Accelerating & Communicating Government Fisheries Data Modernization

EXECUTIVE SUMMARY

FUTURE of FISH

About Future of Fish

Future of Fish is an international non-profit that supports small-scale fisheries and communities impacted by overfishing to build sustainable livelihoods while also protecting fish, a critical source of protein for billions of people worldwide. www.futureoffish.org

Disclaimer

The ideas presented here reflect insights and enormous intellectual contribution from our colleagues, as shared with us through both written products and over 60 interviews. In particular, we would like to recognize the work of CEA Consulting (CEA) on this topic and the expertise contributed by Kate Wing as a consultant for this publication. In acknowledging the contributions of these experts, we hereby take full responsibility for the content of this report, which reflects our current understanding of a complex and dynamic space. We expect to continue to refine and advance the concepts presented here and offer this report as a working draft. We look forward to input and updates from the sustainable seafood, technology, and governance communities. .

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OVERVIEW

Today, there are more efforts to improve data capture and sharing systems for wild caught seafood than ever before. This is a positive trend, as better data is key to unlocking sustainable fisheries: for generating the information needed for effective management and enforcement; to provide business intelligence that can support a more economically viable and responsible seafood trade; and to drive bottom-up solutions that alleviate enforcement burdens on government agencies, allowing more focus on better science and adaptive management.

Unfortunately, current data modernization efforts are not translating into more effective, adaptive fisheries management at a fast enough rate. A key stuck point appears to be a lag within governments where inefficiencies, redundancies, and data errors from paper-based record-keeping and/or poorly designed systems are prevalent.

> ***This report aims to advance the field of fisheries data modernization within governments by providing insights from case studies, interviews with global experts, and a review of existing literature and online resources.***

We propose the following holistic, working definition of data modernization:

> Government fisheries data modernization is any initiative or process that results in more **accurate** data and/or more efficient and **timely data delivery and analyses** that support **both** improved governance (management, science, and enforcement) and serves industry and public needs for the long term.

This definition includes three core elements—accuracy of, timeliness of, and access to data and analyses—for government, industry, and public stakeholders. The definition does not restrict data modernization to technological improvements. Improved protocols for data capture and sharing in paper-based systems is considered modernization if the protocols facilitate better management and insight for stakeholders. That said, technology, and especially electronic systems, are best positioned to provide the efficiencies and data QA/QC that is needed. But technology alone is not enough. In fact, piecemeal technology adoption without a holistic plan for integration of newly generated data often creates more problems.

To advance government fisheries data modernization around the world requires the following first steps: 1) build awareness of the value of data modernization for fisheries (communication and messaging to governments and funders); 2) increase understanding of where things are stuck (barriers) and where progress has been made (design principles and strategies for success); and 3) identify how modernization unfolds (process framework and tools, see Figure 3).

BUILDING AWARENESS AND ENGAGING GOVERNMENTS

The nascent state of government fisheries data modernization means many countries lack awareness of how data modernization could improve their fisheries management and seafood trade. Research to identify promising communication approaches to reach government stakeholders revealed five key communication insights and five strategic entry points to help introduce government agencies to the data modernization concept.

Communication Insights: How to Spark Interest

Science and Enforcement Divisions are Promising Gatekeepers

The Challenge: Governments often struggle to accept outside expertise for many reasons: prior bad experiences with NGOs or development agencies; fear of looking unprepared or lacking experience; or, a strong cultural preference for working internally.

The Strategy: The science and enforcement arms of government currently appear as the most open to data modernization solutions for fisheries challenges. Leverage the interest in these departments to reach the fisheries managers.

Workshop Your Way In

The Challenge: Governments are often resistant to outside assistance. As a newcomer to the space, finding a way to initially gain access to key decision-makers can be challenging.

The Strategy: In-person symposiums or workshops provide venues to detail and share the benefits of an approach, tool set, or strategy in a specific fisheries context, and serve as an effective approach for initially engaging important government officials.

Multi-pronged approaches are a must

The Challenge: Government organizational structures are fragmented and often siloed. Thus, no one decision-maker can push through an idea from concept to implementation.

The Strategy: Plan for a multi-pronged communication campaign that targets the needs of each critical individual and brings them together after initial interest is peaked.

Focus on Acute Needs

The Challenge: The people and departments executing projects are most likely resource strapped, under deadline, and worried about the project failing in public. These conditions create a sense of urgency and often a singularity of focus on existing work and resolving current issues.

The Strategy: Begin engagement with governments by: a) learning what their pain points are in order of importance; and b) understanding how to address their most urgent needs or concerns quickly, effectively, and in-person.

Prove it

The Challenge: There is a demand for evidence that holistic data modernization works—testimonials or proof of concepts from implementation in the field.

The Strategy: Harness wins within the broad umbrella of data modernization. Showcase successful EM pilots, examples of new markets unlocked through traceable fish, or leverage existing resources such as the US Federal Data Maturity Model as “baselines” to show progress over time.

Strategic Entry Points: Align with Existing Values

The following strategic lines may help accelerate progress by:

1. Assisting practitioners within or outside government to identify positive incentives or goals that may attract the attention and support of needed government staff and leaders;
2. Helping steer funders towards projects that serve as promising stepping stones into larger fisheries data modernization conversation and action.

Robust Fisheries Management for Resource Security

Target: Fisheries or state agencies, Department of Public Health (nutrition and food security); Department of Labor (job creation and employment rates)

The Push: International development finance institutions provide significant resources to countries to target poverty alleviation, food security, and economic growth, including linkages to global markets. The health of local fisheries are inherently tied to these issues, especially through nutrition, livelihoods, and even ecotourism.

The Potential: With appropriate design and deal structuring, a percentage of development financing could be explicitly channeled to spark and support holistic data modernization efforts within fisheries divisions as a means to drive better fisheries management that in turn secures livelihoods and improves the stability and sustainable growth of the sector's output. The longer time horizons of these development programs (5-10 years) allows for the continued support needed to build capacity, weather government turnovers, and execute a comprehensive vision.

Trade and Tourism

Target: Department of Commerce; Department of Agriculture

The Push: New and stricter trade regulations (e.g. US SIMP and EU import laws), continued growth of FIPs and certifications, increased interest in mariculture, and in some regions, increased consumer demand for ethical seafood, are pushing industry and government reforms. In addition, with coastal and marine tourism expected to be the largest value-adding segment of the ocean economy by 2030, countries are beginning to recognize the importance (and value) of restoring and preserving healthy marine environments to their local economies.

The Potential: To meet both the opportunities and demands of the trade and tourism sectors requires that governments have better and more timely information to effectively and efficiently monitor and manage their fisheries—creating a strong case for data modernization.

Electronic Monitoring and Reporting Initiatives

Target: Fisheries division; Government IT department or CTOs.

The Push: EM and ER technologies and systems are gaining traction in fisheries around the world.

The Potential: EM and ER provide scores of new information, creating a need for new data storage and analyses —such capacity needs can be a great opportunity to build out a holistic data management system for the country, including consideration for:

- (For EM), establishing a broad vision for how data can be used to achieve compliance and science/management goals; one clear purpose may be needed to launch a pilot (such as compliance-focused initiative) but building in future capacity to leverage these systems to their full effect will allow for maximum benefits. Benefits to industry are also key, and may include things such as worker safety and insurance against false claims of IUU.

- More data without enforcement achieves nothing. Ensure strategies are developed so that information from EM and ER can be used for management, science, and enforcement.
- Fear of EM/ER impacts on employment is common. Knowing how to anticipate and address this can help with building trust and buy-in.

National and Maritime Security

Target: Department of Defense, Homeland Security, and Coast Guard Agencies

The Push: Efforts to more effectively protect national waters and resources from illicit activities, from piracy to drug trafficking, are gaining traction in many developing regions of the world.

The Potential: As nations collaborate and invest in technical and analytical capabilities to better monitor and enforce their national waters, there is opportunity to bring training and capacity into the fisheries realm, as critical data comes from fishing fleets; also, there is often overlap in jurisdiction and responsibility between maritime security and fisheries enforcement agencies.

Consider the Role of Data Modernization Initiatives as a Risk Mitigation Tool

Target: Military/Department of Defense; Tax Departments (relief funds); National Fisheries Agencies

The Push: A lack of coordination and data accessibility restricts government capacity to effectively and rapidly utilize and apply information for the benefits of their constituents—especially in response to change. In fact, these inefficiencies limit the ability of both governments and industry to better mitigate negative impacts from catastrophic events (such as market and trade disruptions due to COVID-19), climate change-induced impacts on stock health, location, or abundance, or political upheavals that impact rules and regulations. In some cases, the lack of efficient data coordination exacerbates these negative impacts, such as the case we see illustrated by the *impacts of Brexit* on UK fishers who are now required to fill out over 70 pages of paperwork for every shipment entering the EU.

The Potential: While strong, co-designed data frameworks and technologies cannot prevent these major disruptions, we believe they can provide a way for governments and industry to rapidly assess and respond to acute changes in fishery stocks and market and supply chain disruptions. For example, during COVID-19, more integrated data systems could support struggling fishers to process elogbook information to help provide access to relief funds; provide fishers with the information and resources needed to find available buyers; determine viable species for diversification options; and assess opportunities for aggregate sales with local partners. Accessible, integrated data allows everyone involved to better achieve the full potential benefits of data analyses and application, including crisis response.

INCREASE UNDERSTANDING: BARRIERS TO IMPLEMENTATION

Comparisons across case studies and existing reports surfaced eight widespread barriers to data modernization efforts, independent of geographic location, fishery, or initiative structure.

B1. Lack of Long-Term Planning & Vision

Specific projects to address a discrete issue are developed in the absence of overarching strategy or vision. The ability to appropriately budget and leverage one project to advance another is lost under these circumstances, as are other types of economies of scale.

B2. Inflexible and Rigid Systems

Passing new protocols or policies to secure resources and execute a pilot are heavier lifts within governance bodies; legacy systems and staffers can make change hard.

B3. Capacity Missing for Tech Adoption

Modern data systems require IT expertise, infrastructure, and at least some level of literacy. Unfortunately, these conditions are often not met.

B4. Policy Prevents Progress

Logistical hurdles in hiring outside experts, conflicting decision-making practices among departments or across jurisdictions—such obstacles impede data modernization initiatives.

B5. Data Ownership Confusion

Stakeholders from both industry and government sectors continue to be confused and often misled in their understanding of data ownership and sharing.

B6. Missing and/or Perverse Incentives to Attract Participation

The benefit and the need for better data are often unrealized and thus, unrecognized; scarce resources make it difficult to retain talent or impose new tasks on already-overburdened staff.

B7. Insufficient In-house Expertise

Current models are limited in how they leverage pilots to build internal expertise—a resource that would return benefits again and again as data modernization progresses. Instead, limited resources, overburdened staff, inadequate training, and missing expertise reduce success of data modernization initiatives; language and cultural factors also limit effectiveness of outside experts.

B8. Most-Recently Elected Leaders Want All The Credit

New administrations have an aversion to inheriting former projects. This, combined with high turnover rates, poses a threat to long-term investment and execution of data modernization initiatives, which require longer time horizons to achieve success.

INCREASE UNDERSTANDING: DESIGN PRINCIPLES FOR SUCCESS

In addition to barriers, our research also unpacked the characteristics of robust systems and implementation processes. We identify best practices based on past and ongoing initiatives, synthesizing strategies, design principles, and practical solutions that emerged in the case study research and literature review.[1] We looked for underlying, universal concepts in order to name opportunity areas that are scalable to multiple locations and conditions; however, recommendations will be more or less applicable depending on existing enabling conditions and attributes of the system. Table 2 provides an overview of the 24 design principles, according to the stage of project development where they apply.

1. There are a number of existing best practice guidelines and design principles offered for EM/ER projects, Digital Investment, Fisheries Monitoring, and Government IT Modernization. EDF's *Designing and Implementing Electronic Monitoring Systems for Fisheries*, Stanford's *Digital Impact Toolkit*, Bradley et. al's *Opportunities to improve fisheries management through innovative technology and advanced data systems*, and IBM's *A Roadmap for IT Modernization in Government* are just a few examples. There are significant overlaps and similarities in principles encountered across these types of publications that a) point to a range of different organizations reaching similar conclusions independently, both within and external to the sustainable fisheries industry, and b) directly supports findings from the case study interview stage of our work, the results of which are presented here. For additional information regarding existing resources and how they can be utilized in the Fisheries Data Modernization space, please see *Part 4: Tools and Resources*.

Table 2. Summary of Design Principles by Implementation Stage (see framework, Figure 3). We have categorized these design principles by stage, but the majority cross multiple stages. Each design principle is listed in the stage where it begins—for example, "be transparent regarding expectations around timelines" is found within stage 1 (initiate), although it also applies across all later phases of implementation.

Stage 1 (Initiate)	Stage 2 (Pilot)	Stage 3 (Establish)	Stage 4 (Scale)
Set A Clear And Holistic Vision	Define Software And Hardware Parameters	Provide Enforcement Mechanisms At Every Step In The Supply Chain	Build Proactive Components Into All Aspects Of Legislation And Data Systems
Be Transparent Regarding Expectations Around Timelines	Establish Pilots As Learning Opportunities	Create Ongoing Training For All Supply Chain Actors	Balance Top Down With Bottom Up
Embed Adaptive Learning Into Strategy	Be Transparent With Data Flows And Share Data Quickly	Ensure Trainings Are Wide And Deep To Grow Institutional Knowledge	Use Policy To Promote Stability
Set Interdisciplinary Focus And Map Roles And Responsibilities From The Start	Engage Mentors For In-person Trainings And Long-term Support	Promote Technological Communication	Focus On The "How" And "Why" Of Success In Order To Scale
Foster Relationships Between Key Leaders And Champions	Enlist Experts Who Can Talk Cross-sector (It, Fish, And Policy)	Anticipate And Budget For System Upgrades	
Resource Beyond Pilot		Balance Stability and Adaptability of IT Solutions	
Consider The Role Of An Intermediary			
Employ Human-centered Design (HCD) And Co-design			
Utilize Existing Experts			

THE PROCESS FRAMEWORK

Our framework (Figure 3) maps seven attributes that impact success of a holistic data modernization approach: Primary Drivers, Enabling Conditions, Funding, Leadership, Barriers, Tools, and Timelines. By analyzing how attributes manifest within each of four stages, practitioners can better design holistic data modernization approaches and anticipate where barriers may impede progress. This work builds upon and incorporates multiple studies that provide roadmaps for discrete elements of the data modernization process.

CONCLUSION AND NEXT STEPS

Modernization of government fisheries data systems offers great opportunity for advancing sustainable fisheries: when coupled with appropriate fisheries management frameworks, a robust data system enables effective fisheries science, management, and enforcement by providing accurate and timely information flow across diverse governance divisions. The key is to build an aligned and appropriately-resourced movement to create impact at scale. The following areas of opportunity aim to address core barriers by building the enabling conditions and supportive structures necessary to achieve long-term and larger-scale government data modernization systems for fisheries.

Advance a Central Fisheries Data Modernization Hub

The Need: Hundreds of reports, guides, toolkits, presentations, case studies, technology platforms, initiatives, awards, and events exist that can support specific stages or aspects of the data modernization.

While websites such as *SALT* and *EM4Fish* provide a promising step forward for aggregating these resources, content remains difficult to find, access, and apply due to a number of challenges. To advance the field, curated and multilingual content, as well as expertise, that is easily found and accessed by a diverse set of users is needed.

The Opportunity: Create a single, accessible, electronic forum that houses information for a broad range of data modernization needs and includes the following elements:

- *Curated and vetted list of data modernization resources* that are searchable and sortable.
- *Interactive Visual Map:* Map tools have been successfully used in other sectors such as the *timber industry* and are becoming more common *in seafood*. These visual guides provide means for users to both see where initiatives are happening as well as sort through information such as technology type, data platforms, technology vendors, existing laws and policies, species, or desired export market.
- *Translation of existing resources into other languages*
- *Reformat lengthy and dense materials* into visual/short guides and toolkits that are accessible to laymen.
- *Directory of experts:* A searchable database of experts in the data modernization field, including (where appropriate) contact information for practitioners.

Launch a Global Modernization Mentorship Program

The Need: Most governments lack in-house IT expertise to provide assistance, mentorship, and guidance to those implementing projects over the long-term time horizons necessary for scaled success. And, because every government has its own unique structural, policy, and process constraints, it remains challenging to adapt and apply existing tools and resources.

The Opportunity: What if government officials looking to implement data modernization had expert, customized, long-term support from a network of colleagues with experience in the unique challenges of government settings? Across the globe, there are individuals and agencies that have reached more advanced stages of implementation and have valuable expertise through learned experiences. A formalized mentorship program can streamline access to experts with the skills necessary to guide the design and implementation of new systems while effectively transferring knowledge, abilities, and experiences to local stakeholders. Over time, “mentees” maintain the project and share their experiences and expertise with others in the future.

Encourage Knowledge Sharing and Connect Experts

The Need: High touch, customized support is critical, but will take time to scale. Meanwhile, there is an immediate need to increase effectiveness of existing support systems for data modernization. At the moment, stakeholder support falls to two players: NGOs (efforts focused on shifting policy and process); and technology vendors (engage with the system at a very technical level). More often than not, these two groups lack alignment and are often engaging in the space for vastly different reasons, leading to conflicting, incomplete, or unclear information communicated to participants.

The Opportunity: Establish in-country support systems, which will look different for each country. For example, tailored support could come from: 1) use of an intermediary who can align and coordinate efforts among various stakeholders; 2) conducting research to identify the best approach to cultivating in-country expertise; or 3), developing a support program that champions government officials with interest in improving data. Additionally, prioritization of the following at a global scale can help build conditions for greater success, including:

- *Creating a common language around data modernization initiatives:* Define key terms, processes,

technologies, and project stages that can be utilized and recognized across technologies and geographies, by all stakeholders.

- *Providing training resources for technology vendors:* Equipping vendors with training in some of the tools and resources that already exist, as well as the strategy and mission of the project, can help to align messaging to government agencies about key issues such as data collection and sharing, verification mechanisms, or how and when to make technical changes to the system.
- *Support cross-sector information sharing:* The seafood sector potentially has much to learn from the systems that already exist for other commodities, such as timber, beef, or soy. A variety of tools and technologies ranging from field-based training materials to satellites, drones, and cameras, to DNA testing or RFID tags and AI are all already in use in parallel commodity markets; lessons learned from the implementation of these systems have tremendous potential value for the fisheries world.


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