



Mapping of organizations, institutions and companies developing digital solutions to address forced labour in the fisheries sector

This mapping provides a snapshot of digital solutions that are being used or are in the process of being developed or trialled to address labour rights abuses and forced labour in the fisheries sector. It is by no means an exhaustive list but rather an attempt to map out the main players and some of the innovations that have the potential to improve the detection of labour rights abuses and forced labour on fishing vessels and throughout the seafood processing sector.

For ease of reading, the mapping has been divided into three broad categories: (a) fishing vessel tracking technology for monitoring forced labour and labour rights abuse at sea; (b) recruitment process and labour inspection tools to prevent and detect forced labour in fishing; and (c) traceability e-tools to prevent and detect forced labour in the seafood supply chain.

Organizations, companies	Technologies used	How does the technology apply to forced labour or other labour rights abuses?	Website
(a) Fishing vessel tracking technology for monitoring forced labour and labour rights abuse at sea			
Ecotrust Canada	Spyglass started as a criminal record of fishing vessels using basic technology (searching for key words on the internet, reviewing and extracting data from relevant documentation found).	<ul style="list-style-type: none"> Spyglass is a cooperative platform that publishes information from the criminal record of fishing vessels. It gives users free access to the criminal history of individual large-scale fishing vessels and their companies/owners and individual small-scale fishing vessels, in support of local governments, monitoring, control and surveillance agencies, local communities and the general public. Spyglass.fish is a portal. The database contains a record of various offences from 2010 to present day. Offences are divided into ten categories, including human rights and labour rights abuses.³ It currently holds about 10,000 cases. 	spyglass.fish/

³ The category defined by Spyglass for human rights and labour abuse encompasses: "All forms of abuse (to crew, observers, etc.), slavery, human trafficking, murder, underpayment, over crewing, overworking conditions, etc."



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<p>Nautical Crime Investigation Service (NCIS)</p> <p>NCIS is a tech start-up.</p>	<p>NCIS provides digital and technology solutions to curb maritime criminality and detect threats to maritime security. NCIS uses automated decision-making to develop upon the criminal record of fishing vessels¹ in over 60 languages. NCIS platform "HAVA" provides extensive information on fishing vessels, 19 crime baskets, and beneficial ownership, skippers, fishing companies, reports by governments, court cases and personal communications through private networks.²</p>	<p>HAVA is a platform that provides records of human and labour rights abuses at sea and traces the networks involved in such abuses. In addition to individual vessels and companies' criminal history, HAVA documents the risk levels associated with each company and each recruitment route to assist governments and civil society in preventing the occurrence of such crimes. HAVA is a live AI based portal accessed through a licence system.</p>	
<p>Global Fishing Watch (GFW)</p> <p>GFW is an independent international non-profit organization, which was founded in 2015 through a collaboration between three partners: Oceana, an international ocean conservation organization; SkyTruth, a technology firm that uses satellite imagery and data to protect the environment; and Google, whose tools and contributions help</p>	<ul style="list-style-type: none"> • GFW uses satellite technology – satellite imaging systems (infrared, optical and radar), Cloud computing and machine learning. • GFW combines tracking data from publicly available Automatic Identification Systems (AIS) and integrates it with information acquired through vessel monitoring systems (VMS) that are operated by governments and made available to GFW through partnerships. • Vessel tracking data is critical for tracking commercial fishing activity, but monitoring AIS and VMS still excludes a significant portion of global fishing activity. Imaging-based systems can detect vessels that have no tracking device or those whose tracking devices are or have been switched off to conceal their location. GFW is working to incorporate numerous satellite imagery sources for a complete picture of global fishing activity. It can be used to detect potentially illegal transshipment operations at sea, for instance. 	<ul style="list-style-type: none"> • GFW is in the process of developing a partnership with members of the Pacific Islands Forum Fisheries Agency to implement the minimum terms and conditions of access relating to decent working and living conditions. The minimum terms and conditions are used by the Agency's member States to define, as a minimum standard, the terms and conditions of access to their national exclusive economic zones by foreign fishing vessels. • To build the database of vessels with a high-risk of engaging in labour or human rights abuses, GFW analyses AIS and VMS data to determine whether vessels stay away from ports for longer periods, fish for more hours or tranship at sea. • Combining AIS, machine learning and on-the-ground expertise from human rights practitioners, GFW identified vessels with a high-risk of engaging in human rights abuses. GFW has established a list of approximately 200 vessels with a record of non-compliance with working and 	<p>globalfishingwatch.org/</p>

¹ The same criminal record of fishing vessels that was used to develop Spyglass.

² HAVA is a massive extension of the Spyglass platform developed by Ecotrust Canada.



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<p>process big data (AI and machine learning).</p> <p>OceanMind</p> <p>OceanMind is an independent non-profit organization that aims to empower fisheries enforcement and compliance. It is supported by Draper Richards Kaplan Foundation, the Pew Charitable Trusts and Satellite Applications Catapult.</p>	<ul style="list-style-type: none"> Using satellites, remote sensing, big data techniques, and AI, OceanMind brings together and analyses multiple data sources to get an understanding of vessel behaviour, such as fishing. By comparing this activity to the complex web of applicable rules and regulations, OceanMind’s algorithms highlight suspected non-compliance with applicable fisheries laws and regulations as well as international conservation and management measures. <ul style="list-style-type: none"> OceanMind uses a range of technologies and databases: <ul style="list-style-type: none"> vessel tracking data, such as AIS and VMS data, and low-cost tracking devices, such as cell phone-based systems; satellite remote sensing observations, such as synthetic aperture radar, electro-optical imagery, near infrared sensors, such as VIIRS, and a range of other satellite-based sensors; unmanned remote sensing platforms; in-situ sensors, such as buoys and tethered sensors; vessel registry and identity databases. 	<p>living conditions requirements on board fishing vessels or of forced labour (international labour standards as reflected in the Work in Fishing Convention, 2007 (No. 188).</p> <ul style="list-style-type: none"> GFW focuses on two issues: (a) understanding the vessel behaviours and characteristics associated with the use of forced labour in fisheries; and (b) supporting government efforts to tackle forced labour in fisheries; through coastal State boardings and port State inspections. OceanMind has been a fisheries enforcement partner with the Government of Thailand since 2015, providing advice, training and technology to the Department of Fisheries. OceanMind has also partnered with the Seafood Task Force in Thailand since 2015. OceanMind has also been in partnership with Sainsbury’s since 2015 to provide compliance assessment and due diligence support for their tuna supply chain. As part of its work to monitor non-compliance in fisheries, OceanMind has developed AI algorithms that understand fishing activities to high degrees of granularity. By breaking down fishing into different phases, such as setting gear, soaking gear and retrieving gear, it is possible to then apply human expertise and experience to understand how long the crew would need to work at each phase for different gear types. Through this granular understanding of fishing, Ocean Mind estimates the time a crew spends working during a fishing trip. This information is then used to highlight vessels at risk of breaching labour laws, including national working hours standards and to facilitate inspection when the vessel 	<p>oceanmind.global/</p>



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	<ul style="list-style-type: none"> OceanMind has been working with Microsoft since 2015 to advance the global vessel analysis. 	<p>returns to port. This same technique will be applied to a range of ocean-related activities where vessel behaviour can be correlated with the work of the crew.</p>	
Trygg Mat Tracking (TMT)	<ul style="list-style-type: none"> TMT has developed a fisheries intelligence database and analytical platform called FACT. This integrates multiple global data sources to monitor and analyse vessel identities, authorisations, compliance histories (fishing and associated crimes, including labour violations), and linked companies. The system is used to generate intelligence reports for partner countries, and also informs public tools such as the Combined IUU Vessel List, external partner platforms through Application Programming Interface (API), and joint tools such as Vessel Viewer. TMT uses satellite-based information (AIS and VMS) to track fishing vessels, satellite imagery, and analytical tools using AI. Unmanned Aerial Vehicles (UAVs) are being integrated into country assistance programmes. 	<ul style="list-style-type: none"> TMT provides national fisheries authorities and international organizations with expert fisheries intelligence and analysis to help with enforcement and broader improvements in fisheries governance. TMT works globally, but primarily targets fisheries crimes in and near African waters and assisting coastal African States. TMT has an implementing partnership with the Fisheries Committee for the West Central Gulf of Guinea. It supports and coordinates the work of the West African Task Force, which for the first time in 2021 addressed the issue of decent work and forced labour onboard fishing vessels. TMT maintains the Combined IUU Fishing Vessel List (https://iuu-vessels.org/). The website is intended as a public service to provide an updated and consolidated real-time listing of the main regional fisheries management organizations' IUU vessel lists. The vessel data is in the Combined IUU Fishing Vessel List, which is a subset of vessels in TMT's global fishing vessel database and analytical system FACT and which is continuously updated to record and monitor identity changes, operational information and illegal activities - including labour rights abuses - on the part of global fishing vessel fleets and associated companies. 	<p>www.tm-tracking.org/</p>
Allen Institute for Artificial Intelligence (AI2)	<ul style="list-style-type: none"> Skylight is a maritime monitoring and analysis software using AIS, synthetic aperture radar (satellite radar, or SAR), computer vision, and machine learning. 	<ul style="list-style-type: none"> Skylight is a tool for surfacing suspicious events (e.g., illegal or unreported transshipments) in the maritime domain. IUU fishing is the primary focus but Skylight can 	<p>support@skylight.global skylight.global/</p>



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	<ul style="list-style-type: none"> The platform’s machine learning and computer vision algorithms enable maritime analysts to identify anomalous vessel behaviour that can help detect illegal transshipments, “dark” vessels,⁴ and illegal fishing activities. Skylight’s real-time tracking gives users the ability to set up alerts needed to monitor and protect areas of interest. 	<p>be used for identifying other potential maritime crime activities.</p> <ul style="list-style-type: none"> Analysts can look up vessels entering their jurisdictions and determine how much time has elapsed since their last port of call – an indicator of vessels with risk of forced labour - and check if they may have conducted illegal transshipment operations. Technology partners include Global Fishing Watch and Trygg Mat Tracking. Partners such as the United Nations Organization on Drugs and Crimes (UNODC) and Blue Nature Alliance help Skylight scale the platform’s deployment across the globe through support for capacity-building, training and other resources to enforce fisheries regulations and protect marine reserves. 	

(b) Recruitment process and labour inspection and tools to prevent or detect forced labour in fishing

International Transport Workers’ Federation (ITF)

ITF is a Global Union Federation of transport workers. Any independent trade union with members in the transport industry is eligible for membership in the ITF. It is one of several global union

- In the merchant shipping sector, ITF has developed a series of seafarers’ applications, such as the [Look Up a Ship, Inspector or Union App](#), [the Wellbeing App](#) and [the Shore Leave App](#). While there is no dedicated tool for fishers the Inspector or Union App can be used by fishers.

No applications have yet been developed for the fisheries sector. Major issues to be overcome for current Apps to be used in the fisheries industry are language barriers because, unlike on merchant ships, English is not commonly used on board fishing vessels. Also, there is limited access to the internet in areas far away from any coastline.

itfglobal.org/en
itfseafarers.org/en/look-up

⁴ “Dark vessels” is the jargon used to denote vessels that have switched off their tracking devices to avoid detection.



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<p>federations allied with the International Trade Union Confederation.</p> <p>iRespond</p>	<ul style="list-style-type: none"> • The iRespond digital identity solution primarily relies on iris biometrics, the most accurate and reliable modality after DNA. Other modalities, such as finger or face recognition can be used instead of, or in combination with iris recognition. • iRespond is an international non-profit organization dedicated to solving the identity problem using a unique digital biometric identity solution. When a new migrant worker is enrolled, an encrypted biometric template is created from their iris scan and a randomly assigned number is drawn from a pool of 90 billion possible numbers. On subsequent visits, the identity of the participant is verified when their template is matched and the system returns the original unique identifier. The system operator uses the pseudonymous identifier within their ecosystem to positively identify the participant. • This technology could potentially be used to improve transparency in the recruitment and employment process and to monitor the changing of crews, both in ports and at sea, as well as time spent at sea. 	<p>iRespond worked closely with the Royal Thai Government to develop and deploy a secure identification solution to account for every fisher leaving from or returning to a Thai port. Over 170,000 migrant fishers are currently enrolled in the iRespond system.</p>	<p>irespond.org/</p>
<p>Mekong Club and United Nations University Macau Institute</p> <p>Diginex</p>	<ul style="list-style-type: none"> • The Apprise application was developed by the United Nations University Macau Institute (UN-Macau) in collaboration with the Mekong Club. The purpose of this application is to facilitate victim identification. Apprise is a tool designed to enhance the screening of vulnerable populations and unmask situations of forced labour and human trafficking. Through a mobile phone-based application and a web-based content management 	<ul style="list-style-type: none"> • The Mekong Club also takes an advocacy role regarding technology and its impact on modern slavery, organizing and participating in conferences, research studies and projects to develop innovative tools for the protection of human rights, as well as triaging cases. One version suggests referral agencies based on the outcome of interviews. 	<p>themekongclub.org/</p>



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	<p>system, front-line responders can communicate with vulnerable workers while ensuring inclusivity, privacy and consistency of the screening process.</p> <ul style="list-style-type: none"> • The tool uses sets of audio questions, recorded into workers preferred language, to identify cases of labour exploitation and forced labour. It currently provides workers with questions in over 25 languages, across 8 sector-specific question lists. Currently, it supports frontline responders to identify exploitation in: fishing, seafood processing, sex work, and domestic work. There is also a question list aimed to identify exploitative work practices that is not tied to a particular sector. Apprise also supports triaging cases by calculating the vulnerability of the situation (using a methodology based on ILO's <i>Hard to See Harder to Count</i> methodology), and suggesting next steps based on the outcome. • Three versions of Apprise have been developed: one for brands and social auditors that is currently being used in supply chains across Asia with partner companies (Apprise Audit); one for NGO workers and law enforcement officers that was used in Thailand in the fishing and fish processing sectors, and is being considered by law enforcement in other countries (Apprise); and one being used by IOM in Hong Kong (China) to support enhanced outreach and access to remedy for migrant domestic workers and other workers (IOM Apprise). • Apprise is an open-source tool and is currently being extended by a private company, Diginex. 	<ul style="list-style-type: none"> • UNU-Macau and The Mekong Club partnered with Thailand's Command Center to Combat Illegal Fishing to pilot the Apprise application during inspections of fishing vessels in Thai fishing ports, notably through the Port-in Port-out (PIPO) Centres (August 2019-January 2020).⁵ A longer study was undertaken with a number of NGOs who support fishers in exploitative situations: Stella Maris, Raks Thai, and LPN (July 2018 - Jan 2020). • Apprise Audit is being implemented within the ongoing social audit processes of a range of multinational brands and retailers (e.g., H&M, Philip Morris International, HSBC, and Adidas). • It has also been used by a number of cisgender and transgender sex workers' foundations and NGOs in Thailand to assess risk of labour exploitation in their communities and support workers with access to justice. 	
Stanford University	<ul style="list-style-type: none"> • A Digital Employment Platform has been developed to promote transparency in the recruitment process and 	<ul style="list-style-type: none"> • The Stanford Center for Ocean Solutions and the Stanford Center for Human Rights and International Justice are 	oceansolutions.stanford.edu/

⁵ The Command Center to Combat Illegal Fishing selected four PIPO Centres – Samut Sakhon, Chon Buri, Rayong and Chanthaburi – for the pilot.



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<p>Stanford Center for Ocean Solutions and Stanford Center for Human Rights and International Justice</p>	<p>monitor compliance with the provisions of employment contracts and terms of payment.</p>	<p>working together to address labour abuses in the tuna sector. Together, they are building a collaboration with leading researchers, the International Seafood Sustainability Foundation and some of its member companies, IOJI and other partners to develop tools that increase transparency and accountability in the recruitment of fishers for tuna vessels. The objective is to design and pilot a Digital Employment Platform for Indonesian migrant workers on Taiwanese-owned and flagged longline tuna vessels.</p>	
<p>Indonesia Ocean Justice Initiative (IOJI)</p>			
<p>Geeks Without Frontiers (GWF)</p>	<ul style="list-style-type: none"> • GWF’s mission is to promote technology in a resilient, technologically neutral and sustainable manner to bring the benefits of broadband connectivity to marginalized and isolated communities. • Low/no “airtime” (GSM Extenders and LoRa) solutions. Stand-alone or plug-in modules extending GSM to 30km and LoRa (100 km) coverage. Provides WiFi to crew and bridge staff. • “Universal” carry-on/off “Boat Box” connectivity solution designed to be carried on/off regardless of vessel type. Size approximately the same as a small desktop computer. Incorporates battery, power supplies (from vessel sources). Native support for vessel-wide (smartphone) and WiFi (crew and bridge). Houses “plug in” modules for GSM/VSAT/VHF/L-Band SBD. • “Metered” technologies (Swarm-like & L-Band SBD). Stand-alone or plug-in modules that connect to Low Earth Orbit (LEO) satellites for store/forward messaging. Provides “WiFi Interface” to crew and bridge staff (smartphone). • Emerging LEO Satellite connectivity (e.g., Starlink, OneWeb) that will enable simple internet connectivity at 	<ul style="list-style-type: none"> • In 2019, GWF worked on a USAID-funded project focused on Thailand entitled “Sustainability Models for the Global Fishing Industry”. The initiative laid the groundwork to bring Internet connectivity to small fishing vessels as part of the fight to protect human rights and the health of the oceans. • Since early 2021, as part of the “Secure and Safe Worker Voice at Sea” project funded by the Walmart Foundation and in partnership with OceanMind, Stella Maris Seafarers Centre, WWF Pacific, Francisco Blaha and iRespond, GWF has worked in Thailand and Fiji to gather user requirements and investigate innovative technologies to design sustainable, resilient and cost-effective connectivity business models that incorporate worker voice and fishery compliance validation mechanisms to help ensure workers’ safety. 	<p>https://www.geekswf.org</p>



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	<p>lower cost than traditional satellite.</p> <ul style="list-style-type: none"> VMS: conventional, application-specific system used by Government Institutions to track/report vessels within their Exclusive Economic Zone (EEZ). Uses traditional L-Band satellites (e.g. Inmarsat). 		
(c) Traceability e-tools to prevent and detect forced labour in the seafood supply chain			
<p>FishWise</p> <p>FishWise is a seafood consultancy firm.</p>	<ul style="list-style-type: none"> The Roadmap for Improving Seafood Ethics (RISE) is a free, online resource set up by FishWise to help companies navigate challenges and create the conditions for decent work across the seafood industry. RISE includes: <ol style="list-style-type: none"> industry-specific due diligence guidance tools and resources access to a community of human and labour rights experts. The RISE Roadmap includes guidance with eight simple steps that companies may take to build social responsibility programmes. 	<ul style="list-style-type: none"> With marine and social scientists and data analysts on staff and through strategic academic affiliations, FishWise translates scientific information into recommendations for a range of seafood stakeholders. FishWise works alongside retail partners and a network of experts and organizations to understand and improve human rights issues in seafood supply chains. FishWise has partnered with Conservation International to examine the issue of labour rights on board the tuna fishing fleets operating in the West and Central Pacific Ocean. FishWise has a project to study the recruitment process of Indonesian nationals to crew tuna fishing vessels flagged in Fiji. FishWise is supporting the collection of data that are useful to ensure labour protection on board fishing vessels and throughout the seafood supply chain. 	<p>fishwise.org/</p> <p>riseseafood.org</p>
<p>Seafood Alliance for Legality and Traceability (SALT)</p>	<ul style="list-style-type: none"> SALT has created the <i>Comprehensive Traceability Principles and Pathway</i>. The Principles advocate for government implementation of electronic traceability programs that yield comprehensive benefits including improved data for: fisheries management (ecological), reduced risk of human rights and labour abuses in seafood supply chains (social), and efficiencies and compliance with seafood import requirements (economic). The 'Pathway to the Principles' is a web- 	<ul style="list-style-type: none"> SALT is a global community of governments, the seafood industry and non-governmental organizations working together to share ideas and collaborate on solutions for legal and sustainable seafood, with a particular focus on traceability – the ability to track the movement of seafood through supply chains. SALT is a public-private partnership between the United States Agency for International Development and the 	<p>salttraceability.org/</p>



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	<p>based portal laying out steps to implementing the Principles. It includes guidance on social and labour topics – particularly as they intersect with traceability.</p> <ul style="list-style-type: none"> SALT maintains a seascape map that compiles traceability, counter illegal fishing and social responsibility efforts throughout the world. 	<p>Packard, Moore and Walton family foundations and is implemented by FishWise.</p> <ul style="list-style-type: none"> SALT’s objectives are fourfold: <ol style="list-style-type: none"> empower the seafood sector to adopt electronic traceability; improve fisheries management and verify seafood data; incentivize traceability to ensure the legality of seafood across supply chains; apply seafood traceability systems to support human and labour rights. 	
C4ADS	<ul style="list-style-type: none"> Since 2017, C4ADS has developed an analytical methodology designed to consistently trace vessel ownership back through several layers of companies in an effort to identify fishing vessels’ ultimate beneficial owners. In 2018, C4ADS demonstrated that it is possible to map beneficial ownership networks behind industrial fishing fleets at scale and with precision by leveraging the global democratization and proliferation of open data. C4ADS analytical methodology is built primarily on official documentation and data from national corporate, property, and judicial registries, and secondarily on other credible public datasets, such as national vessel registries, regional fisheries management organizations’ authorized vessel lists and trade records. 	<ul style="list-style-type: none"> In 2019, C4ADS built the Triton platform to share C4ADS information on vessel ownership publicly as a resource for fishing and seafood industry stakeholders interested in heightened transparency and enhanced traceability. By publicly disseminating such data, C4ADS aims to support enhanced due diligence and regulatory reform on an industry-wide scale. 	https://triton-transparency.com/

Websites of interest:

- Tech against trafficking, <https://techagainstrafficking.org/interactive-map/>
- Fair Fish: Fostering Accountability in Recruitment for Fishery Workers (a United States Department of Labor-funded project), www.dol.gov/agencies/ilab/fair-fish-fostering-accountability-recruitment-fishery-workers#