

CMM-FG for Fisheries Governance



CMM-FG™

Capability Maturity Model for Fisheries Governance

Building Institutional Fisheries Governance Capability Through Data, Governance, Workflows, Compliance, Sustainability, and Continuous Optimization

Whitepaper

Date 26.05.2026

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Version 1.0

Executive Summary

Fisheries governance is one of the most complex institutional and operational challenges facing governments and coastal nations today. Sustainable fisheries management depends not only on regulations and policy objectives, but on the institutional capability required to implement governance effectively and consistently over time.

Many fisheries authorities continue to struggle with fragmented workflows, weak traceability, inconsistent reporting, limited operational visibility, and reactive governance environments. In many cases, the challenge is not the absence of regulation, but the absence of operational capability required to support sustainable governance.

The Capability Maturity Model for Fisheries Governance (CMM-FG™) introduces a structured framework for progressively assessing and improving fisheries governance capability.

Inspired by the original Capability Maturity Model (CMM) developed for the software industry, CMM-FG adapts maturity-model principles to fisheries governance, sustainability management, compliance, monitoring, operational workflows, and institutional modernization.

CMM-FG defines five maturity levels describing how fisheries authorities evolve from fragmented and reactive operational environments toward integrated, intelligence-driven, and continuously improving governance systems.

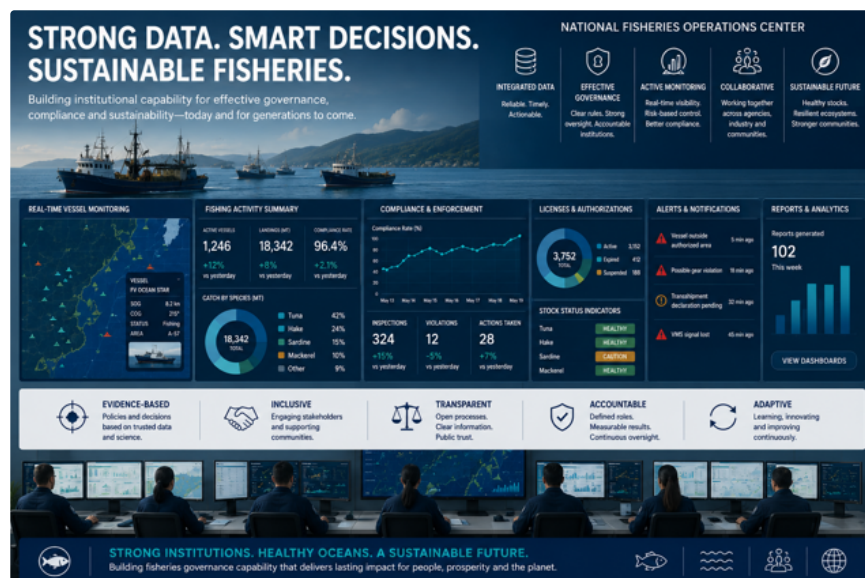
The framework recognizes that:

- Reliable fisheries data is the foundation of effective governance
- Governance capability is implemented through operational workflows
- Sustainable governance depends on institutional capability
- Governance maturity develops progressively over time

CMM-FG provides governments and fisheries authorities with:

- A fisheries governance maturity framework
- A capability assessment model
- A modernization roadmap
- A workflow-oriented governance structure
- A foundation for digital governance enablement

Ultimately, CMM-FG positions fisheries governance as an institutional capability maturity challenge rather than solely a regulatory or technology challenge.



1. The Fisheries Governance Capability Challenge

Fisheries governance is one of the most operationally complex governance environments managed by governments and coastal nations today.

Fisheries authorities are expected to coordinate sustainability management, fisheries data collection, licensing, monitoring, compliance, enforcement, reporting, inspections, traceability, and operational decision-making across highly dynamic and geographically distributed environments.

At the same time, fisheries governance requirements continue to increase in complexity due to:

- Sustainability pressures
- International reporting obligations
- Illegal, Unreported, and Unregulated (IUU) fishing risks
- Traceability requirements
- Compliance expectations
- Ecosystem-based management approaches
- Increasing operational and regulatory complexity

Despite decades of fisheries reforms globally, many fisheries authorities continue to struggle operationally with fragmented workflows, weak traceability, inconsistent reporting, limited operational visibility, and reactive governance environments.

In many cases, fisheries authorities possess:

- Fisheries legislation
- Management plans
- Licensing frameworks
- Sustainability objectives
- Reporting obligations

Yet continue to face major operational governance challenges.

The problem is often not the absence of regulations or policy objectives alone.

The problem is the absence of institutional and operational capability required to implement governance consistently, operationally, and sustainably over time.

1.1 Why Fisheries Modernization Initiatives Often Fail

Many fisheries modernization initiatives focus heavily on technology acquisition, regulatory reform, or isolated reporting obligations without sufficiently addressing institutional governance capability.

As a result, fisheries authorities may implement new software platforms, monitoring systems, reporting programs, or compliance initiatives while continuing to struggle with fragmented

operational workflows, inconsistent data quality, weak coordination, limited enforcement capability, and reactive governance structures.

In many cases, modernization initiatives fail not because the technology itself is inadequate, but because the surrounding institutional capability required to operationalize governance consistently has not yet matured sufficiently.

Common governance challenges include:

- Fragmented operational workflows
- Weak institutional coordination
- Limited workforce capacity
- Inconsistent data collection practices
- Weak interoperability between systems
- Limited operational visibility
- Weak compliance and enforcement capability
- Dependence on individuals rather than institutionalized processes

Many fisheries authorities continue to depend heavily on spreadsheets, paper-based workflows, isolated databases, and manually coordinated reporting processes because sufficiently integrated fisheries governance platforms and operational systems have not yet been established.

Many fisheries modernization initiatives are heavily donor-driven and initially funded through short-term projects or external modernization programs. While these initiatives may successfully introduce new technologies, reporting systems, or pilot programs, the long-term operational sustainability of these environments is frequently underestimated.

Governance modernization must be operationally sustainable beyond initial donor-funded implementation phases.

In many cases, insufficient consideration is given to the long-term institutional capacity, operational ownership, staffing requirements, infrastructure costs, maintenance requirements, training needs, cybersecurity obligations, and continuous governance capability required to sustain fisheries governance systems over time.

As a result, fisheries modernization initiatives may struggle to achieve long-term operational sustainability after initial project funding ends, causing governance environments to gradually revert back toward fragmented operational processes, spreadsheet-driven reporting, paper-based workflows, and limited operational visibility.

These challenges are often symptoms of low institutional governance maturity rather than isolated technology failures alone.

Where governance maturity remains limited, fisheries authorities frequently struggle to establish sustainable operational ownership, integrated governance workflows, long-term operational funding models, institutional continuity, and the organizational capability required to sustain modernization initiatives over time.

Under these conditions, modernization initiatives may become heavily dependent on external funding, individual expertise, temporary project structures, or isolated technology deployments without achieving long-term operational sustainability.



1.2 The Institutional Capability Gap

Sustainable fisheries governance depends on far more than regulations, databases, or standalone software systems.

Effective governance requires:

- Reliable fisheries data
- Structured operational workflows
- Institutional coordination
- Governance processes
- Monitoring capability
- Compliance and enforcement capacity
- Operational visibility
- Continuous operational improvement

Without these capabilities, fisheries governance environments often become reactive, fragmented, inconsistent, and heavily dependent on individuals rather than institutionalized governance structures and repeatable operational processes.

As fisheries governance environments increase in complexity, the gap between regulatory ambition and operational capability often becomes increasingly visible.

The central challenge facing fisheries governance is therefore not regulation alone, but the institutional capability required to operationalize governance effectively over time.

This is the governance challenge addressed by CMM-FG.

A FOUNDATIONAL PRINCIPLE OF
FISHERIES GOVERNANCE

WITHOUT DATA, THERE IS NO FISHERIES MANAGEMENT.

Reliable data is the foundation
of knowledge. Knowledge is the
foundation of governance.
Governance is the foundation
of sustainability.



Without data, we cannot
understand our fisheries.



Without understanding,
we cannot make sound
decisions.



Without sound decisions,
we cannot ensure healthy
oceans for future generations.

DATA IS THE STARTING POINT. EVERYTHING ELSE DEPENDS ON IT.



COLLECT RELIABLE DATA

Systematic, accurate and
timely data collection
across all fisheries
operations.



GENERATE KNOWLEDGE

Transform data into
information, insights and
understanding of our
fisheries.



ENABLE GOVERNANCE

Use knowledge to
design and implement
effective policies,
rules and controls.



ACHIEVE SUSTAINABILITY

Ensure the long-term
health of fish stocks,
ecosystems and
communities.



DRIVE CONTINUOUS IMPROVEMENT

Continuously review,
adapt and optimize for
better outcomes
over time.

STRONG DATA. SMART DECISIONS. SUSTAINABLE FUTURE.

Building fisheries governance capability that delivers lasting impact
for people, prosperity and the planet.

2. Origins of Capability Maturity Models

Sustainable governance capability depends on institutionalized operational processes rather than dependence on individuals alone.

The original Capability Maturity Model (CMM) was developed during the late 1980s and early 1990s by the Software Engineering Institute (SEI) at Carnegie Mellon University.

The model was originally created to address major operational challenges within the software industry, where organizations frequently experienced delayed projects, inconsistent quality, weak governance processes, and heavy dependence on individuals rather than structured operational capability.

A critical realization emerged from the software industry:

Organizations become operationally resilient not through isolated expertise alone, but through mature, repeatable, measurable, and continuously improving institutional processes.

The Capability Maturity Model introduced the concept that organizations evolve progressively through stages of operational maturity rather than achieving operational excellence all at once.

The original maturity levels were:

1. Initial
2. Repeatable
3. Defined
4. Managed
5. Optimizing

Over time, maturity-model thinking expanded beyond software engineering into broader governance, operational excellence, institutional capability, cybersecurity, quality management, healthcare, manufacturing, and public-sector modernization initiatives.

Today, maturity models are widely used to:

- Assess organizational capability
- Identify operational weaknesses
- Prioritize modernization initiatives
- Improve governance structures
- Standardize operational workflows
- Strengthen institutional resilience
- Support continuous improvement

The central principle behind maturity models remains highly relevant across industries:

Sustainable operational success depends on institutional capability rather than dependence on individuals alone.

CMM-FG builds upon these same principles and applies them to fisheries governance, operational management, sustainability, compliance, monitoring, and institutional modernization.

3. The Relationship Between CMM and CMM-FG

The Capability Maturity Model for Fisheries Governance (CMM-FG™) adapts the core principles of traditional Capability Maturity Models to fisheries governance and fisheries operational management.

While the original CMM focused primarily on software engineering capability, CMM-FG applies maturity-model thinking to fisheries governance environments where operational fragmentation, weak traceability, inconsistent reporting, limited operational visibility, and reactive governance structures continue to limit sustainability outcomes.

Both frameworks recognize that sustainable operational success depends on institutionalized processes, operational consistency, governance structures, reliable data, measurement, and continuous improvement.

The conceptual relationship between CMM and CMM-FG is therefore highly aligned.

Both models recognize that sustainable capability should not depend primarily on individuals, isolated expertise, or reactive operational practices.

Instead, sustainable operational capability is achieved through:

- Institutionalized workflows
- Governance structures
- Standardization
- Operational consistency
- Reliable data
- Measurement
- Traceability
- Continuous improvement

Within fisheries governance environments, these principles apply across a broad range of operational domains including:

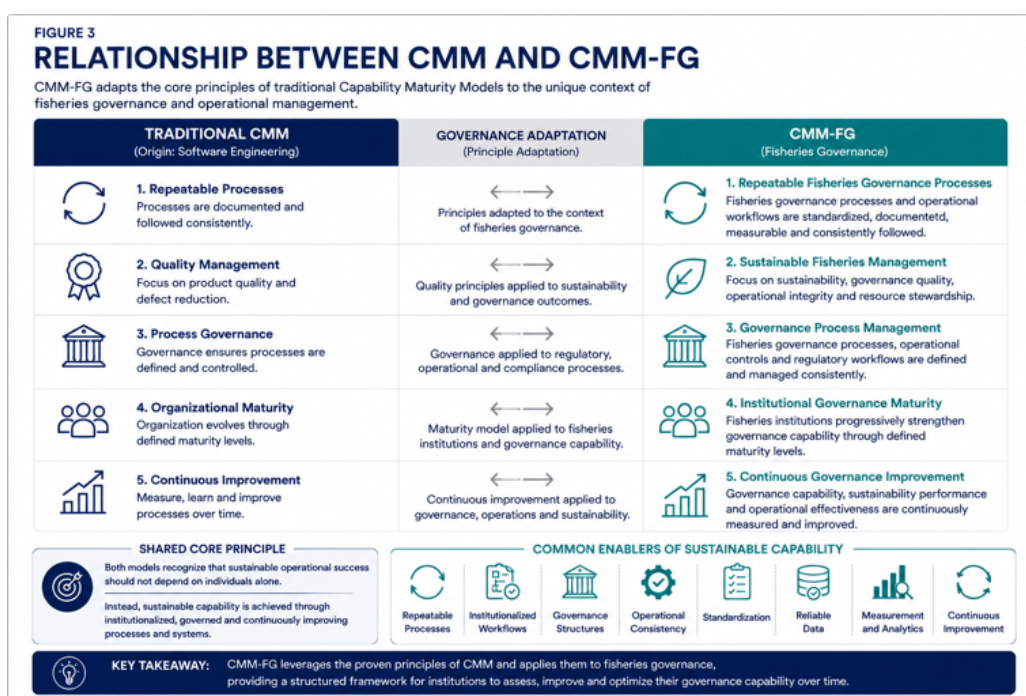
- Fisheries data collection
- Licensing and registries
- Monitoring and compliance
- Enforcement operations

- Sustainability management
- Reporting and analytics
- Operational intelligence
- Cross-agency coordination

CMM-FG therefore positions fisheries governance not simply as a regulatory challenge, but as a long-term institutional capability maturity challenge.

The framework recognizes that fisheries authorities progressively evolve from fragmented and reactive governance environments toward increasingly integrated, measurable, intelligence-driven, and continuously improving operational governance systems.

This progression forms the foundation of the CMM-FG maturity model.



4. Core Principles of CMM-FG

DATA IS THE FOUNDATION OF GOVERNANCE

CMM-FG is built around a set of core principles describing how fisheries authorities progressively develop governance capability over time.

At its foundation, the framework recognizes that sustainable fisheries governance is fundamentally an institutional capability challenge rather than solely a regulatory or technology challenge.

Effective fisheries governance depends on the ability of fisheries authorities to operationalize governance consistently through:

- Reliable fisheries data
- Structured operational workflows
- Governance processes
- Monitoring capability
- Compliance and enforcement systems
- Operational visibility
- Continuous operational improvement

Without reliable fisheries data, fisheries authorities struggle to maintain traceability, generate reliable statistics, support stock assessments, monitor sustainability outcomes, or enforce fisheries regulations effectively.

CMM-FG also recognizes that governance capability is implemented operationally through workflows.

Fisheries governance is not performed through isolated systems or administrative silos alone, but through coordinated operational processes such as:

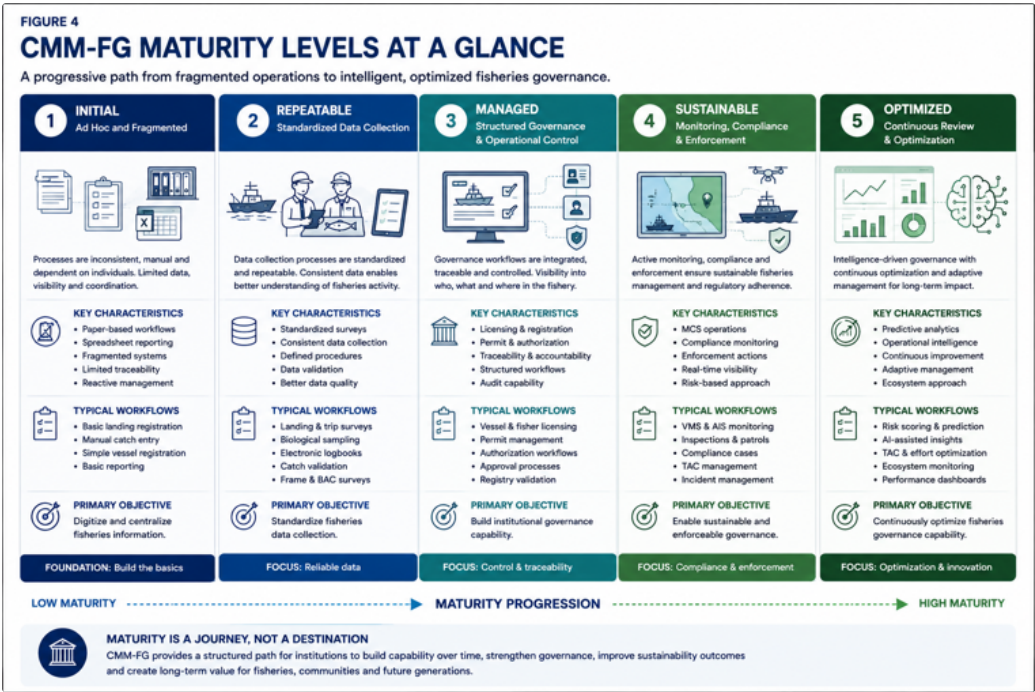
- Landing surveys
- Licensing workflows
- Monitoring operations
- Inspections
- Compliance investigations
- Reporting and analytics
- Enforcement coordination

As governance maturity increases, these workflows become progressively more standardized, integrated, measurable, traceable, and optimized.

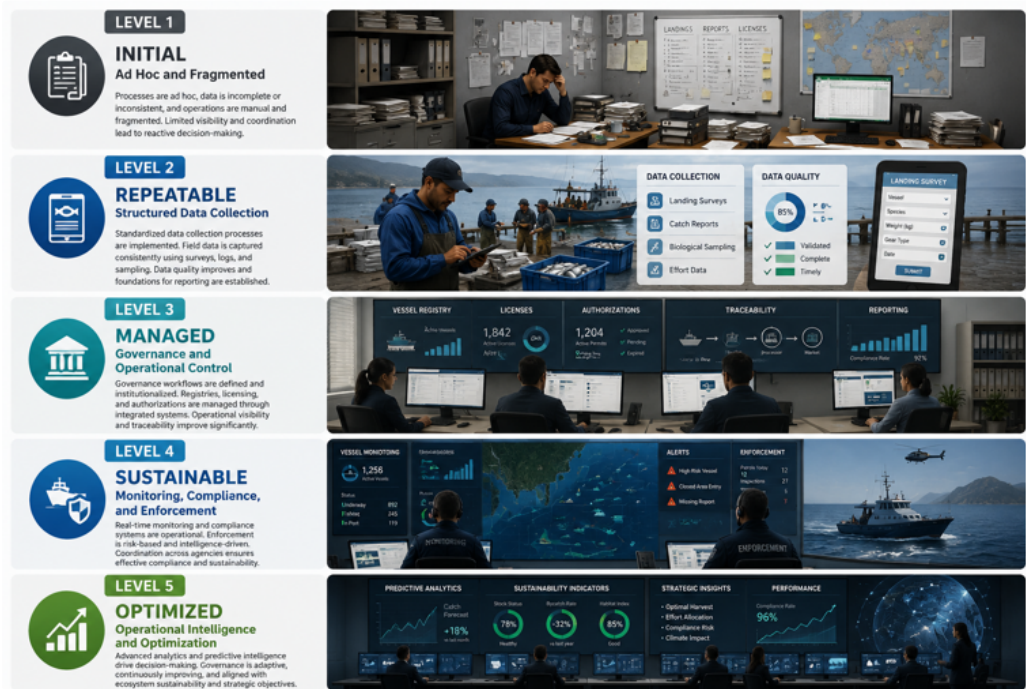
Technology platforms play an important enabling role within this process. Modern fisheries governance increasingly depends on digital platforms capable of supporting operational workflows, reporting, monitoring, compliance management, analytics, and operational intelligence across the fisheries value chain.

Sustainable fisheries governance ultimately depends on the alignment of institutional capability, governance structures, operational workflows, compliance systems, reliable data, and continuous operational improvement.

CMM-FG therefore recognizes that governance maturity develops progressively over time through the continuous strengthening of operational capability, governance coordination, institutional resilience, and intelligence-driven decision-making.



5. The Five CMM-FG Maturity Levels



Level 1 — Initial

Ad Hoc and Fragmented

At Level 1, fisheries governance environments are largely reactive, fragmented, and heavily dependent on individuals rather than institutionalized governance structures and operational processes.

Operational activities are often managed through disconnected workflows, paper-based processes, spreadsheets, and manually coordinated reporting practices. Fisheries data may exist across multiple systems, departments, or individual records without consistent integration, validation, or operational visibility.

Governance capability at this stage is typically limited by inconsistent operational procedures, weak traceability, limited coordination between functions, and the absence of standardized workflows. As a result, operational continuity is frequently vulnerable to staffing changes, institutional knowledge gaps, and limited organizational capacity.

In many Level 1 environments, fisheries authorities may possess regulations, management objectives, and reporting obligations, yet lack the operational infrastructure and institutional capability required to implement governance consistently and effectively.

Typical operational activities at this stage may include:

- Basic landing registration
- Manual catch reporting
- Paper-based workflows
- Simple vessel records
- Spreadsheet-driven reporting
- Limited operational monitoring

At this stage, fisheries governance is primarily focused on establishing foundational operational capability and improving visibility into fisheries activity.

The primary objective of Level 1 is therefore to begin digitizing, centralizing, and standardizing fisheries information and operational workflows as the foundation for future governance maturity.

Level 2 — Repeatable

Standardized and Consistent Data Collection

Level 2 represents the transition from fragmented and reactive fisheries operations toward structured and repeatable fisheries data collection and operational workflows.

At this stage, fisheries authorities begin establishing standardized procedures for collecting, recording, validating, and managing fisheries information. Operational activities become more coordinated and less dependent on individual practices, enabling greater consistency and continuity across fisheries operations.

The primary focus at Level 2 is the development of reliable fisheries data collection capability as the operational foundation for fisheries governance, sustainability management, and future institutional maturity.

As data collection processes become more standardized, fisheries authorities gain improved visibility into fisheries activity, fishing effort, catch composition, landing operations, and basic operational trends. This creates the foundation for more reliable fisheries statistics, reporting capability, and evidence-based decision-making.

Typical operational workflows at this stage may include:

- Landing surveys
- Trip and catch surveys
- Biological sampling
- Boat Activity Counts (BAC)
- Frame surveys
- Landing declarations
- Electronic logbooks
- Catch validation workflows
- Official catch reporting

Institutional capability at Level 2 typically includes trained data collectors, standardized survey procedures, operational coordination mechanisms, and structured fisheries reporting processes.

At this stage, fisheries governance becomes increasingly data-driven, enabling fisheries authorities to improve operational consistency, strengthen fisheries reporting capability, and establish the foundational data infrastructure required for stock assessments, governance modernization, compliance capability, and sustainability management.

The primary objective of Level 2 is to establish reliable, standardized, and repeatable fisheries data collection and operational reporting capability as the foundation for higher levels of

fisheries governance maturity.

Level 3 — Managed

Structured Governance and Operational Control

Level 3 represents the transition from primarily data-driven fisheries operations toward structured institutional governance and operational control.

At this stage, fisheries authorities begin establishing formal governance structures, registries, authorization processes, and traceability mechanisms that provide greater visibility into fisheries activity, regulated entities, and operational accountability.

Governance workflows become increasingly standardized, integrated, and operationally controlled. Fisheries authorities gain improved visibility into who is fishing, which vessels are operating, which licenses and permits are active, and which regulatory conditions apply across fisheries operations.

Operational capability at Level 3 extends beyond fisheries data collection alone and begins incorporating broader governance processes required to support sustainable fisheries management, regulatory oversight, and institutional accountability.

Typical operational workflows at this stage may include:

- Vessel registration
- Vessel licensing
- Fisher registration
- Fisher licensing
- Permit management
- Authorization workflows
- Approval processes
- Registry validation
- Traceability workflows
- Operational audit processes

Institutional capability at Level 3 typically includes dedicated governance functions, registry management processes, defined operational responsibilities, audit capability, and structured data governance practices.

As governance maturity increases, fisheries authorities become progressively better positioned to establish accountability, strengthen traceability, improve operational coordination, and

support more effective regulatory oversight across fisheries operations.

At this stage, fisheries governance becomes increasingly institutionalized, reducing dependence on informal processes and individual knowledge while improving operational consistency and governance continuity over time.

The primary objective of Level 3 is to establish structured institutional governance capability and operational control as the foundation for compliance management, monitoring capability, enforcement operations, and sustainable fisheries governance at higher maturity levels.

Level 4 — Sustainable

Monitoring, Compliance, and Enforcement

Level 4 represents the transition from structured governance capability toward active sustainability management, monitoring, compliance oversight, and enforcement operations.

At this stage, fisheries authorities gain the operational capability required to actively monitor fisheries activity, enforce regulations, manage sustainability measures, and support real-time operational oversight across fisheries operations.

Governance environments become increasingly integrated, operationally visible, and enforcement-oriented. Fisheries authorities are no longer focused solely on data collection and governance administration, but on actively governing fisheries behavior, monitoring compliance, identifying operational risks, and supporting sustainable fisheries management.

Level 4 typically introduces full Monitoring, Control, and Surveillance (MCS) capability, supported by integrated operational workflows, monitoring systems, compliance processes, and enforcement coordination.

Typical operational workflows at this stage may include:

- Vessel Monitoring Systems (VMS)
- AIS monitoring
- Patrol operations
- Boarding and inspections
- Incident management
- Compliance investigations
- TAC management
- Observer workflows
- Transshipment monitoring

- Enforcement case management
- PSMA implementation workflows

Institutional capability at Level 4 typically includes dedicated compliance units, monitoring centers, patrol capability, inspectors, investigators, enforcement coordination mechanisms, and operational procedures supporting regulatory oversight and sustainability enforcement.

As operational visibility improves, fisheries authorities gain stronger traceability, improved compliance oversight, greater situational awareness, and more effective sustainability management capability across fisheries operations.

At this stage, fisheries governance becomes increasingly proactive rather than reactive. Authorities are better positioned to identify compliance risks, respond to operational incidents, coordinate enforcement activities, and support evidence-based fisheries governance and sustainability management.

The primary objective of Level 4 is to establish sustainable, enforceable, and operationally visible fisheries governance supported by integrated monitoring, compliance, and enforcement capability.

Level 5 — Optimized

Continuous Review and Optimization

Level 5 represents the highest stage of fisheries governance maturity, where governance capability becomes continuously improving, intelligence-driven, adaptive, and strategically optimized over time.

At this stage, fisheries authorities move beyond operational control and compliance management toward continuously evaluating and improving governance effectiveness, sustainability outcomes, operational performance, enforcement efficiency, and institutional resilience.

Importantly, fisheries governance maturity is cumulative. Higher maturity levels do not replace foundational governance capabilities such as fisheries data collection, governance workflows, monitoring, compliance, and enforcement. Instead, these capabilities become progressively more integrated, standardized, measurable, optimized, and intelligence-driven over time.

Governance environments at Level 5 are characterized by strong operational visibility, advanced analytics capability, integrated operational intelligence, performance measurement, and continuous institutional learning.

Fisheries authorities increasingly use data, analytics, and operational intelligence to support predictive governance, risk-based decision-making, sustainability optimization, and strategic resource management.

Typical operational capabilities at this stage may include:

- Operational intelligence dashboards
- Predictive compliance monitoring
- Risk scoring and risk-based inspections
- Advanced analytics and reporting
- AI-assisted operational analysis
- Ecosystem monitoring
- TAC optimization
- Fleet performance analysis
- Executive decision-support systems
- Cross-agency operational intelligence

Institutional capability at Level 5 typically includes advanced analytics functions, continuous improvement processes, strategic governance planning capability, innovation management, and integrated ecosystem-based governance approaches.

At this stage, fisheries governance becomes increasingly proactive, adaptive, measurable, and continuously optimized. Fisheries authorities are better positioned to identify emerging risks, evaluate governance effectiveness, improve sustainability outcomes, strengthen operational resilience, and support intelligence-driven policy and operational decision-making.

The primary objective of Level 5 is to continuously optimize institutional fisheries governance capability through operational intelligence, strategic governance improvement, advanced analytics, and continuous organizational learning.

6. Workflow-Oriented Fisheries Governance

Fisheries governance is implemented through workflows — not isolated systems.

Traditional fisheries systems are often organized around disconnected software modules, administrative departments, spreadsheets, forms, or isolated reporting systems. While these structures may support individual functions, they frequently fail to reflect how fisheries authorities actually operate across governance environments.

CMM-FG instead promotes workflow-oriented fisheries governance.

Within this model, fisheries governance is viewed as a coordinated set of operational workflows connecting governance structures, operational activities, fisheries data, compliance processes, analytics, and decision-making into an integrated operational environment.

Rather than organizing governance primarily around systems or administrative silos, fisheries governance becomes organized around operational processes such as:

- Landing declaration workflows
- Fisheries data collection workflows
- Licensing and authorization workflows
- Inspection workflows
- Patrol and monitoring workflows
- Compliance investigation workflows
- Reporting and analytics workflows
- Sustainability management workflows

This approach better reflects how fisheries governance is operationalized in practice across fisheries authorities, monitoring centers, compliance units, inspectors, analysts, administrators, and decision-makers.

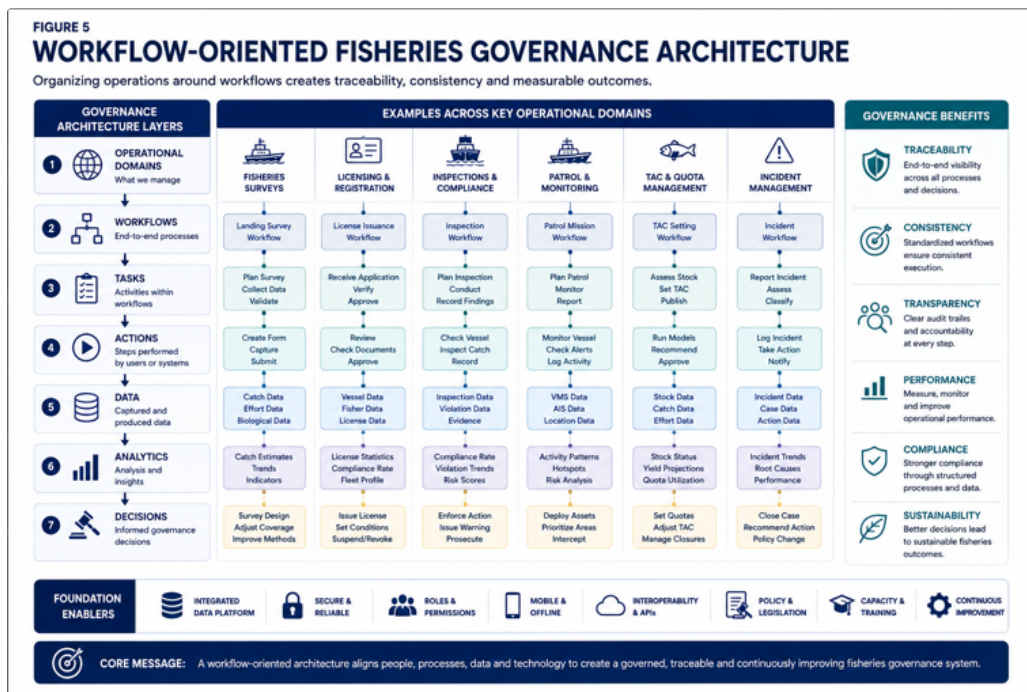
Workflow-oriented governance also improves:

- Operational coordination
- Governance traceability
- Accountability
- Auditability
- Role-based operations
- Cross-agency collaboration
- Operational visibility
- Continuous operational improvement

As governance maturity increases, these workflows become progressively more standardized, integrated, measurable, traceable, and intelligence-driven.

This allows fisheries authorities to reduce operational fragmentation, strengthen governance consistency, improve institutional continuity, and support more effective sustainability management across the fisheries value chain.

Workflow-oriented governance therefore forms a critical operational foundation for institutional fisheries governance maturity within the CMM-FG framework.



7. Institutional Capacity and Digital Enablement

Technology enables governance capability — it does not replace it.

Sustainable fisheries governance depends not only on regulations, reporting obligations, or digital systems, but on the institutional capability required to operationalize governance consistently over time.

As fisheries governance environments increase in complexity, fisheries authorities must coordinate a growing range of operational responsibilities including fisheries data collection, licensing, monitoring, compliance management, enforcement operations, sustainability reporting, operational intelligence, and cross-agency coordination.

This requires long-term institutional capability across:

- Governance structures
- Operational procedures
- Workforce development and training
- Monitoring and enforcement capability
- Operational coordination
- Data governance

- Decision-making processes
- Continuous operational improvement

Without sufficient institutional capacity, governance environments often become reactive, fragmented, inconsistent, and heavily dependent on individuals rather than structured and repeatable operational processes.

Modern digital platforms increasingly play an important enabling role within fisheries governance environments.

Integrated governance platforms can support:

- Operational workflows
- Monitoring systems
- Compliance activities
- Reporting and analytics
- Traceability
- Operational visibility
- Cross-agency coordination
- Operational intelligence

As governance maturity increases, fisheries authorities increasingly require integrated digital environments capable of supporting end-to-end fisheries governance workflows across the fisheries value chain.

The Fisheries Manager (TFM) is designed as a workflow-oriented fisheries governance and operational intelligence platform supporting institutional fisheries governance capability development.

TFM supports operational workflows across multiple fisheries governance domains including:

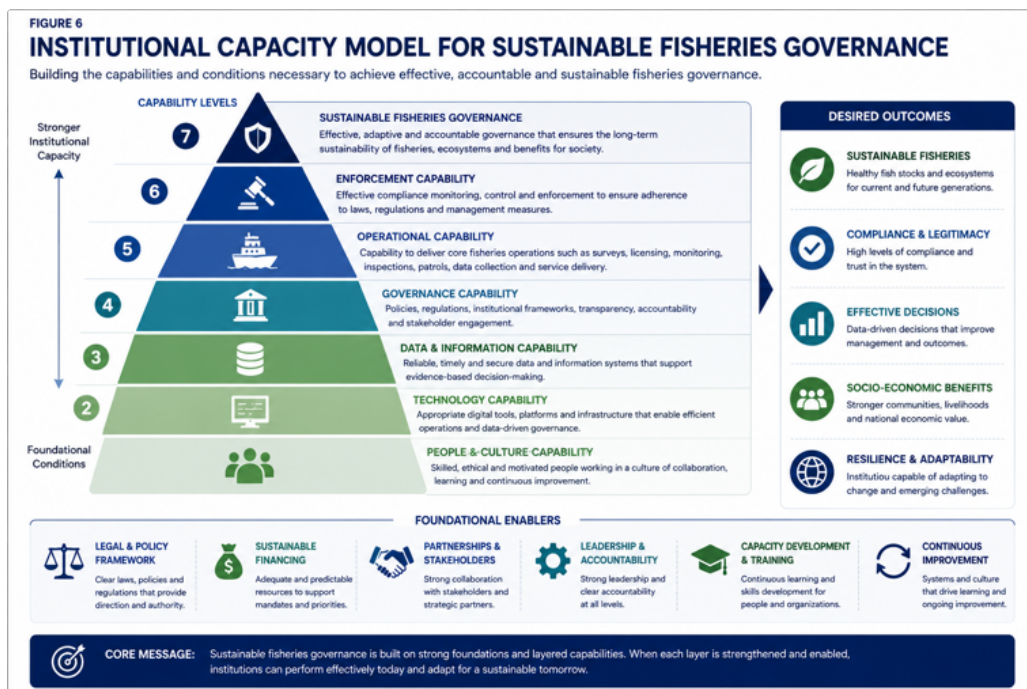
- Fisheries data collection
- Landing surveys and declarations
- Registries and licensing
- Monitoring and compliance
- Patrol and inspection workflows
- Traceability and auditability
- Analytics and reporting
- Operational intelligence
- Sustainability management

In this context, TFM can be viewed as a digital enablement platform supporting governance capability progression across the CMM-FG maturity model.

However, digital platforms alone do not create governance maturity.

Sustainable fisheries governance ultimately depends on the alignment of institutional capability, operational workflows, governance structures, reliable data, compliance capability, and continuous organizational improvement.

As institutional maturity increases, fisheries authorities become progressively better positioned to strengthen operational resilience, improve sustainability outcomes, support intelligence-driven governance, and continuously improve fisheries governance capability over time.



8. Operational Intelligence and Command Centers

Operational visibility is the foundation of intelligence-driven governance.

As fisheries governance maturity increases, operational intelligence becomes increasingly important.

Modern fisheries governance environments require the ability to monitor fisheries activity, coordinate compliance operations, identify operational risks, analyze sustainability indicators, and support real-time decision-making across highly dynamic operational environments.

At higher maturity levels, fisheries authorities increasingly depend on integrated operational intelligence environments capable of combining:

- Vessel monitoring
- Compliance workflows
- Operational alerts
- Inspection activities
- Analytics and reporting
- Sustainability indicators
- Risk scoring
- Enforcement intelligence
- Cross-agency operational coordination

This creates the foundation for fisheries command centers and operational intelligence platforms capable of providing live operational visibility across fisheries governance environments.

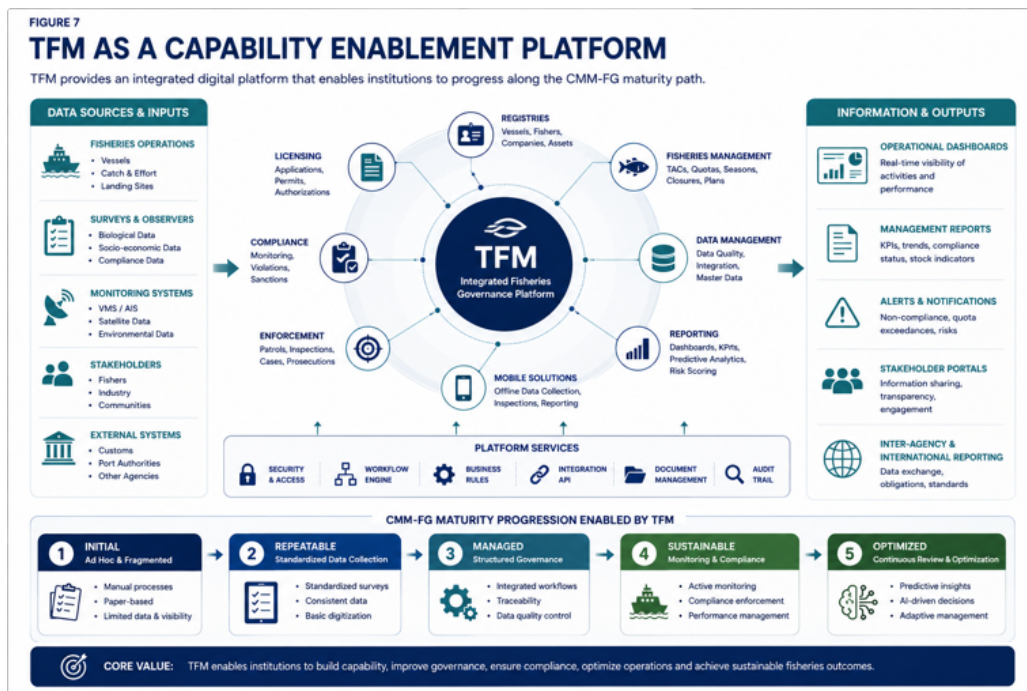
Operational intelligence environments support fisheries authorities by enabling:

- Real-time situational awareness
- Risk-based decision-making
- Predictive compliance monitoring
- Faster operational response
- Improved enforcement coordination
- Enhanced sustainability oversight
- Intelligence-driven governance

As governance maturity progresses, fisheries authorities increasingly move from reactive governance toward proactive and intelligence-driven operational management.

Operational intelligence also strengthens the ability of fisheries authorities to evaluate governance effectiveness, identify emerging operational risks, optimize enforcement activities, and improve sustainability outcomes over time.

Within the CMM-FG framework, operational intelligence therefore represents a key component of higher maturity governance environments where fisheries governance becomes increasingly measurable, adaptive, integrated, and continuously optimized.



9. Implementation Roadmap

CMM-FG provides governments with a practical roadmap for progressively building fisheries governance capability over time.

Capability maturity should be developed progressively rather than through large-scale transformation initiatives implemented all at once.

Sustainable fisheries modernization requires long-term institutional investment rather than isolated software projects or short-term compliance initiatives.

Governments that progressively invest in governance capability, operational workflows, institutional capacity, digital enablement, and enforcement systems are significantly better positioned to achieve sustainability, traceability, compliance, and operational resilience.

A typical progression includes:

Phase	Focus
Phase 1	Data digitization
Phase 2	Governance workflows
Phase 3	Monitoring & compliance
Phase 4	Operational intelligence
Phase 5	Continuous optimization

This allows governments to prioritize investments realistically while building sustainable operational capability progressively over time.

10. Applying CMM-FG

CMM-FG is designed not only as a conceptual governance framework, but also as a practical tool for supporting fisheries modernization, institutional development, operational assessment, and long-term governance planning.

Fisheries authorities can use CMM-FG to:

- Assess current governance maturity
- Identify operational capability gaps
- Prioritize modernization initiatives
- Structure digital transformation programs
- Improve workflow standardization
- Strengthen institutional coordination
- Support compliance and enforcement planning
- Align investments with operational priorities
- Guide workforce development and training
- Support donor-funded modernization initiatives

The framework can also support progressive governance transformation by helping fisheries authorities avoid attempting large-scale modernization initiatives all at once.

Instead, organizations can develop governance capability progressively through manageable and realistic maturity improvements over time.

Because CMM-FG is workflow-oriented and operationally focused, it can also help fisheries authorities better align governance structures, operational responsibilities, technology platforms, reporting systems, and compliance activities across the fisheries value chain.

At higher maturity levels, CMM-FG can support the development of intelligence-driven fisheries governance environments based on operational visibility, advanced analytics, risk-based decision-making, and continuous institutional improvement.

11. CMM-FG Capability Assessment Framework

The Capability Maturity Model for Fisheries Governance (CMM-FG™) is designed not only as a conceptual governance framework, but also as a practical assessment and modernization tool for fisheries authorities, governments, regional organizations, and donor-funded fisheries initiatives.

A core objective of CMM-FG is to help fisheries authorities evaluate their current institutional capability maturity, identify operational gaps, prioritize investments, and establish realistic governance modernization roadmaps over time.

CMM-FG therefore introduces a structured capability assessment approach that evaluates fisheries governance maturity across multiple operational and institutional domains.

The assessment framework recognizes that fisheries governance maturity is multidimensional. Fisheries authorities may demonstrate high maturity in some operational areas while remaining underdeveloped in others.

For example:

- Strong fisheries data collection capability may exist without effective compliance systems
- Monitoring systems may exist without integrated governance workflows
- Advanced analytics may exist without institutional coordination
- Regulatory frameworks may exist without operational enforcement capability

The purpose of the assessment framework is therefore not simply to assign a maturity “score,” but to help fisheries authorities understand where operational capability exists, where governance gaps remain, and how institutional capability can progressively evolve over time.

Assessment Domains

CMM-FG assessments typically evaluate governance maturity across several core capability domains.

Governance and Institutional Structures

Assessment areas may include:

- Governance structures
- Defined operational responsibilities
- Institutional coordination
- Policy implementation capability
- Role-based governance

- Decision-making structures
 - Cross-agency collaboration
 - Operational accountability
-

Fisheries Data Collection and Reporting

Assessment areas may include:

- Landing surveys
 - Catch reporting
 - Biological sampling
 - Electronic logbooks
 - Data validation
 - Data quality controls
 - Standardized reporting procedures
 - Statistical reporting capability
-

Registries and Authorization Management

Assessment areas may include:

- Vessel registries
 - Fisher registries
 - Licensing systems
 - Permit management
 - Authorization workflows
 - Registry traceability
 - Auditability
 - Data governance controls
-

Monitoring, Compliance, and Enforcement

Assessment areas may include:

- Vessel monitoring capability
- AIS/VMS integration
- Patrol coordination
- Inspection workflows

- Incident management
 - Enforcement case management
 - Compliance investigations
 - Risk-based enforcement capability
-

Operational Workflows and Process Maturity

Assessment areas may include:

- Workflow standardization
 - Operational consistency
 - Interdepartmental coordination
 - Process traceability
 - Audit workflows
 - Approval processes
 - Incident escalation procedures
 - Operational visibility
-

Analytics and Operational Intelligence

Assessment areas may include:

- Reporting capability
 - Operational dashboards
 - Sustainability indicators
 - Risk scoring
 - Predictive analytics
 - Operational intelligence
 - Executive decision-support systems
 - Performance measurement
-

Digital Enablement and Technology Integration

Assessment areas may include:

- Integrated governance platforms
- Workflow digitization
- System interoperability

- Data integration
 - Mobile data collection
 - Operational automation
 - Real-time visibility
 - Cybersecurity and governance controls
-

Assessment Methodology

CMM-FG assessments are typically performed through a combination of:

- Stakeholder interviews
- Operational workflow reviews
- Governance documentation analysis
- System architecture reviews
- Field observations
- Reporting reviews
- Compliance process evaluations
- Institutional capability workshops

Assessments should evaluate not only whether systems or policies exist, but whether governance capability is operationalized consistently, repeatably, and institutionally across fisheries operations.

The assessment process therefore focuses heavily on operational maturity rather than theoretical governance design alone.

Maturity Scoring Approach

Each capability domain may be assessed against the five CMM-FG maturity levels:

Level	Description
Level 1	Ad Hoc and Fragmented
Level 2	Standardized Data Collection
Level 3	Structured Governance and Operational Control

Level 4	Monitoring, Compliance, and Enforcement
Level 5	Continuous Review and Optimization

Importantly, maturity progression is cumulative.

Higher maturity levels do not replace foundational governance capability. Instead, governance capability becomes progressively more:

- Standardized
- Integrated
- Traceable
- Measurable
- Auditable
- Intelligence-driven
- Continuously optimized

A fisheries authority may therefore operate at different maturity levels across different domains simultaneously.

For example:

Capability Domain	Example Maturity
Fisheries Data Collection	Level 2
Registries and Licensing	Level 3
Monitoring and Enforcement	Level 2
Operational Intelligence	Level 1
Analytics and Reporting	Level 4

This multidimensional approach provides a more realistic representation of institutional fisheries governance capability.

Assessment Outcomes

The CMM-FG assessment framework is designed to support:

- Governance modernization planning
- Institutional capacity development
- Fisheries digital transformation initiatives
- Donor-funded fisheries projects
- Operational improvement programs
- Compliance modernization
- Monitoring and enforcement strengthening
- Long-term sustainability planning

Assessment results can also support the development of phased modernization roadmaps aligned with institutional capability, operational priorities, available resources, and governance objectives.

Continuous Capability Development

CMM-FG recognizes that fisheries governance maturity is not a one-time achievement, but a continuous institutional development process.

Governance environments evolve continuously in response to:

- Regulatory changes
- Sustainability pressures
- Technological advances
- Compliance risks
- Operational complexity
- Climate impacts
- International reporting obligations
- Emerging fisheries management requirements

For this reason, fisheries governance capability should be reviewed and reassessed periodically as part of long-term institutional governance strategy and continuous operational improvement.

The ultimate objective of the CMM-FG assessment framework is therefore not simply to measure governance maturity, but to help fisheries authorities progressively build sustainable, intelligence-driven, operationally resilient, and continuously improving fisheries governance systems over time.

12. Future Vision

The future of fisheries governance is adaptive, intelligence-driven, and continuously optimized.

Fisheries governance environments will continue evolving rapidly in response to increasing sustainability pressures, operational complexity, climate impacts, international reporting obligations, and technological advancement.

Future fisheries governance will increasingly depend on the ability of governments and fisheries authorities to transform fisheries data into operational intelligence, coordinated governance capability, and adaptive decision-making environments.

As governance maturity increases, fisheries authorities will progressively move beyond fragmented and reactive operational structures toward integrated, intelligence-driven governance ecosystems capable of supporting:

- Real-time operational visibility
- Predictive compliance monitoring
- Risk-based enforcement
- AI-assisted operational analysis
- Ecosystem-based fisheries management
- Integrated sustainability monitoring
- Cross-agency operational coordination
- Regional and international interoperability
- Continuous institutional learning and improvement

Operational intelligence platforms, digital governance environments, analytics systems, vessel monitoring technologies, mobile fisheries data collection, and AI-assisted decision-support systems will increasingly become foundational components of modern fisheries governance capability.

At the same time, governance complexity will continue increasing.

Fisheries authorities will be required to coordinate growing volumes of operational data, compliance activities, sustainability indicators, monitoring systems, enforcement workflows, and reporting obligations across increasingly interconnected governance environments.

This evolution will require governments to strengthen not only technology environments, but also institutional capability, governance coordination, operational resilience, workforce capacity, and continuous governance improvement capability over time.

CMM-FG provides a structured framework for supporting this long-term governance evolution.

By progressively strengthening governance maturity across operational workflows, institutional capability, monitoring systems, compliance operations, analytics, and operational intelligence, fisheries authorities can move toward more sustainable, adaptive, measurable, and intelligence-driven fisheries governance environments.

Ultimately, the future of fisheries governance will depend not simply on regulation or technology alone, but on the ability of governments to build operationally resilient, continuously improving, and intelligence-driven governance capability capable of supporting sustainable fisheries management for future generations.

13. Conclusion

The Capability Maturity Model for Fisheries Governance (CMM-FG™) provides a structured framework for progressively improving fisheries governance capability.

CMM-FG positions fisheries governance not simply as a regulatory or technology challenge, but as a long-term institutional capability maturity challenge.

Sustainable fisheries governance depends on far more than regulations, databases, reporting obligations, or standalone software systems alone.

Effective governance requires the alignment of:

- Reliable fisheries data
- Operational workflows
- Governance structures
- Institutional capability
- Compliance and enforcement systems
- Operational visibility
- Digital enablement
- Continuous operational improvement

By progressively strengthening these capabilities over time, fisheries authorities can evolve from fragmented and reactive operational environments toward increasingly integrated, measurable, intelligence-driven, and continuously improving governance systems.

Importantly, governance maturity develops progressively.

Higher maturity levels do not replace foundational governance capabilities such as fisheries data collection, governance workflows, monitoring, compliance, and enforcement. Instead,

these capabilities become progressively more integrated, standardized, traceable, measurable, auditable, and optimized over time.

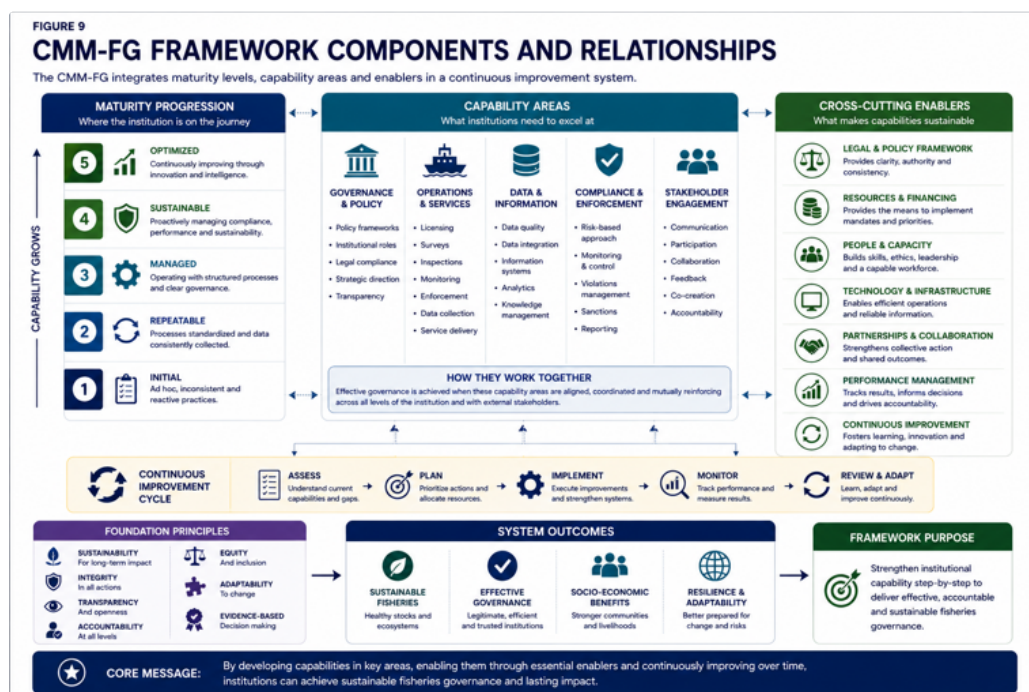
CMM-FG therefore provides governments and fisheries authorities with:

- A fisheries governance maturity framework
- A capability assessment model
- A modernization roadmap
- A workflow-oriented governance structure
- A foundation for digital fisheries governance enablement

The framework can support fisheries modernization initiatives, institutional capacity development, compliance modernization, sustainability management, operational intelligence initiatives, and long-term governance transformation programs across fisheries governance environments.

Ultimately, the future of fisheries governance will depend on the ability of governments and fisheries authorities to build operationally resilient, adaptive, and intelligence-driven governance capability capable of supporting sustainable fisheries management over time.

Nations that successfully strengthen institutional fisheries governance capability will be significantly better positioned to improve sustainability outcomes, strengthen food security, combat Illegal, Unreported, and Unregulated (IUU) fishing, support resilient blue economy development, and protect marine resources for future generations.



About Fisheries Technologies ehf.

Fisheries Technologies ehf. develops workflow-oriented fisheries governance and operational intelligence platforms supporting fisheries authorities and fisheries management organizations.

For more information:

[Fisheries Technologies ehf.](#)

