperautomation is characterized by three key dimensions *(reference Figure 1)*: (1) level of automation (end-point based or end-to-end), (2) adaptability in behavior (not adaptive to adaptive); and (3) dimension to governance (by self, through other, or by other). TM Forum in the management and operations realm positions 'autonomous operations' as an initiative that enables end-to-end automation to achieve zero-touch operations. This covers the redesigning of operations to leverage AI (at scale), self-healing network domains, and the operating models emerging with the advent of 5G, Cloud, AI and Edge Computing.

The rapid evolution in management and operations practices is trickling down to service engagement and operating models. Past successes and lessons learned from managing operations since the era of assisted operations, through managed services to end-to-end full outsourcing engagement, it is clear, where adaptability and governance lacked sound basis, these engagements failed. Lessons from across the globe have hinted on lack of agility and flexibility on the side of engaging parties to independently and collectively realize value. Autonomous Operations is changing the paradigm with the adoption of new technologies for closed loop management and requirement/goals management to deliver a zero-touch operations ambition where the model of engagement with use of these technologies facilitates better means to achieve enterprise responsiveness, business agility, and improve quality of confidence in driving returns on investments.

2.2. Origins

Autonomous Operations Maturity Model is born out of the cumulative work done in TM Forum Digital Maturity Model project, Digital Organization Transformation project (DOT) Customer Experience Maturity Model project and ongoing work on AI-Closed Loop Automation, Autonomous Network Levels and Culture Maturity Model, amongst others. This model is structured to enable harness value of improving a set of capabilities that enable drive business outcomes and supported business value when using the MAMA Framework.

To manage the definition and adoption of Autonomous Operations as a collection of capabilities to drive enterprise operations and operational management, AOMM ascribes levels, dimensions and assessment criteria for the capabilities that establish a set of predetermined behavioral patterns of an enterprise or enterprise functions

exhibiting signs of autonomous operations. Some parallels along these lines can be ascribed to a modern enterprise having the capability to change suppliers in its supply chain management strategy at a fast rate to integrate new resources to cover a gap in shortages of another supplier (Case: Tesla Works with suppliers to source alternative chips amid semiconductor shortage, Apple, AMD navigate chip shortage with focus on profitable products). The capabilities underpinning these organizations dexterity to be swift, responsive and agile to respond to both market forces and consumer demand can largely be attributed to their autonomous operations' ability.

In the service provider arena, with particular emphasis on the Communications Service Providers, operations and operational management needs must factor in business outcomes as the cornerstone to drive the business value targets. Operations management with use automation of value fabrics, value chains and value streams that are adaptive and self-governing bring resilience to the enterprises business - amidst market forces and helps us to defend and grow margins/profits.

2.3. Terms

- **Autonomy**

> *The state of quality of being self-governing with the capability to adapt to circumstances.*

- **Automation**

> *In this guidebook, automation, is the implementation of processes to perform activities towards a goal without human assistance.*

- **Adaptability**

> *The quality of being able to adjust to new conditions based on internal and environmental circumstances. It involves the use of information about the environment to select from a repertoire of possible behaviors.*

- **Autonomous Network**

> *A self-driving network with fully automated zero-x (zero wait, zero touch, zero trouble) innovative network/ICT services for vertical industries' users and consumers, supporting Self-x (self-configuration, self-healing, self-optimizing and self-evolving) telecom network infrastructure for telecom internal users: planning, service/marketing, operations and management.*

Refer to TM Forum Autonomous Network Project

- **AI-CLA**

> *Use of artificial intelligence techniques in closed loop management.*

- **AIOps**

> *Use of artificial intelligence techniques to in operations.*

- **Operational Effectiveness**

> *Operational effectiveness is how well an enterprise and its business operations put resources to use to deliver services and products. It involves practices that enable a business or organization to maximize the use of inputs, by developing products at a faster pace than competitors or reducing defects.*

- **Self-governance**

> *The ability of a person or group to exercise all necessary functions of regulation without intervention from an external authority.*

- **Zero-touch Operations**

> *An operations' paradigm that is characterized by no human interventions to achieving operational objectives.*

- **Autonomous Operations**

> *This is generally referring to operations that are self-governing and adaptive to their environment without human-intervention.*

Beyond self-driving networks and autonomic technology systems, there are the people and processes that altogether realize the enterprise operations. Autonomous Operations in TM Forum is an initiative to identify, scope out and establish use of AI and related technologies to improve automation towards autonomy. The term autonomous operations hereby define concepts and solutions that enable operations to act to their environment in a tactile way to meet specific needs as their operating mandate in an operating environment.

3. The Model

3.1. Scope and Objectives

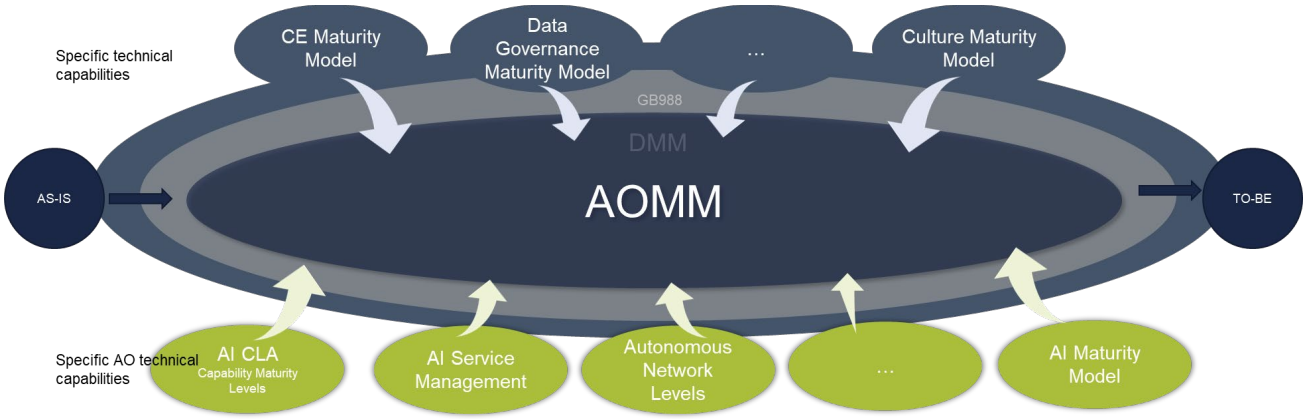

Figure 4. ***Integrating core capabilities of existing capability, behavior and culture maturity models into AOMM.***

3.2. Taxonomy of AOMM Levels

The TM Forum Autonomous Operations Maturity Model ascribes levels of capability demonstrated by way of people, processes, information, and resources in realizing automation, adaptation, and self-governance. Operational management functions are decomposed into planning, scheduling, purchasing, controlling, quality control and inventory control.

Initial definition of the TM Forum taxonomy on maturity levels for AOMM is provided in Figure 5 below. The taxonomy leverages the five DMM maturity level taxonomy to AOMM. Referring to Figure 4, this is done purposefully as AOMM can be a digital transformation strategic ambition, albeit with a scale and scope focused on what autonomy means to the organization and its enterprise.

Figure 5. ***Taxonomy of Autonomous Operations Maturity Model***

Added context on the levels

- **Level 0: ZERO**

This taxonomy has been included to enable setting a baseline for assessing any function, organization or groups of organizations. It enables set a tone for non-existence of this novel concept of autonomy-backed technology and business operations concepts, behaviors, and capabilities as a new and emerging foundation, and thus not every organization may be including this in their strategy.

- **Level 1: INITIATING**

In Level 1, "initiating", the taxonomy identifies the effort an organization or enterprises is making towards incorporating autonomy-backed technology and business operations concepts, behaviors and capabilities into the business. It recognizes the existence of an early stage formulation of autonomy-backed technology and business operations concepts, behaviors and capabilities in the enterprise.

- **Level 2: EMERGING**

In Level 2, "emerging", the taxonomy recognizes isolated cases of ongoing implementation of autonomy-backed technology and business operations concepts, behaviors and capabilities into specific parts of the enterprise's operations, and the linkage to identified business outcomes and then to business value. There is also recognition by the organization of improvements needed, and plans conceived and/or in place to realize such improvements.

- **Level 3. PERFORMING**

In Level 3, "performing", the taxonomy recognizes the coordinated and implementation of innovative approaches to autonomy-backed technology and business operations concepts, behavior and capabilities, and how this is executed across multiple parts/areas/groups/functions of the enterprise. There is also the

implementation of ongoing expansion and improvements of the approach to autonomy-backed technology and business operations concepts, behaviors and capabilities to achieve scale and scope of business outcomes to support business value.

- **Level 4. ADVANCING**

In Level 4, "advancing", the taxonomy recognizes a coherent organization-wide implementation of autonomy-backed technology and operations concepts, behavior and capabilities across the enterprise and using them to achieve competitive advantage.

- **Level 5. LEADING**

In level 5, "leading", the taxonomy recognizes a best-in-class autonomy-backed technology and business operations concepts, behavior and capabilities embedded as a part of the enterprise and with ecosystem partners and by doing so leveraging its achievement to drive leadership of best practices, standards and advancement of autonomous operations adoptions.

With the maturation of autonomous operations concepts, technology, behavior and capabilities, this taxonomy will be enhanced or optimized to meet the needs of the industry.

3.3. Dimensions of Assessment

The dimensions of assessment juxtapose the three definitive dimensions of assessing autonomous operations with the autonomous operations levels taxonomy to identify and attribute the embodying behaviors and capabilities at each level for each dimension. This will be further reviewed to enable arrive at a more informative set of descriptions while ensuring mutual exclusivity and comprehensively exhaustive principle for dimension, level, and criteria definition.

Table 1. High level view on AOMM taxonomy

AOMM Level	Automation	Adaptability	Self-Governance
Level 0*	• *No Automation*	• *No adaptability* *(To include the relevance and impact of intelligence in future work)*	• *No governance/No self-governance* • *Accuracy is not scoped.*
Level 1	• *Automation at a discrete task level.* • *Activity used here references to the TM Forum Business process ontology of Process Group -*	• *Adaptability is reactive* *(To include the relevance and impact of intelligence in future work)*	• *Immature* • *Applicability - Applicable to existing process for services and operational management* • *Accuracy is in a low state of application.*

AOMM Level	Automation	Adaptability	Self-Governance
	Process - Activity - Activity unit (task)		
Level 2	• *Automation at a workflow level.* • *Workflow used here references to the TM Forum Business process ontology for Business Process model. A Business Process Model represents a set of Activity units that are automated based on operational journeys.*	• *Adaptability is preventative* *(To include the relevance and impact of intelligence in future work)*	• *Developing* • *Applicability - Applicable to existing process for services and operational management* • *Accuracy - High accuracy in applying local data in algorithm and then navigating in process flow*
Level 3	• *Automation of end-to-end process by function. Function can be domain or business unit.* • *This level of automation takes into account the value stream of value-realizing stakeholder into account. E.g., a complete functional process that takes into account the value delivered to a customer. It can be within a domain or business unit.*	• *Adaptability is conditionally proactive* *(To include the relevance and impact of intelligence in future work)*	• *Compliant* • *Applicability - Applicable to existing process with generalization across products and services* • *Accuracy - High accuracy in learning from historical data patterns and managing future occurrence of similar pattern within process flow*
Level 4	• *Automation of end-to-end process cross-functionally.* • *This level of automation takes into account the value chain of the enterprise with cross-functional endpoints integrated for stakeholder value delivery. E.g., A cross-functional process that supports*	• *Adaptability is fully proactive* *(To include the relevance and impact of intelligence in future work)*	• *Institutionalized* • *Applicability - Applicable to existing process with specialization on needs for products and services due to high level of adaptability* • *Accuracy - High Accuracy in predicting scenario occurrence and taking preemptive decision*

AOMM Level	Automation	Adaptability	Self-Governance
	a customer based on operational journeys.		
Level 5	• Automation of end-to-end process groups acr*oss the enterprise.* • *This level of automation takes into account the value fabric, which could span multiple organizations working together to create an ecosystem.*	*Adaptability is predictive* *(To include the relevance and impact of intelligence in future work)*	• *Mature* • *All Self-x (e.g., optimizing, healing, configuring etc.)* • *Applicability- Applicable to existing and new processes for existing and new products & services with human centric intelligence i.e., capable of self-defining new processes and adjusting the operational flow.* • *Accuracy - High accuracy like human expert in decision-making and implementation*

**Included level only to enable establish a zero baseline.*

4. Key Assessment Criteria formulation strategy

Six assessment criteria formulation approaches have been analyzed to determine and drive the evolution of AOMM with backward compatibility at all times. These six types, including diagnostic criteria, formative criteria, summative criteria, ipsative criteria, norm-referenced criteria and criterion-referenced criteria each play a specific role in identifying and attributing assessment scores to enterprises or service delivery functions exhibiting autonomous operations' behavior.

In the effort of TM Forum members to make the assessment criteria valid, reliable, equitable, explicit and transparent to support cross-validation and cross-pollination of experience, most importantly be efficient tool to provide interpretative information about outcomes of investments to stakeholders, criteria are formulated to provide diagnostic insights on the steps that must be taken to deliver value of change and/or adaptation in operations that realize business value.

- Diagnostic criteria are formulated to identify information needed to understand knowledge of and capabilities of autonomous operations to enable assessors better the engagement for autonomous operations. E.g., What is your level of understanding of Closed Loop automation? Or What is your level of understanding of Intent Based Networking? Diagnostic criteria are used to identify and segment assesses providing visibility and insights into the organizations AO initiatives.
- Formative criteria help to optimize the basis for improving and benchmarking MAMA framework. It helps to align the business outcomes to the AOMM's criteria statements by processing facts, adjusting assumptions, and drawing nuanced conclusions. Meaningful adoption of technologies, processes re-engineering and culture change does not always imply the enterprise has the capability to impact business outcomes and change over time. Formative criteria help to track progress where AOMM assessments are done periodically.
- Summative criteria help to assess the enterprises' ability to learn and adapt progress towards achieving autonomous operations based on specific AO strategic initiative.
- Ipsative criteria are formulated to ascertain the attitude of the organization towards autonomous operations and autonomy concepts. E.g., The organization has improved maintenance management using AI-agents to operate and manage spares and spares allocation.
- Norm-references criteria are designed to enable benchmark objectively given a set of supporting standards that are adjusted periodically. E.g., Is use of AI in Closed Loop Management based on TM Forum standards r2022 or r2023; or Is adoption of Intent Based Networking based on TM Forum common ontology versions or domain specific ontology like 3GPP etc.
- Criterion-referenced criteria are formulated to compare performance against an industry defined AO performance standard.

5. Related Models & Levels

Related models and maturity levels/scales that are linked with Autonomous Operations Maturity Model include:

- DMM (Digital Maturity Model – GB997A) – This is the overarching master maturity model of TM Forum which represents a strategic decision of an organization to use or apply digital transformation to their business.
- CEMMM (Customer Experience Management Maturity Model - GB962B) - This is the customer experience maturity model which provides a surgical assessment framework of an organization's customer experience centeredness.
- AI & DA MM (Artificial Intelligence & Data Analytics Maturity Model – GB1003) - This is the AI maturity model which focuses on requirement to support and use AI to deliver business outcomes.
- RAMM (Revenue Assurance Maturity Model – GB941B) - This maturity model focuses on the field of revenue assurance and necessary capabilities and focus for driving improvement in revenue assurance.
- FMMM (Fraud Management Maturity Model – GB969A) – This is laid out as a questionnaire with 38 criteria across 4 subdimensions, each with a 'Yes' or 'No' type of answer
- SCMM (Smart City Maturity Model – TR259) – This consists of a set of Survey statements across 5 dimensions
- Omni Channel Maturity Model – part of the Omnichannel Guidebook – GB994 - This is focused on multichannel use strategies and the interlock needed to deliver seamless multichannel establishment and management.
- BDA (Big Data Analytics Solution Suite – GB979) – This maturity model lays out a set of questions with 89 criteria across 10 dimensions, each with a 'Yes' or 'No' type of answer to understand an organizations big data analytics solution capability.
- DGMM (Data Governance Maturity Model – GB1025) – This maturity model is delivered in a wiki format, It consists of 7 criteria defined across three perspectives: Process, People and Technology.
- EMM (Ecosystem Business Maturity Model - GB1001) - Still a work in progress maturity model, it provides a set of criteria and dimensions around how well and healthy an organization's ecosystem is. It is evolving to provide an assessment of ecosystems towards assuring their value fabric.
- ANLEM (Autonomous Network Levels Evaluation Methodology – IG1252) - This is the Autonomous Network levels of maturity.
- CMM (Culture Maturity Model – GB1019) - This is the culture maturity assessment model that focuses on the people and organization side to successful and sustainable business.
- DOT (Digital Organization Transformation) Framework - Is a framework more than a model that ties together DMM with CMM and other sets of tools to provide diagnostics and troubleshooting of the organization practicing or investing into any digital transformation initiative.

All these models provide some value proposition into AOMM. In future work further details on the leverage into AOMM, along with the specific aspects of AOMM will be defined.

6. Use

A good maturity model serves as a tool that the organization or practitioner can use to measure how well their business or project or set of capabilities are doing, and how capable they are of continuous development. AOMM applies the same goal to define and evaluate the attributes representative of "autonomy" applied to the enterprise's "operations". It is meant as one of the tools in the organizations' arsenal to consistently and continuously contribute to achieve the business value set out when investments into AO strategic initiative are planned. It will support AN's operations, AI-CLA operations, AI-Ops and other AO strategic initiatives to emerge in the future.

The trap with maturity models is the misunderstanding the role that a maturity model plays, and what can be expected from the use of one. Every maturity model, by itself, does not ensure organizational improvement. It is an assessment yardstick, an indicator of progress, but not the outcome. A maturity model can help to identify weaknesses, but not fix them. The results of an assessment against a maturity model can help generate an improvement plan, but not execute the plan. It is therefore important to understand the role of AO Maturity Model and to ensure it is carried out through the AO Strategic initiatives, as well as communicating this within the MAMA Framework.

For an organization that undertakes the initiative of using any maturity model, the work does not end once the assessment is complete. Although it is true that an organization may have had a goal of achieving a particular level on the chosen model, and that may give cause for celebration, the level needs to match its expected business outcome and attributable business value. AOMM is not meant to be used as a project, or as much as a program. At this time, the model is being defined to enable capture essential characteristics that can enable define clearly what autonomous operations means to the industry, and most importantly to the drive for business value improvement in the wake of new digital technologies, increasing customer experience expectations and business growth beyond connectivity.

Organizations embracing an ongoing process of assessments, analysis, improvement plans, etc. will use AOMM to help inform the decision they make in pursuit of higher levels. It is noteworthy that the model does not promote the need to drive higher levels of AOMM at cost of implementation that does not return the needed value. It is the reason AOMM is to be used closely with the other modules in the MAMA framework, such as Value Realization Framework and Value Model and to understand clearly what a level means to the business.

The model is also not meant to be a stringent model. It is availed as a baseline for TM Forum members, and industry practitioners to update/upgrade as the industry matures around AO, as well as customizable to meet specific needs of an AO strategic initiative. The organization's goals, strategy, mission and vision are important influences in the adoption, use and extension of AOMM. These elements are subject to change, making the model subject to change.

7. Governance

As the first standard for assessing Autonomous Operations, this guide is subject to the TM Forum Maturity Model Governance guide, IG1216.

It follows IG1216 principles to establish its position with DMM (the umbrella TM Forum Maturity model). Development, use and enhancement of AOMM will be subject to the requirements defined in IG1216. All specific governance concerns that are unique to AOMM shall be detailed in this guidebook, but without conflict with the overarching TM Forum established guidelines.

8. References

Reference	Description	Source	Brief Use Summary
Project Charter	MAMA Project Charter		
IG1031	MAMA Whitepaper - Unlocking business value of Digital Transformation	TM Forum	Member through leadership that established MAMA project
GB1040	Measuring and Managing Autonomy framework standard	TM Forum	TM Forum best practice framework for Measuring and managing autonomy.
SAE Levels of Driving Automation	Taxonomy of Six Levels of driving automation	SAE	Taxonomy reference to SAE J3016 which defines the SAE Levels from Level 0 (no driving automation) to Level 5 (full driving automation) in the context of motor vehicles and their operation on roadways.
GB997	Digital Maturity Model	TM Forum	TM Forum's Digital Maturity Model offers a practical approach to transformation. It has been crafted over the course of many months by industry thought leaders. CSPs, technology companies, and global advisory firms that have pooled their knowledge and experience to create a model that can be used to identify possible investment priorities and manage the journey itself, step-by-step.
Assessing Organizational Governance Maturity	Governance Maturity Assessment.	University of Pretoria, SA.	Reference is made to the organizational governance maturity framework by Wilkinson et al., UoP,SA as a tool that can be used to determine governance and therefore self-governance maturity. This study determines whether the organizational governance maturity framework can be applied to an industry organization to assess the maturity of the organization's governance, albeit limited to the 'leadership' attribute. The levels in this framework are used as the descriptive label and for future synthesis and expansion into criteria characteristics for assessment. https://virtusinterpress.org/IMG/pdf/10-22495_rcgv6i2art8.pdf

Reference	Description	Source	Brief Use Summary
IG1216	TM Forum Maturity Models Governance Guide	TM Forum	The purpose of this document is to cover the scope of maturity models that have been formalized as such by the TM Forum, the following paragraph provides a list of such models; all other TMF models, frameworks, tools, or assets not listed below are out of scope from a governance perspective in the context of the scope intended by this document.

9. Administrative Appendix

9.1. Document History

9.1.1. Version History

Version Number	Date Modified	Modified by:	Description of changes
1.0.0	09-Dec-2022	Alan Pope	Final edits prior to publication

9.1.2. Release History

Release Status	Date Modified	Modified by:	Description of changes
Pre-production	09-Dec-2022	Alan Pope	Initial Release
Pre-production	23-Jan-2023	Adrienne Walcott	Updated to Member Evaluated status

9.2. Acknowledgments

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