TRANSFORMING FOOD PROCESSING

Navigating the future of seafood processing

From paper trails to digital traceability

A critical choice

Seafood processors face a critical choice, adapt to the increasingly digital landscape of traceability compliance or risk falling behind. Beyond compliance lies opportunity, with digital systems enhancing operational control and increasing market access. This white paper explores how processors of all sizes can navigate the shift from traditional paper-based systems to digital traceability solutions and embrace a sustainable future for the seafood industry.

Traceability and technology

The food traceability climate has been increasingly supported by technology. When awareness of overfishing and major food safety incidents increased regulations, widespread introduction of barcodes was key to enabling a shift in the landscape.

Today, the advancement of AI and IoT integrated technologies have the potential to facilitate ever more stringent food safety regulations and sustainable resource management. For those in the seafood supply chain, the increase of digital technology within the industry means a need to adapt and adjust. The investment in time and money this requires can be daunting. However, beyond meeting regulatory compliance, adopting digitalization has multiple benefits aiding seafood processors to meet the range of industry challenges and increase operational control. As technology advances so do the opportunities for better food safety, traceability and industry practices.

Beyond regulatory compliance,

why is traceability so crucial to the seafood industry?

Global supply chains are increasingly complex and at risk from environmental and human influences. Recent exposure of these vulnerabilities has shown the need to increase focus on ensuring a sustainable seafood industry.

- Stricter traceability requirements implemented in major markets are strengthening international cooperation to combat illegal fishing. The increased control helps monitor IUU (illegal, unreported and unregulated) fishing, manage fish stock, and minimize waste.
- Consumer demand for transparent sourcing is growing. Added transparency can be an opportunity for processors who implement digital systems which provide detailed data on products from source to plate. Verified sustainable seafood often commands higher market prices and brand reputation is protected as quick, targeted recalls are enabled through digital systems.
- Restaurants and retailers must now provide detailed dietary and allergen information to customers, with many also offering accurate source information. This data is easily made available through digital platforms, such as QR codes, supporting the demand of a consumer focus on diet, sustainable and environmentally responsible sourcing.

Traceability as it stands in the seafood industry today

Processing systems

Seafood traceability in many parts of the world has traditionally followed the basic 'one step forward one step back' approach, where businesses track their immediate suppliers and customers. Today, while leading many other food processing sectors in digital adaptation, the seafood supply chain largely relies on a combination of digital and traditional paper-based systems. Standard practices still centered around manual record-keeping, include catch certifications, landing declarations, logbooks and chain of custody documents. Many larger operations have been adopting sophisticated digital systems to manage data. While for many smaller processors, the cost of implementing a complex system is prohibitive and unsuited for their business.

A wide range of technologies to track products are in use today, ranging from basic barcoding systems to, at the other end of the scale, cloud-based traceability software that integrates with ERP systems managing data across complex supply chains. Regardless of the size of your business, there is a technology ready to enable future growth through the benefits of digitalization.

Fish management

In the 1990s, global frameworks targeting IUU fishing were introduced, with comprehensive catch documentation schemes becoming common in the 2000s. Catch schemes provide a means to share information about fish as they move through the supply chain, combating illegal fishing by verifying legal catch origins. Today, growing international cooperation is combating IUU fishing through data sharing and harmonized traceability standards. Supported with stricter traceability requirements being implemented in major markets.

- **Catch schemes reduce seafood fraud and species substitution, enable ecosystem-level monitoring of fish stocks, and support sustainable fisheries management by providing better data and monitoring of fishing and farming health.**
- **DNA testing is employed to verify species authenticity, while satellite monitoring systems track fishing vessel movements.**
- **Data from traceability systems is used to inform fishing management decisions and fishery improvement projects.**
- **Traceability systems are increasingly linked with sustainability certifications such as MSC.**

The challenge of today's regulatory landscape

The seafood industry faces unique challenges in current and emerging regulations and trends in global traceability. Fishing and food supply chain tracking has been emerging since the 1960s. In 2002 the EU introduced mandatory food and feed traceability requirements and in 2008 catch certification for imported seafood. The US Seafood Import Monitoring Program (SIMP) was launched in 2016 implementing stringent requirements for fisheries. Regulations have become more stringent as pressure on supply chains and food safety standards increase.

Aspect	FSMA 204 (US)	EU General Food Law Regulation	Safe Foods for Canadians Regulations (SFCR)	Food Standards Australia New Zealand (FSANZ)	Japan Food Sanitation Act
Scope	High-risk foods on FTL	All food or feed products	All food products	All food products	All food products
Traceability requirement	one step back, one step forward, plus additional KDEs	one step back, one step forward	one step back, one step forward	one step back, one step forward	one step back, one step forward
Data elements	Highly specific KDEs required	Specific KDEs required	Less prescriptive KDEs required	Less prescriptive KDEs required	Less prescriptive
Response time	24 hours	On demand	24 hours or shorter period if risk to human health	On demand	Not specified
Electronic records	Emphasizes electronic, sortable records	Not specified (CATCH mandatory digital)	Electronic or paper. Must be accessible in Canada	Electronic or paper	Not specified
Implementation deadline	January 20, 2026	Already in effect	Already in effect	Already in effect	Already in effect
Applies to imports	Yes	Yes	Yes	Yes	Less emphasis

Upcoming regulatory changes

In January 2026, partners on the food supply chains to the US and fisheries supplying the EU market will be required to meet new, stricter regulatory compliances with the introduction of FSMA 204 and CATCH. The industry expectation is that this will be the catalyst for an increasingly rapid shift in international regulations, forcing a dramatic increase in industry digitalization.

US – FDA FSMA 204

At its core, FSMA 204 is a rule designed to create a standardized approach to traceability in the US food industry. It mandates that businesses maintain Key Data Elements (KDEs) at Critical Tracking Events (CTEs) throughout the supply chain. It does not just affect US companies, but any supplier whose product ends up on the plates of US consumers. Processors need to be compliant with the new rules by January 20, 2026.

Five or more stops in a seafood supply chain is common, with the violability of products meaning inventory churn is measured in minutes and hours rather than days or weeks. To meet compliance supply chain partners will need to seamlessly pass information between players, which will require shared standards and protocols.

While the FDA does not mandate suppliers adopt digital systems, the requirement of suppling relevant data in a sortable format, along with all related documentation, within 24 hours of demand, predicate challenges for businesses dependent on manual and paper-based systems.

CATCH

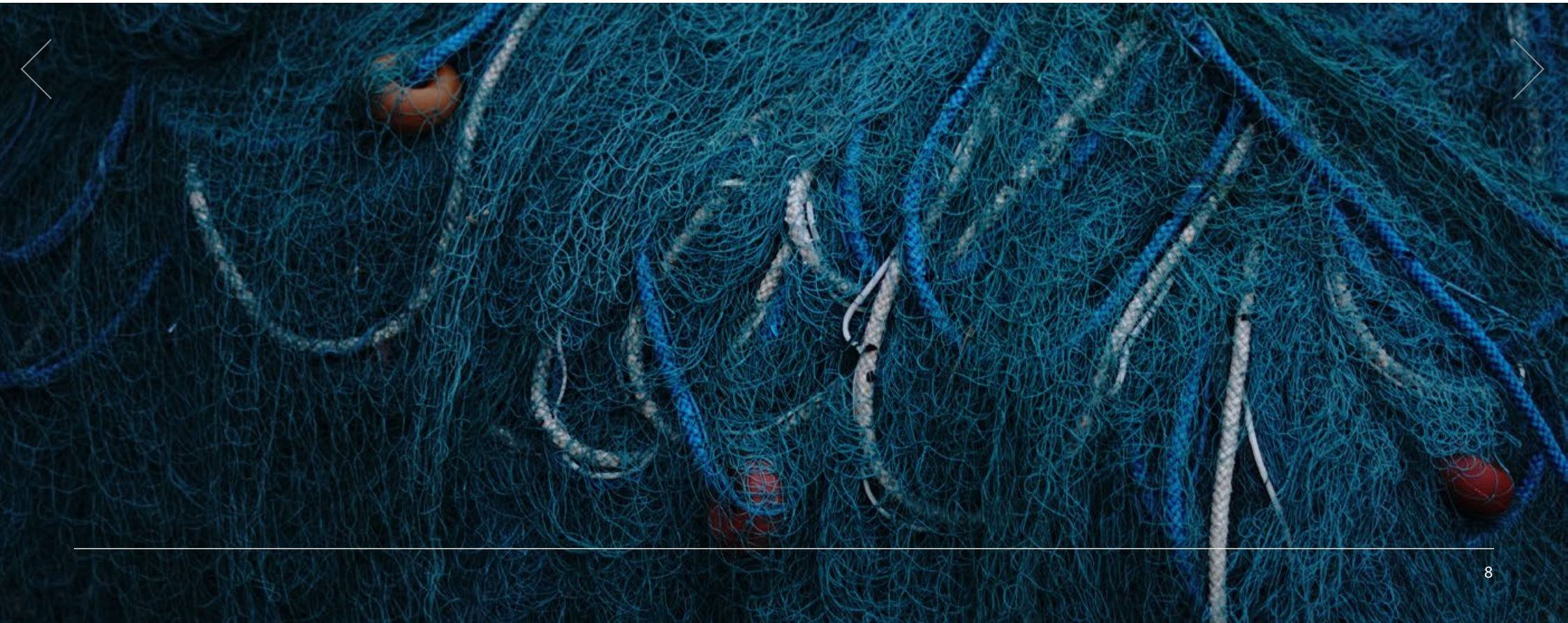
Building on EU General Food Law traceability requirements, as of January 10, 2026, fisheries that import to the EU are required to upload detailed catch certification and related documents onto the IUU regulatory IT system CATCH; including:

- **Fishing vessel identity**
- **Species caught**
- **Catch dates and areas**
- **Quantities landed**

The use of CATCH is mandatory. It streamlines the certification process with a fully digitalized workflow, thus facilitating the exchange of data, information and documents between trading parties and authorities. The aim of the improved, digital system is to prevent, deter and eliminate illegal, unreported and unregulated fishing.

CATCH primarily targets fishing vessels, fishing operators and importers of seafood products entering the EU market. However, seafood processors will need to interact with the system in two keys ways.

- As importers, when receiving raw materials, processors will need to verify that valid catch certificates exist in the CATCH system for incoming seafood from non-EU countries, if catch documentation is received on paper, the importer is required to enter the document into CATCH.
- Transferring the catch certificate to the next operator via the CATCH system. Processors that handle products with catch certificates and export to other countries will need to complete processing statements that link to original catch certificates.



Global perspective on traceability requirements

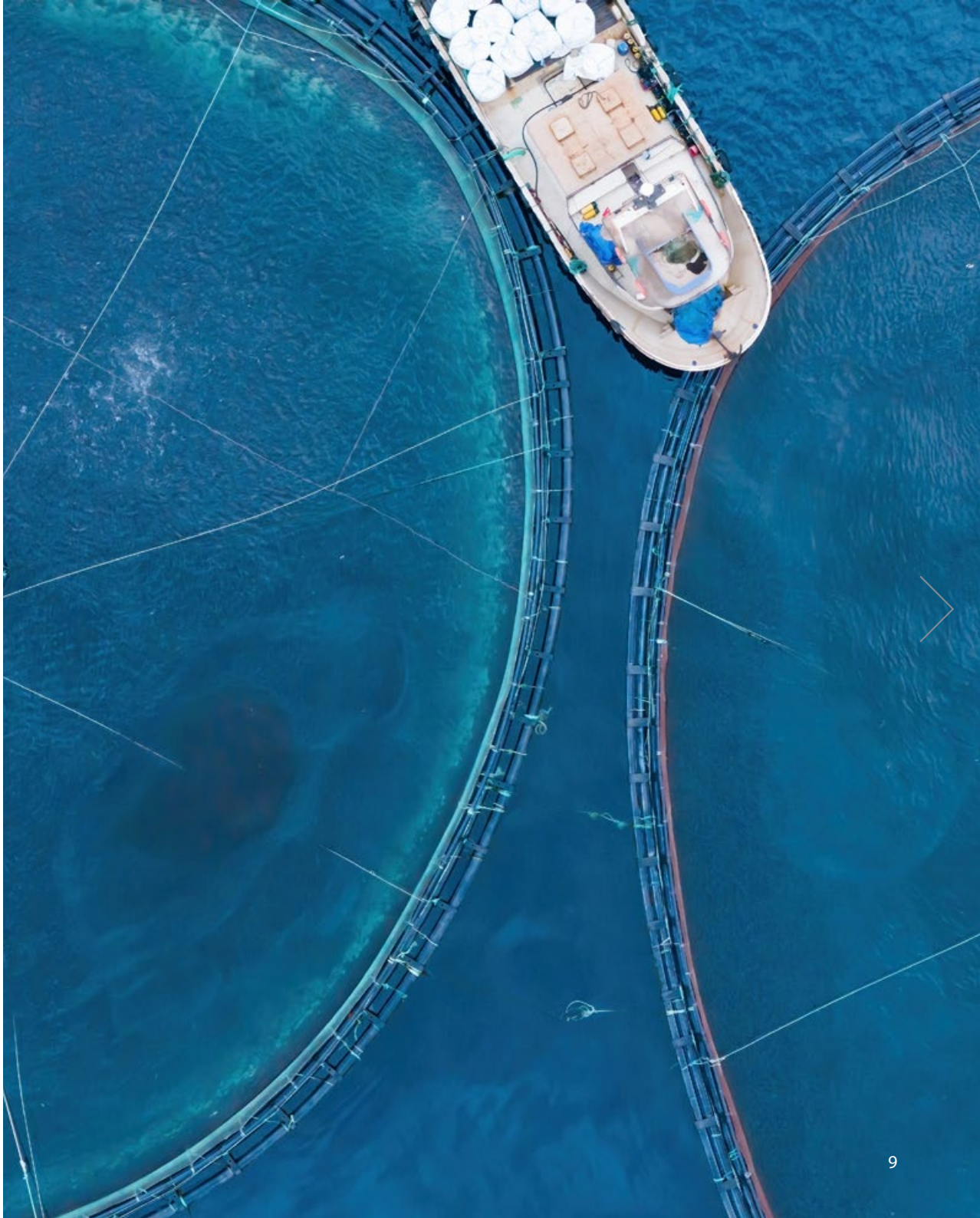
For businesses already operating globally, compliance with traceability regulations in one region, such as FSMA 204, may position you to meet or exceed other international traceability requirements.

The key to efficient compliance management is understanding which regulations affect your business; and if you are a global supplier, where they overlap and where they differ. Based on this analysis, processors can build a unified documentation system that satisfies all major markets, implement hierarchical compliance procedures and leverage technology to automate compliance across different regulatory frameworks.

By identifying shared compliance elements global businesses affected by more than one regulatory body can optimize costs and minimize rework. While smaller businesses may see an opportunity for growth.

How the 2026 regulations impact seafood processors

The most significant impacts to processors from the upcoming FSMA 204 and CATCH traceability regulations include the cost of introducing new systems and instigating efficient data sharing and communication between supply chain partners.



Solutions: traceability technologies available today

	BASIC Solutions		ADVANCED Production Solutions			DATA MANAGEMENT Systems	
	1D Barcodes	**GS1 Databar**	**QR Codes**	**RFID**	**IoT Sensors**	**Cloud-based systems**	**Blockchain**
Food safety compliance	Basic lot tracking only	Good, includes dates & weights	Excellent, comprehensive data storage	Excellent, real-time tracking	Excellent, continuous temperature logging	Comprehensive documentation	Complete traceability
Best for	Small operations	Mid-sized operations needing global compliance	Processors needing detailed product information	Large processors with automated lines	Processors requiring detailed monitoring	Multi-facility operations	Processors requiring absolute transparency
Processing speed	High – quick scanning	High – standard scanners	Moderate to high	Excellent – bulk scanning	N/A - continuous monitoring	Real-time data processing	Can handle high volume data
Cost impact	Minimal	Low	Low	Moderate-high	High	Setup + monthly subscription	High initial investment
Production integration	Minimal disruption	Some system updates needed	Flexible placement options	Requires line modification	Needs technical setup	Adaptable to existing systems	Complex
Key benefits	Simple & widely used	Works with existing scanners	Smartphone readable	No line-of-sight needed	Continuous monitoring	Accessible anywhere	Immutable records
Main limitation	Very limited data storage	Needs line-of-sight scanning	Requires internet full of features	High infrastructure costs	Requires technical expertise	Internet dependent	Complex implementation, security

Standardization and security considerations

The industry faces several significant challenges with source to fork traceability.

- Supply chain fragmentation makes it difficult to maintain consistent documentation across multiple handlers and international borders
- Data standardization remains problematic, with different regions and companies using varying formats and systems that don't easily communicate with each other
- Multiple traceability standards exist globally including GDST, GS1, EPICS
- Small-scale fisheries and processors often lack the resources to implement complex traceability systems
- Fraud and mislabeling continues, particularly in regions with limited enforcement capabilities

To facilitate the sharing of data efficiently between supply chain partners, large and small, businesses will need to work collaboratively along the supply chain. Deciding how much information will be included on product barcodes and how to ensure the correct data is shared safely.

Using global standards for product identification and tracking offers numerous benefits:

- Improved accuracy in data capture
- Enhanced interoperability across the supply chain
- Easier compliance with traceability regulations

GS1 standards and barcodes: the universal language of traceability

GS1 Standards play a crucial role in global supply chain management, providing a consistent system for identifying, capturing and sharing supply chain data. GS1 standards include:

- Global Trade Item Numbers (GTINs), unique product identification codes
- Serial Shipping Container Codes (SSCCs), for tracking logistics units
- Global Location Numbers (GLNs), for identifying physical locations

GS1 Standards align seamlessly with FSMA 204 requirements, facilitating the recording of KDEs through standardized barcodes such as GS1-128 and DataBar, the two most relevant for the food industry. By following GS1 Standards, businesses contribute to a globally consistent traceability system, paving the way for smoother international trade and improved food safety worldwide.

GS1 Global Data Synchronization Network - GDSN

Part of GS1 standards for global commerce, GDSN enables any company in any market to share high-quality product information globally. Product data is uploaded, maintained and shared automatically. The system enables real-time sharing, reduces errors and enables brad transparency to consumers.

Data security considerations

In today's digital landscape there are a number of key security topics of consideration and concern for any business sharing, accessing and storing data across digital networks:

Confidentiality: ensuring you send the right data to the right team, you are not sharing data with other suppliers, and that unauthorized access is prevented.

Integrity: ensuring that the data you send is correct and has not been tampered with.

Availability: having access to your data when you need it.

The increase in digitalization is unavoidable for today's seafood industry, thereby making risks to data security inevitable. For this reason, the EU introduced the NIS2 Directive with the specific aim of achieving a high common level of cybersecurity across EU member states, with the specified measures transposed into national law by 17, October 2024. While not limited to, NIS2 enforces higher levels of security compliance for food supply chains. The EU Cyber Resilience Act (CRA) introduced new rules to safeguard consumers and businesses using hardware and software with a digital component.

Dealing with the data security risks is a topic of high importance regardless of where data is kept. When data is stored in on-site systems, processors maintain control as the data remains in local IT/IoT environments. With the landscape shifting to cloud-based storage and cross business data sharing, it is inevitable the security risk will increase. Data security at this point is a shared responsibility between the processor and the service provider. The right digital partner will be available to discuss and explain how they keep your data secure.

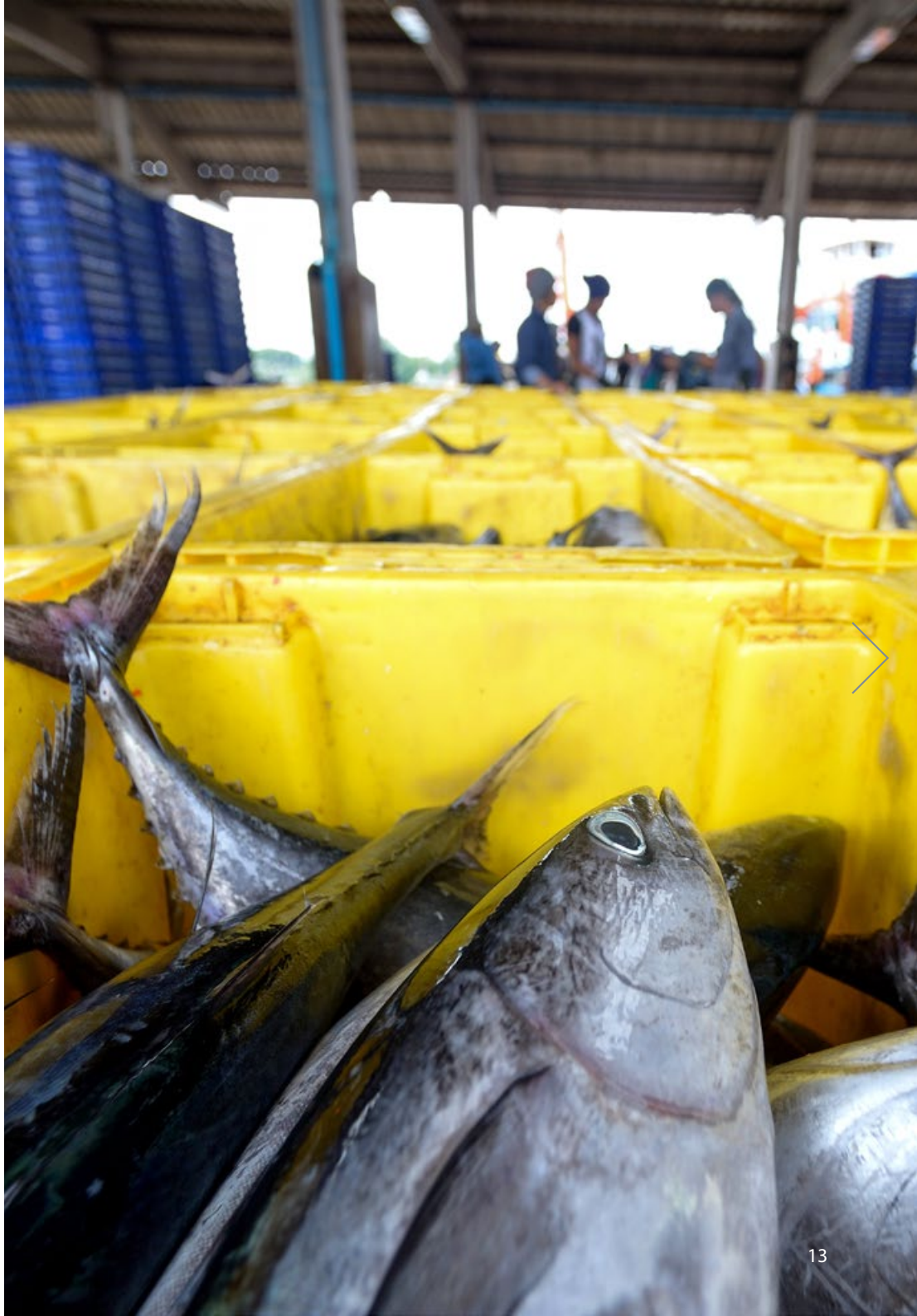
When working with a digital partner it is crucial to sit down with the right people and ask questions that demonstrate how the digital systems align with relevant data security regulations and information security protocols. The responses should reassure you that the confidentiality, integrity and availability of your data will meet the highest standards.

Implementation of the right system for specific business needs

Starting now is crucial to ensuring your business is ready to meet FSMA 204 and CATCH requirements. Understanding what needs to change and implementing those changes successfully is a process. The more time you give your business and your team to adjust the more successful the shift will be. Even if your business is unaffected by the upcoming FSMA 204 and CATCH regulations, remember, it is predicted the regulations will start a rapid shift in the traceability landscape, globally.

Roadmap of critical elements to consider:

1. Understand your current process
2. Communicate with your supply chain partners
3. Evaluate and select a software solution
4. Begin implementation and staff training
5. Run pilot programs and refine processes
6. Full implementation and continuous improvement



Is increasing digitalization worth the investment?

The need for adopting advanced digitalization goes beyond traceability. Utilizing today's technology can reduce margin pressure to ensure businesses in the food processing industries remain competitive, meet changing consumer demands, simplify meeting compliance and regulations, and optimize equipment and labor forces.

It can seem daunting and costly to implement a digital system. Although the advantages of complex digital systems are obvious, they are not the only option available. For many smaller and mid-sized businesses, implementing a cloud-based AI driven system won't make sense. By engaging a software and digital partner with industry experience, you can explore the multiple options that exist today such as barcodes, RFID, QR and Databar, which can all be employed to meet new regulations and begin the digital journey of your business.

The good news inside the challenges

As the pressure from regulatory bodies for more detailed, accurate data increases, businesses who use traditional paper-based and manual systems will experience increased challenges to meet requirements within specified time frames. Smart adaptation and adoption of innovative technologies is key to remaining a successful part of the seafood supply chain.

While traditional paper-based systems are becoming obsolete in their ability to meet compliance, current technology is available to support businesses with a range of digital solutions, from basic barcodes to cloud-based, AI integrated systems. Whichever option businesses choose, successful implementation requires careful planning and collaboration with supply chain partners to ensure compliance today, and the scalability for any future changes.

All businesses along the seafood supply chain can benefit from digital advantages beyond compliance, including operational efficiency, waste reduction and increased market access. For processors who need to meet the 2026 deadlines of FSMA 204 and CATCH compliance, the sooner adaptation begins the better. Short-term actions can start businesses on the journey of adopting digitalization, such as:

- identifying gaps in current systems by auditing current traceability systems and documentation processes
- assessing supply chain partners and opening communications
- planning for initial implementation steps of any necessary adjustments

Working with a strong digital partner with industry experience will support these short-term actions and enable long-term strategic planning. By understanding the gaps in current systems, energy and investments in digital integration can be focused to support your business evolution and create best practices for ongoing systems management. Aligning with global standards like GS1 will streamline data sharing and enhance the traceability of seafoods, supporting a safer food environment.

The time to act is now. The investment in digital traceability today will not only ensure compliance but also position your business for success in an increasingly competitive and regulated industry.

To explore these topics even further here are a few reference links to follow:

- **FSMA 204 (US): US Food and Drug Administration (FDA) website:**
  https://www.fda.gov/food/food-safety-modernization-act-fsma/fsma-final-rule-requirements-additional-traceability-records-certain-foods
- **EU General Food Law: European Commission website:**
  https://ec.europa.eu/food/safety/general_food_law_en
- **EU IT system CATCH FAQs:**
  https://oceans-and-fisheries.ec.europa.eu/system/files/2024-01/FAQ-amendment-IUU-Regulation_en.pdf
- **Canada (SFCR): Canadian Food Inspection Agency website:**
  https://inspection.canada.ca/food-safety-for-industry/toolkit-for-food-businesses/traceability/eng/1427310329573/1427310330167
- **Australia/New Zealand: Food Standards Australia New Zealand website:**
  https://www.foodstandards.gov.au/business/food-safety/fact-sheets/food-traceability
- **GS1 GDSN data standardization**
  https://www.gs1.org/services/gdsn
- **Digital security**
  https://digital-strategy.ec.europa.eu/en/policies/nis2-directive
  https://ec.europa.eu/commission/presscorner/detail/en/ip_22_5374
- **Seafood monitoring**
  https://www.fisheries.noaa.gov/international/international-affairs/seafood-import monitoring-program
  https://www.fao.org/home/en/