
SECTOR OPPORTUNITY SCAN

Where the sector still runs on people reading documents

**An automation and AI opportunity scan for maritime, rail, road, inland
waterway and multimodal transport**

Deepsea · Shortsea and breakbulk · Terminal operators · Rail freight · Road haulage · Inland
waterway · Multimodal

Second edition, September 2026

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Why this report exists

Transport is one of the most heavily optimised industries in the world. Vessels, terminals, wagons and trucks have been engineered for decades against cost per unit moved. The physical layer works.

The information layer around it does not work nearly as well, and that is where the money now sits.

This report is a scan of the whole sector, written from the outside, with a European focus. It covers deepsea and shortsea shipping, terminal operators, rail freight, road haulage, inland waterway and multimodal operations, with logistics service providers touched on only where they sit in the same chain. It sets out three things:

- What the operational and commercial bottlenecks actually are, with evidence.
- What the industry already buys to solve them, and what those purchases leave untouched.
- Where automation and AI can step in, including in places that rarely appear on a technology roadmap because they do not look like technology problems at all.

A note on evidence. Every figure is referenced in section 16, and each source is graded there. Where a number comes from a supplier who sells the solution, we say so. Where a number could not be traced to a primary source, we either cut it or label it. Several widely repeated industry statistics did not survive that test and are not in this report. Figures are in euro.

A note on honesty. We have written this without access to your systems, your volumes or your cost base, so nothing here should be read as a finding about your business. It is a map of where, in this sector, value tends to be hiding.

On this edition. A practitioner with a long career in the sector read the first edition and marked it up. This edition carries his corrections and the four points he raised that were missing, which are noted where they appear. Comments of that kind are worth more to us than agreement, and the offer in section 15 is open to anyone who wants to do the same.

On air freight. Air cargo is deliberately out of scope. It is the most digitally advanced of the freight modes, and its data standards work is further along than the sea, rail and road equivalents: in an IATA survey published in December 2025, over 70% of respondents were aware of the ONE Record data standard and nearly half described themselves as ready to adopt it. The argument this report makes, that the information layer lags a long way behind the physical one, applies least to air. Where air appears in an operator's business it is usually one leg of a multimodal chain, and the handover bottlenecks in section 10 apply to it as they do to any other interchange.

A note on language. We are an automation and AI implementation agency. Plenty of what follows needs no AI at all, and saying so matters. A rules engine that checks a declaration against a code list is automation. A model that predicts when a container will be collected is AI. Confusing the two is how organisations end up buying the expensive answer to a cheap problem.

The pattern behind the bottlenecks

Across every mode we looked at, the same three findings appear.

2.1 The physical layer is optimised. The information layer is not.

A container moves from Shanghai to Rotterdam with remarkable efficiency. The paperwork that governs it does not.

The best-documented illustration is academic rather than commercial. In a study published in 2018, Jensen, Vatrappu and Bjørn-Andersen traced a single refrigerated container of avocados from Mombasa to Rotterdam and found **at least 40 actors across more than 30 organisations in seven countries**, using **over 100 documents and separate pieces of information**, spanning more than 30 separate IT systems, eight border crossings and eleven authorities. Maersk, presenting its own version of the same route at an industry conference in 2017, counted around **200 information exchanges** in a mix of electronic messages, paper, handwritten delivery notes and informal notes.

The dates matter, and they are the reason for citing work of that age here. Those two accounts, from 2017 and 2018, are what set off a large share of the digitalisation programmes the sector has run since. Close to a decade later, the exchanges are more electronic than they were, the count has not fallen much, and the coordination burden has moved rather than disappeared.

2.2 The expensive work is judgement between systems

Sector conversations tend to focus on the two ends: the asset, and the enterprise system that records what the asset did. The cost is concentrated in the middle, in the human work of getting from one to the other.

Reading a document that arrived in an unpredictable format. Checking it against rules that were never written down. Deciding whether an exception matters. Chasing a counterparty for a correction. Reconciling one system's version of events against another's. Explaining, later, why the two do not match.

Very little of that work appears in an operations KPI. It appears in headcount, in overtime, in claims that time out, and in the quiet observation that the business cannot grow volume without growing the back office at roughly the same rate.

The structural point does not depend on a statistic. Any operator can test it in an afternoon by asking a specialist team what proportion of their week is spent preparing to do their job rather than doing it. In bulk shipping demurrage, the specialist provider Marcura puts that

proportion at around three quarters, with a single claim running to roughly 45 discrete steps. That is a supplier's own observation of its market rather than an independently measured figure, and we have not found an independent measurement of it anywhere. We include it because the shape it describes matches what operators in every mode describe when asked, not because the number itself is proven.

2.3 Experience is doing the work that data should be doing

The third pattern is the one operators recognise fastest and discuss least.

In most transport businesses, a large share of operational decisions rests on individual judgement rather than on evidence. Which customer collects late. Which agent sends unusable paperwork. Which terminal actually takes four hours rather than the two it publishes. Which subcontractor is worth trusting with a high-value load. These are all empirical questions. The answer is sitting in the operator's own historical records. Almost nowhere is it retrieved from there. It is retrieved from the person who has been doing the job longest.

That has three consequences. The judgement is usually good, so it is rarely challenged. It cannot be checked, improved or handed over, because nobody can see the reasoning. And it leaves the business when the person does.

That last point is now a scheduled risk rather than a theoretical one. Around a fifth of Europe's professional drivers, and a comparable share of the operational and administrative staff around them, are due to retire within five years.

The replacements are not arriving in the numbers required, and the sector should plan on that basis rather than hope otherwise. The IRU already counts 502,000 unfilled driver positions in Europe alongside that retirement wave, and the shortage has widened rather than narrowed since 2021. Recruitment will close part of the gap. It will not close the part that consists of undocumented knowledge, because a new joiner arrives without it and the person who held it has gone.

2.4 The gap is an integration gap, not a product gap

Ask a terminal operator, a shipping line or a haulier what systems they run, and the answer is rarely "none". They have a TOS, a TMS, a planning system, a finance system, a compliance tool, a customer portal, a telematics feed and a shared mailbox. The problem is almost never the absence of a system. It is that the systems were bought at different times, for different departments, from different suppliers, and the joins between them are people.

This changes what a decision maker should be shopping for. The market sells products. The gap is bespoke. Most of the value described in this report is unlocked not by buying another platform, but by connecting what already exists and putting reading, checking and deciding into the join.

It also changes the risk calculation, and this is the part that tends to win the argument internally. A system that is solid but not modern can stay exactly where it is, with the modern layer placed on top of it. The operator keeps a core that already works and that the organisation knows how to run, avoids a replacement programme with a budget large enough to threaten the business if it fails, and still gets the benefit of current technology. Replacement can then become a decision taken later on its own merits, rather than the entry ticket to any improvement at all.

What the industry is already buying

Any honest scan has to acknowledge that this sector is not standing still. The following are well understood, actively sold, and in many cases genuinely worth having.

Already on the roadmap	What it does well	What it leaves untouched
Terminal automation (ASC, AGV, automated stacking cranes)	Removes labour and variability from the physical move	Says nothing about whether the move should have happened at all
Terminal operating systems and TMS	Records and instructs; the operational backbone	Assumes clean, timely input; degrades quietly when input is late or wrong
Route and load optimisation	Real savings on fuel, distance and asset use	Optimises against the plan it is given, not against the quality of the data behind it
Predictive maintenance	Mature, measurable, well proven on vessels, wagons and fleets	Covers assets, not processes or documents
Telematics and track and trace	Visibility of where things are	Visibility is not a decision; most operators now have more data than they act on
Port community systems and single windows	Standardised message exchange between known parties	Works for structured messages between connected parties; the long tail of email, PDF and spreadsheet stays outside
Autonomous vehicles and vessels	Genuine long-term shift	A decade-scale capital programme, not an operating improvement available this year
Digital twins and simulation	Excellent for planning and capital decisions	Rarely wired back into daily operational decision-making
Emissions and ESG reporting tools	Meets the reporting obligation	Usually a reporting layer bolted on, not connected to how a shipment is priced or planned

The consistent pattern is worth stating plainly. Existing purchases optimise the parts of the business that were already measured. They tend not to touch the unmeasured administrative and exception-handling work, because that work is spread thinly across many people and never showed up as a line item that justified a project.

On adoption, the honest position is that nobody has a reliable market measurement. The most-quoted figure, a maritime AI market of around €3.6 billion in 2024 growing at roughly 23% a year, comes from research by the specialist consultancy Thetius commissioned by Lloyd's Register, published in 2024. It is a bottom-up sector estimate with an unpublished methodology, and the same research reported the market nearly tripling in a single year, which suggests the definition widened rather than that spending tripled. The barriers reported in the same work are more useful than the market size, and they match what we found: data maturity, workforce skills, and integration between systems and departments. The technology is not the constraint. The joins are.

Maritime: deepsea

4.1 Schedule unreliability has become a permanent planning assumption

Global schedule reliability remains structurally poor and has been getting worse through 2026. Sea-Intelligence recorded 59.0% in February and 62.6% in June, then **56.4% in July 2026**, the lowest month of the year, with the average delay for late arrivals reaching 6.06 days. Only one carrier was above 70%.

Every party downstream of that number, terminals, hauliers, rail and barge operators, shippers, absorbs the variance through buffers: extra yard space, extra equipment, extra staff on standby, extra phone calls. The industry treats this as weather. It is partly weather and partly a coordination problem, and coordination problems respond to automation in a way that weather does not.

THE OVERLOOKED OPPORTUNITY

The common approach is to plan against the schedule you were given and re-plan reactively when it slips. Very few operators maintain their own probabilistic view of arrival, built from their own record of how a given line, service and vessel has actually behaved at their facility. That model is not difficult to build, and it changes berth planning, labour rostering and equipment allocation more than any of the visibility tools currently being bought. It also replaces a running argument about whose ETA to believe with a number that can be checked against outcomes.

4.2 Documentation remains the single largest pool of manual effort

Bills of lading, manifests, dangerous goods declarations, verified gross mass submissions, customs filings, certificates of origin, phytosanitary certificates, letters of indemnity. Most of these arrive as email attachments in formats nobody standardised.

Electronic bills of lading illustrate the gap between direction and reality. The Digital Container Shipping Association, the Amsterdam-based standards body whose nine member carriers move the large majority of global container volume, committed those members in 2023 to **100% electronic bills of lading by 2030**. Adoption has moved from roughly 1% in 2021 to **around 11% in 2025**. Real progress, and still a long way from the target.

What is instructive is the DCSA's own diagnosis of why. It is explicitly not a technical or legal problem. The association attributes the remaining gap to what it calls soft barriers: hesitation to commit, misaligned incentives between parties, and low confidence in whether anyone else is ready, with close to a third of stakeholders saying they are waiting on others to move first.

The legal groundwork, meanwhile, is largely done in Europe. The UK's Electronic Trade Documents Act 2023 gives an electronic trade document the same effect as its paper equivalent, and the EU is moving the same way through the eFTI Regulation described in section 8.4.

THE OVERLOOKED OPPORTUNITY

If the barrier is that counterparties are waiting for each other, then waiting is not a strategy. The available response is to stop trying to make counterparties send clean data and instead read whatever they send. Reading an unfamiliar document layout reliably was not possible three years ago. It is close to solved now, and it is the single highest-value unglamorous capability available to a shipping business in 2026.

4.3 Laytime and demurrage: a measurable, recoverable leak

Bulk and tanker operators have a process problem that is unusually well suited to automation, and unusually badly measured.

We looked hard for a defensible figure for the size of the demurrage market and could not find one. The numbers in circulation come from software suppliers, and the most-quoted of them turns out to be one assumption restated as two findings. We are not going to repeat them. The process description below is credible, is consistent across sources, and does not need a market size to be actionable.

The leakage has four named causes:

- **Missed time bars.** Deadlines tracked manually or across disconnected systems slip, and a claim that expires is unrecoverable. Marcura cites one portfolio that lost close to €390,000 in a single year this way. That is a supplier's account of one client, not a benchmark.
- **Incomplete calculations.** Under volume pressure, analysts transcribe selectively, and unrecovered detail compounds across the portfolio.
- **Unusable data.** Statements of facts exist but are not held in queryable form, so patterns across counterparties stay invisible and every claim is argued from scratch.
- **Knowledge loss.** When an experienced analyst leaves, an undocumented understanding of which counterparty disputes which clause leaves with them. This is section 2.3 in its most expensive form.

THE OVERLOOKED OPPORTUNITY

This is the clearest example in the sector of a process combining document reading, deterministic calculation and deadline management. All three automate well. The reason it has not been automated in most operators is that it sits with a small specialist team rather than in an IT roadmap, and the loss is invisible, because you cannot see a claim you never made.

4.4 Port disbursement accounts and voyage cost control

Every port call generates a proforma disbursement account from the agent, then a final account, then a reconciliation that in many operators is done by eye against a tariff nobody has time to re-read. Agency fees, pilotage waiting and cancellation charges, tug standby, mooring premiums, waste and sludge removal, customs and immigration overtime, security and sanctions screening costs, and increasingly at-berth emissions charges.

Published figures on the average overcharge do not exist, which is itself the finding: this category is not systematically measured by anyone.

THE OVERLOOKED OPPORTUNITY

Checking a final disbursement account against a published tariff, against the proforma, and against what the same agent charged at the same port last quarter is arithmetic and comparison. It is exactly the work an automated agent does consistently and a human does unevenly at six o'clock on a Friday. Few owners and operators have automated it, because it has always been classed as a judgement task for experienced people. It is not. It is a lookup, a subtraction and a comparison against your own history.

4.5 Regulatory load is now continuous rather than periodic

2026 is the year the compliance burden in European maritime stopped being a project and became an operating process. As at September 2026:

- **EU ETS reached full phase-in on 1 January 2026.** Operators surrender allowances for 100% of 2026 emissions, up from 70% of 2025 emissions, and methane and nitrous oxide enter the scope, moving the calculation from CO₂ to CO₂e. The surrender itself falls due in September 2027, so 2026 is the year the exposure accrues.
- **FuelEU Maritime** completed its first compliance cycle, with verification and compliance statements due by 30 April 2026. The operationally significant outcome is how compliance was achieved: research by the Mærsk Mc-Kinney Møller Center for Zero-Carbon Shipping found that **over 90% of ships met their 2025 obligations through pooling**, with 2% borrowing and 7% switching fuel or paying the penalty. Portfolio-level compliance management, not per-vessel compliance, is now the normal model.
- **UK ETS extended to maritime on 1 July 2026**, covering cargo and passenger vessels of 5,000 GT and above on domestic UK voyages and their in-port emissions, with a 50% deduction on Northern Ireland to Great Britain voyages. Offshore vessels follow on 1 January 2027. Operators need an approved emissions monitoring plan and an annually verified report, with the first surrender, for the 2026 scheme year, due 30 April 2028.

Each of these affects exposure, cost allocation, invoicing and commercial decisions continuously through the year, not once at reporting time.

THE OVERLOOKED OPPORTUNITY

Compliance is usually approached as reporting. The more valuable framing is that a company now needs a live, per-voyage, per-customer view of carbon cost that can be surfaced at the moment of quoting. Very few can do that today, and the ones who can will price better than the ones who cannot.

4.6 Misdeclared cargo

Allianz Commercial's Safety and Shipping Review 2026 records a containership fire roughly **every 17 days** globally and more than **200 fires on large vessels during 2025**, at least nine of them total losses, the second-highest annual total of the decade. Vehicle carriers see a fire roughly every 37 days. Global lithium-ion battery deployment in 2025 was around six times higher than five years earlier, with demand expected to double again by 2030.

Misdeclared cargo is consistently identified as a leading cause. The London-based TT Club has argued since 2019 that dangerous goods declaration quality should be the first focus of container safety work, estimating around 1.3 million potentially unstable dangerous goods containers moving annually alongside more than 150,000 undeclared or misdeclared ones.

European waters are not a quiet corner of this picture. The same Allianz review counted **619 shipping incidents across the British Isles, North Sea, English Channel and Bay of Biscay** and **622 in the East Mediterranean and Black Sea**, the two highest regional totals worldwide.

THE OVERLOOKED OPPORTUNITY

Screening booking descriptions against known misdeclaration patterns is a text classification problem with a very high expected value per catch. Industry-level programmes have shown the principle works. Individual lines, forwarders and terminals can run the same logic against their own booking flow, and almost none do.

Maritime: shortsea, breakbulk and ro-ro

Shortsea is where the administrative burden bites hardest, because the voyage is short and the paperwork is not.

A deepsea voyage of three weeks can absorb a 2-day documentation delay. A shortsea voyage of 30 hours cannot. The same manifest, customs, security and port formality obligations apply, compressed into a fraction of the time, against thinner margins and smaller back-office teams.

Europe has been working on part of this. The **European Maritime Single Window environment**, Regulation (EU) 2019/1239, has applied since **15 August 2025** and harmonises ship reporting formalities across the national single windows, so port call data is reported once in one standardised way rather than differently in each member state. It fixes the interface with authorities, and that is worth having. It does nothing about the documents arriving from agents, shippers and forwarders, which is where the manual effort actually sits.

5.1 There is no standard format for non-container cargo

For containers, there is at least a message standard to aim at. For grain, paper, forest products, steel, project cargo and general breakbulk, there is not. Manifests arrive as PDFs, Excel files, Word documents, scans and email bodies, in whatever layout each agent happens to use.

Where electronic import is impossible, a team types it in. This is one of the largest remaining concentrations of low-value manual effort in European transport, and it is almost entirely absent from sector technology discussion because it is unglamorous and distributed across hundreds of small operations.

5.2 Validation happens after the fact

Breakbulk is discharged quickly and checked against the manifest once it is in the warehouse. By then the vessel has often sailed. A discrepancy found at that point becomes correspondence, an amendment and sometimes a customs hold, rather than a 5-minute correction before arrival.

5.3 Cargo dues and wharfage accuracy

Conservancy, wharfage and cargo dues are assessed on manifest tonnage. Manifest errors therefore flow straight into invoices, in both directions. Undercharging is a silent revenue leak. Overcharging is a customer relationship problem that surfaces months later.

THE OVERLOOKED OPPORTUNITY ACROSS SHORTSEA

The highest-return move is not a new port system. It is a reading and checking layer between the agents' inbound email and the systems the operator already runs, validating every line when the document arrives rather than when the cargo does. The commercial effect is larger than the cost saving. An operator who tells an agent about three errors within minutes of receiving a manifest stops being the party who absorbs bad documentation and becomes the party who sets the standard for it.

Terminal operators

6.1 Unproductive moves are the dominant hidden cost

The most detailed recent measurement of this comes from a study of a mid-sized container terminal in Veracruz, Mexico, published as a preprint by Villalobos and colleagues in 2026. At that terminal, **up to 75% of container-handling moves were classified as unproductive**, and approximately **51% of those unproductive moves involved containers requiring pre-clearance services**, meaning administrative procedures by customs brokers before release.

Two caveats matter, and we would rather state them than have a reader find them. The paper is an unreviewed preprint, and it covers one terminal, whose authors explicitly caution against generalising the figure. We could find no peer-reviewed study reporting a comparable industry-wide prevalence, which is itself worth knowing: this is a large cost pool that the sector has not systematically measured.

Read the second figure carefully, because it is the one that transfers regardless of the exact percentage. The largest single driver of wasted crane and reachstacker time at that terminal was not stacking strategy. It was administrative status the terminal did not know at the moment of stacking.

6.2 The stacking decision is made before the information exists

A container is placed the moment it is discharged. The information that determines when it will leave, a vehicle booking, a customs clearance, an inspection order, typically arrives days later. Operators are not ignoring the system when they deviate from it. They are filling a gap the system cannot fill either, often with better judgement, because they hold context the system does not.

Deviation then degrades the data. When a box is placed somewhere other than where the system expected, the system's picture of the yard drifts from reality, the next instruction is based on a slightly wrong picture, and gets overridden in turn.

THE OVERLOOKED OPPORTUNITY

In the same study, machine learning models predicting dwell time performed strongly at the extremes: for containers staying more than seven days, precision approached 80% with recall above 90%, against the terminal's existing rule-based heuristics at roughly 25% precision and 30% recall. Predicting which containers will sit for a long time is enough to change stacking policy, even without predicting the middle of the distribution accurately.

The practical version is unglamorous: stack in bands by predicted departure rather than by available space, let the prediction harden into fact as customs status and vehicle bookings arrive, and use quiet windows between vessels to correct mis-banked boxes rather than digging for them while a truck waits.

6.3 The gate and the driver visit

Truck appointment systems are widely deployed and well studied. What is less examined is the number of separate data entry points a single driver visit still generates, and how many of those are re-keyings of information the terminal already holds.

6.4 Maintenance and repair, damage and interchange

Equipment interchange receipts, damage surveys and repair estimates remain heavily manual, and the resulting disputes between terminals, depots, lines and hauliers consume disproportionate commercial time relative to the sums involved. Image-based damage detection is technically mature. Adoption is patchy, and where it exists it is usually not connected to the estimate and dispute workflow that follows.

6.5 Berth and labour planning against unreliable arrivals

With schedule reliability in the high fifties, berth plans and shift rosters are built on numbers known to be wrong. Terminals that maintain their own arrival probability model, rather than accepting the published ETA, gain a planning advantage that costs almost nothing in capital.

Rail freight

Rail carries the sector's clearest structural challenge and, for that reason, some of its most overlooked automation opportunities.

7.1 The performance picture

The European Union Agency for Railways' *Report on Railway Safety and Interoperability in the EU 2026* sets out the position:

- Rail freight reached approximately **12% of the wider freight market in 2023**, with **no meaningful increase in transport work since 2006**.
- At border areas, **planned transfer times exceeded actual times by around 90 minutes**, and in some cases by more than **200 minutes**.
- In **over half of analysed sections in 2025**, the average exit delay for freight trains was **above 90 minutes**.
- **ERTMS was deployed on only 15% of European Transport Corridors** by late 2024, with GSM-R at 57% and roughly a quarter of operating tractive vehicles equipped.
- National technical rules fell from around **13,450 in early 2016 to 695 by January 2026**, a genuine achievement, while requests for non-application of interoperability standards remain persistently high.

Volumes are not recovering. Eurostat recorded **375 billion tonne-kilometres of EU rail freight in 2024**, down a further 0.8% on the year, against an EU policy objective of increasing rail freight traffic by 50% by 2030 and doubling it by 2050.

Underneath that sits a slow erosion of access. McKinsey's 2022 analysis recorded Germany's private sidings falling from around 11,500 twenty-five years earlier to 2,300, and France's rail access points from about 11,200 in 1970 to 1,150 in 2019. Those figures are now several years old, but the direction is structural rather than cyclical.

7.2 Capacity management is still annual, national and manual

The European Commission's own description of the position before reform is direct: railway capacity management is "largely organised annually, nationally and through manual procedures". **Regulation (EU) 2026/1184** on the use of railway infrastructure capacity entered into force on 11 June 2026, and the first optimised timetable under it is scheduled for **December 2030**. Around half of all rail traffic crosses at least one national border.

That is a four-year gap between recognising the problem and the structural fix landing, in a sector where operators need to compete now.

THE OVERLOOKED OPPORTUNITY

While the regulatory fix is pending, individual operators can automate their own side of it: path request preparation and variant generation, monitoring published network statements and possession notices for changes affecting their services, and automated re-planning when a path is refused or altered. This is document monitoring plus scenario calculation, and it is currently done by scarce, experienced planners under time pressure.

7.3 Train preparation, composition and brake tests

Train composition, braking calculations, load securing checks and brake tests are highly rule-bound, safety-critical and largely manual. The rules are written down in regulation. The calculations are deterministic. The inputs are known.

THE OVERLOOKED OPPORTUNITY

This is the archetype of a process people assume cannot be automated because it is safety-critical, when safety-criticality is in fact an argument *for* deterministic, auditable, testable rules. The current position, where correct application depends on how experienced the person on shift happens to be, is the less defensible one. The automation here is not a black box making a safety decision. It is a system that prepares, checks and documents, with a human signing off, leaving an audit trail a regulator can read.

7.4 Asset utilisation and empty running

Wagon utilisation across European rail freight remains low relative to theoretical capacity, and empty repositioning is a substantial share of wagon kilometres. Wagon hire, maintenance intervals, revision dates and authorisation status are typically tracked across several systems, and mismatches between them cause both idle assets and compliance exposure.

7.5 Cross-border data

TAF/TSI telematics implementation has been on a more consistent upward trajectory, but quality still varies between infrastructure managers and railway undertakings. In practice, an international train's data quality is set by the weakest link in the chain, and reconciling versions of the same train's composition and status across national systems remains person-work.

Road transport

8.1 The labour picture is structural, not cyclical

IRU's *2025 Global Driver Shortage Report*, published in June 2026, found:

- **502,000 unfilled truck driver positions in Europe**, a shortage rate of about **13%**, and **2.9 million unfilled positions across 18 markets globally**, roughly 11% of the workforce.
- **660,500 European drivers due to retire by 2030**, with around **20% of the workforce retiring within five years**.
- **65% of European operators** rank the driver shortage as their most pressing concern, and **two thirds report turning down new contracts** because they lack drivers.
- **98% of EU road freight enterprises have fewer than ten employees** and employ **79% of the workforce**. Operators with fewer than 50 employees report shortage rates about six percentage points higher than large companies.

The last point matters most for this report. The sector is overwhelmingly composed of very small operators who cannot absorb enterprise software projects and have the least administrative slack. That is precisely the profile for which lightweight, connected automation outperforms platform purchases.

8.2 Empty running is a data problem before it is a market problem

Eurostat recorded **21.6% of EU road freight vehicle-kilometres run empty in 2024**, split between **25.8% on national transport** and **12.6% on international**. Country variation is wide, from 7.5% in Denmark to 43.7% in Cyprus.

Freight exchanges have existed for decades. The residual empty running is not mainly caused by an absence of available loads. It is caused by the cost and speed of finding, evaluating and committing to a matching load inside the planning window, against constraints, driver hours, equipment type, customer restrictions, that are recorded in several places and, in the parts that matter most, not recorded at all.

THE OVERLOOKED OPPORTUNITY

An agent that continuously evaluates available return loads against a specific vehicle's position, remaining driver hours, equipment, customer permissions and margin threshold, and surfaces only the two or three worth a planner's attention, is a different product from a freight exchange. It is a decision assistant that does the research and the arithmetic before a human is asked to choose.

8.3 Detention, and the arithmetic nobody does

Time lost waiting at loading and unloading points is one of the most consistently reported operator complaints and one of the least consistently invoiced. Detention entitlement usually exists in the contract. Establishing it requires arrival and departure evidence, comparison against agreed free time, and a claim raised within a deadline.

THE OVERLOOKED OPPORTUNITY

Telematics already holds arrival and departure timestamps. Contracts already hold free time terms. Almost no operator automatically joins those two to raise detention claims, so a contractual entitlement is written off daily. This is close to a pure integration task, and the recovery is immediate.

8.4 The 2027 documentation deadline is closer than it looks

The **eFTI Regulation (EU) 2020/1056** becomes fully applicable on **9 July 2027**, at which point Member State authorities must accept electronically shared freight information from certified platforms. The Commission has said the change could save the EU transport and logistics sector up to €1 billion a year in operational and administrative costs.

That is roughly ten months away at the time of writing, and the enabling delegated and implementing acts have been in force since January 2025.

Electronic consignment notes are progressing alongside it. According to the IRU, **39 countries have ratified or acceded** to the Additional Protocol to the CMR Convention allowing the electronic consignment note, out of 58 CMR contracting parties, with France, Spain and the Netherlands among the early domestic adopters. Estimates circulate of very large administrative savings across Europe from e-CMR adoption; we could not trace any of them to a published primary source, so they are not repeated here.

THE OVERLOOKED FRAMING

Operators are treating this as a compliance date. It is better read as a forced data-quality upgrade with a known deadline. Businesses that prepare by structuring their consignment data properly will find that half the automation opportunities in this report become straightforward as a side effect. Businesses that wait will buy a compliance tool that satisfies the regulation and changes nothing else.

8.5 Commercial administration

Rate agreements, surcharge tables, fuel and toll indexation, subcontractor rates, self-billing, credit notes and disputes. In a small operator this sits with one or two people who carry the whole pricing logic as personal knowledge, supported by a spreadsheet that only they can

navigate. In a larger one it is a department. In both cases it scales linearly with volume, which is the definition of a process that should be automated.

The wider problem is the one from section 2.3. Ask why a particular customer is on a particular rate and the answer is usually a recollection rather than a record. That makes rates hard to defend in a renegotiation, hard to review for profitability, and impossible to hand over.

Freight audit suppliers commonly quote invoice error rates of 5 to 10%. We searched for an independent source for that figure and found none: every instance traces back to a firm selling the checking service. It is not repeated in this report. The case for automated invoice verification does not need it, because the checking itself is deterministic work that either finds errors or does not.

8.6 Road charging has become a per-kilometre, per-vehicle data problem

Distance-based truck charging is now the European norm rather than the exception, and what an operator pays depends on data it holds about each individual vehicle.

The Netherlands introduced its **vrachtwagenheffing on 1 July 2026**, replacing the Eurovignette and part of the motor vehicle tax. It applies to N2 and N3 vehicles above 3,500 kg, Dutch and foreign alike, across nearly all motorways plus a set of provincial and municipal roads. The average rate is **€0.191 per kilometre**, reduced to **€0.148** for the temporary discount period running from 1 September to 31 December 2026. Rates vary by maximum mass, CO2 emission class and Euro standard, across a published range from zero to €0.487 per kilometre, with the lowest rates applying to zero-emission vehicles. Over **€253 million** is available in 2026 to fund sector decarbonisation.

It joins distance-based systems in Germany, Austria, Belgium, Poland, Czechia, Hungary, Slovakia, Slovenia and Bulgaria, with Denmark, Lithuania and Romania transitioning, alongside concession tolling in France, Italy, Portugal, Croatia and Greece. Germany's toll carries a **€200 per tonne CO2 external cost charge**, double the Eurovignette reference value, while zero-emission trucks remain **fully exempt from the German toll until 30 June 2031** under legislation promulgated in December 2025. Austria has priced CO2 into its toll since January 2024 and updated its CO2-differentiated rates on 1 January 2026. Transport & Environment projected that tolls varied by CO2 would be in force in around **17 member states by 2026**, covering some 62% of EU truck activity.

Three consequences follow, and none of them is about paying the toll.

The charge is only as accurate as the vehicle data behind it. Dutch operators have been advised to verify emission class and mass data directly in the RDW vehicle register, because manufacturers have supplied incorrect emissions data. An error in one field produces a wrong tariff on every kilometre that vehicle drives, for as long as nobody checks.

Cost recovery is now per-route and per-vehicle rather than a flat annual overhead. A quotation that does not account for which vehicle runs the job, on which network, in which

CO2 class, is guessing at a cost that varies by a wide margin between two trucks in the same yard.

The reconciliation load grows. Statements from several national systems and toll service providers arrive monthly and have to be matched against trips actually driven, then allocated to customers.

THE OVERLOOKED OPPORTUNITY

All three are arithmetic against data the operator already holds. Comparing the registry record against the fleet record is a one-off automated check that pays for itself the first time it finds a misclassified vehicle. Toll cost per planned route and per vehicle belongs inside quoting rather than inside a monthly cost review. Matching toll statements to trips and allocating them to jobs is line-by-line reconciliation, the same class of work as the invoice verification in section 8.5. Few operators do any of the three systematically, and the second improves pricing accuracy from the day it goes live.

Inland waterway

Barge is the mode most often left out of sector reviews, and for a Dutch, Belgian or German operator it is not a footnote. Germany and the Netherlands together account for **71.9% of all EU inland waterway transport**. The mode is under pressure: after growing 4.5% in 2024, EU inland waterway freight **fell 3.0% in tonne-kilometres in 2025**.

9.1 The commercial problem is call size, not vessel capacity

A barge calling at a sea terminal with 20 containers, spread across four terminals, is unattractive to every terminal it visits. The barge operator cannot consolidate, because they cannot see enough of what other operators are carrying to combine calls. Peer-reviewed analysis of container barging in Rotterdam by van der Horst, Kort, Kuipers and Geerlings concluded that despite sustained port authority and government support, the prevailing contractual relations in the transport chain are an inadequate basis for solving the coordination problem.

The consequence shows up as waiting, and in September 2026 it was measured. A study by Topsector Logistiek, SmartPort and Rebel Ports & Logistics examined close to **50,000 barge visits** to Rotterdam container terminals and found that **15.8% of barges took between 15 and 60 minutes longer than planned, with a further 7.8% running more than an hour over**. The direct cost of that waiting was put at **at least €900,000 a year**, and the researchers are explicit that this is a floor. It excludes the extra planning effort, the capacity left unused, and the cargo that shifts to road when barge reliability drops.

The most useful part of the study is the cause. The largest single driver of deviation is that the number of containers a vessel actually delivers or collects differs from what was agreed beforehand, which leaves the terminal unable to estimate how long the call will take. Planning systems exist and are not consistently used: a deepsea operator describes them as awkward in practice, while a barge operator states that the necessary data is already available in Portbase and that the problem is the use made of it. Terminals point to unreliable arrival times, variable container counts and poor pre-advice. Carriers point to unclear planning, shifting time windows and delayed deepsea vessels. The study concludes that both are right.

Two further findings suggest the problem is tractable rather than inherent. Terminals that give barges fixed time windows in advance record **20% less waiting time and 25% better planning accuracy**. And one Rotterdam deepsea terminal now charges **€100 extra per call** for barges not handled through an integrated planning system, which is a market already putting a price on planning data.

That is the structural picture. The acute one sits on top of it: during the first half of 2026, congestion-related barge delays at Rotterdam were reported at over 96 hours, while Antwerp

berth waiting times rose from 32 to 44 hours, a 37% increase, with containers sitting on the quay for up to eight days against an ideal of five.

What holds the whole pattern in place is the point van der Horst and colleagues made. A carrier quoted in the 2026 study puts it more plainly: every party has optimised itself, and the result is that the system as a whole works less well. Everyone can see that something has to change, and nobody dares to move first.

THE OVERLOOKED OPPORTUNITY

A barge operator cannot fix the industry's coordination problem, and waiting for a shared platform has not worked. What one operator can do is plan its own rotation against predicted terminal handling windows rather than published ones, built from its own record of how long each terminal has actually taken for a call of a given size. That turns a scheduling gamble into an estimate with a confidence range, which is enough to change which terminals get combined into one rotation. The same applies to the pre-advice going the other way: a container count that has been checked against what this customer actually delivered on previous calls is worth more to the terminal than the number that was agreed, and it costs nothing to produce.

9.2 Water levels turn planning into continuous recalculation

The Rhine reached a reading of **5 centimetres at the Kaub gauge on 17 August 2026**, the lowest level ever measured there, undercutting the previous record of 24 centimetres set on 22 October 2018. Commerzbank estimated that sustained low water through mid-September would remove around **0.35 percentage points from German GDP** for the quarter, and Covestro noted that it takes **60 trucks to replace a single 1,500 tonne barge**.

One point of precision, because it is widely misreported: the Kaub figure is a gauge reading against a fixed datum, not the depth of the river. The navigable channel is around 190 centimetres deep at the 77 centimetre reference low-water level set by the Central Commission for the Navigation of the Rhine, so the fairway runs well over a metre deeper than the gauge reading on its own suggests.

What the reading does determine is how much a vessel can carry, and at the extremes whether it can move at all. Taking the fairway depth and deducting 30 centimetres of under-keel clearance, a medium Rhine container barge of 110 by 11.45 metres and 208 TEU capacity, drawing 110 centimetres empty, loses her last loaded container well before the gauge approaches its record. At the levels recorded around Kaub in the second half of September 2026, between 16 and 6 centimetres, the available depth sits below her empty draught, which means no passage at all rather than a reduced load.

The frequency is the part worth planning around. Records were set in 2018 and again in 2026, with severely low water in 2022 in between, which puts a serious low-water event on the Rhine at roughly one year in four, and there is little reason to assume that interval will lengthen.

Low water therefore changes the arithmetic of every voyage: how much can be loaded against forecast draught, whether a low-water surcharge applies, whether a leg should shift to rail or road, whether the voyage can run at all, and at what point each of those decisions has to be taken to still be actionable.

THE OVERLOOKED OPPORTUNITY

Load and draught planning against water level forecasts is calculation rather than judgement, and the inputs are public. Gauge readings come from PEGELONLINE, forecasts from the federal hydrology service, and the vessel's own dimensions are fixed. Put together, they answer a daily question, how many containers can this vessel carry past Kaub tomorrow, that is currently answered by experienced people under time pressure using published readings and instinct. An agent that recalculates loadable tonnage, surcharge exposure and modal alternatives for every planned voyage each time the forecast updates is a contained piece of work with an immediate answer, and it becomes most valuable in exactly the weeks when the planners have least time for it.

9.3 River information services stop at the authority interface

River Information Services under Directive 2005/44/EC standardise traffic and fairway data, and the Commission proposed amendments in January 2024 to improve traffic management and integration into logistics chains. As with the maritime single window, this addresses the interface with authorities and waterway managers. The commercial exchange between barge operator, terminal, forwarder and shipper remains email, telephone and spreadsheet.

Multimodal: the interchange nobody owns

Every mode above has bottlenecks inside it. The largest single category of avoidable cost in multimodal transport sits between them, at the handover, where responsibility changes hands and no party owns the data.

The barge case in section 9.1 is the clearest documented example, and the same shape appears at every interchange:

- **Sea to rail.** The terminal knows what is on the ground. The rail operator knows what the train can take. The customs status sits somewhere else. The train is built on the best available guess.
- **Sea to road.** The vehicle booking arrives days after the stacking decision, as described in section 6.
- **Rail to road.** Last-mile shunting and collection windows are coordinated by telephone and email at most inland terminals.
- **Barge or rail to sea terminal.** The call-size problem from section 9.1, compressed into a single handover: too small to be attractive, too fragmented to consolidate, and invisible to the party who could sequence it.

THE OVERLOOKED OPPORTUNITY

Nobody will build the industry-wide platform that solves this, and several attempts have already demonstrated that. What one operator *can* build is their own view across the handover: a layer that pulls in what each counterparty has sent, whatever format it arrived in, reconciles it against its own record, and flags the mismatches before the handover rather than after. That requires no change from the counterparties. It requires reading, matching and alerting, and it converts a coordination problem into an exception list.

The cross-cutting layer

Six categories appear in every mode and are almost never on a technology roadmap.

11.1 The shared mailbox

Bookings, amendments, rate requests, status chasers, document submissions, complaints. In most transport businesses the shared mailbox is the real operating system, and no system of record knows it exists. It is the richest and least examined source of automation value in the sector: high volume, repetitive intent, structured enough to classify, and currently handled entirely by people.

11.2 Quotations and tenders

Time to quote is a commercial variable, not an administrative one. A quote that takes a day loses to a quote that takes an hour, at equal price. Building a quote means gathering rates, schedules, surcharges, equipment availability and constraints from several places, which is research and arithmetic performed under time pressure by commercial staff whose time is better spent on the customer.

Annual tenders and RFQ responses have the same structure at larger scale, with the added problem that the reasoning behind last year's pricing is rarely recorded anywhere retrievable.

11.3 Compliance, certification and audit evidence

Vessel certificates and surveys. Wagon revision dates and authorisations. Driver CPC, licences and tachograph records. ADR, RID and IMDG obligations. ISO and customs authorisations such as AEO.

Port state control exposure gives a sense of the stakes: the Paris MoU recorded **16,474 inspections in 2025**, producing **51,797 deficiencies** and **688 detentions**, a detention rate of **4.18%**. Detention rates have now stayed above the 2019 pre-pandemic level of 2.98% every year since 2021. Fire safety alone accounted for **16.8%** of deficiencies.

Compliance work is deadline tracking, document gathering and evidence assembly. All three automate cleanly, and the current alternative is usually a spreadsheet maintained by one person.

The load is set to increase rather than settle. The EU customs union reform, given final Council approval on **3 September 2026**, creates an **EU Customs Data Hub** so that businesses submit customs information once rather than to up to 27 national authorities, alongside a new EU Customs Authority based in Lille that is expected to begin operating in 2027. It applies

to e-commerce goods from **1 July 2028** and to all goods movements by **1 March 2034**. The direction of travel is that customs becomes data-driven rather than declaration-driven. That rewards operators whose consignment data is already structured and reusable, and penalises those who assemble it fresh for every declaration.

11.4 Claims and disputes

Cargo damage, delay, demurrage, detention, container repair, invoice disputes. Every one of these has a deadline, an evidence requirement and a value threshold below which nobody bothers. The claims that fall below the threshold are, in aggregate, frequently larger than the ones above it.

11.5 Institutional knowledge

The most experienced planner, the demurrage analyst who knows which counterparty argues which clause, the operator who knows that a particular customer's boxes always move on a Thursday. Section 2.3 set out why this is a commercial risk rather than an asset. With around a fifth of the European driver workforce and a comparable share of operational staff approaching retirement, it is one of the strongest and least discussed arguments for encoding decision logic into systems now, while the people who hold it are still there to explain it.

The framing that lands with those people matters. Very few of them want their judgement replaced. What they generally do want is for their judgement to stop being the only thing holding a process together, and to be able to take a holiday.

11.6 Cargo crime and freight fraud

European cargo crime is larger than most operators assume, and it has changed shape.

Figures presented by TAPA EMEA at its Poland regional conference in April 2026, and reported in trade press, record **30,543 incidents and €860.5 million in documented losses across 2024 and 2025 combined**. France accounted for €261.5m, Italy €179m, Poland and central Europe €124.8m, Germany €104m, Spain €102m and the Netherlands €89.1m.

Two caveats. These figures come from a conference presentation rather than a published TAPA report, and the outlet reporting them has a commercial relationship with TAPA. More importantly, IUMI notes that **fewer than 6% of cargo crime reports include a loss value**, so every euro total in this field is a severe undercount built on a small, self-selected sample. The true figure is larger, not smaller.

The distribution matters more than the total. In France, **148 incidents above €100,000 produced €255.5m of the €261.5m total**. In the Netherlands, 60 high-value incidents produced €86.7m of €89.1m. This is not a large number of small losses. It is a small number of very large ones, which means prevention has a concentrated and measurable payoff.

The method has reportedly shifted too, away from breaking into vehicles and towards identity fraud: fake carriers, typosquatted domains, compromised email accounts, and the purchase of dormant transport companies with clean records specifically to pass vetting.

THE OVERLOOKED OPPORTUNITY FOR CARGO CRIME

Fraud of that kind is a pattern detection problem against data the operator already has or can retrieve. How long the counterparty has existed, whether its details match the commercial register, whether the domain was registered last month, whether bank details changed part-way through a conversation, whether the same telephone number appears against a different company name, whether the insurance certificate is genuine. Running those checks on every new carrier or customer before a load is released is precisely the research an agent completes in seconds and a planner under pressure skips. It also replaces the current control, which in most businesses is whether the planner has a good feeling about the caller.

11.7 Capacity committed against demand that is not

A capacity operator, whether a shortsea carrier, a rail operator or a haulier running its own fleet, commits to capacity well before it knows who will fill it. Vessel slots, train paths, trailers and drivers are contracted for a season or a year at a time. The cargo owners those commitments are made for rarely offer anything equivalent in return, and stay free to move volume elsewhere when the rate moves.

The industry then runs on margins thin enough that high utilisation is not an optimisation but a condition of staying solvent. The operator therefore carries the risk from both directions at once, with the cost of the capacity fixed and the demand against it anything but.

That imbalance is usually treated as a commercial fact of life rather than as a problem with a technical component. It has two.

The short-term question is how to get the most from capacity already committed, which means knowing early which bookings will actually materialise, which customers habitually book and then do not ship, and where a gap is opening while there is still time to sell it.

The longer-term question is how much capacity to deploy at all, and in what mix. Fixed capacity costs less per unit and cannot be adjusted. Variable capacity, chartered in or subcontracted, costs more per unit and moves in both directions. The right ratio between them depends on how demand actually behaved, lane by lane and season by season, over several years.

THE OVERLOOKED OPPORTUNITY IN CAPACITY PLANNING

Both questions are prediction problems against the operator's own booking history, and both are usually answered from experience supported by a spreadsheet. A model that estimates which bookings will convert, by customer and by lane, changes what can be done with the capacity already paid for. The same history read across several years gives a defensible answer on the fixed and variable mix, rather than one carried over from last year with an adjustment applied by feel.

Six capabilities decision makers rarely know they can buy

This is the section that matters most. The bottlenecks above are well known to the people who live with them. What is less known is which of them are now solvable, and by what.

12.1 Reading documents nobody standardised

What it is. Extracting structured, checked data from a document in a layout the system has never seen, whether that is a PDF manifest, a scanned certificate, a photographed delivery note or the body of an email.

Why it is overlooked. Document capture has a long history of disappointment. OCR and template-based extraction required a template per counterparty and broke when a layout changed, so many operators tried it years ago, were let down, and concluded it does not work. That conclusion was correct then and is wrong now. Understanding an unfamiliar document is one of the capabilities that changed most between 2022 and 2026.

Where it applies. Manifests, bills of lading, statements of facts, disbursement accounts, customs documents, delivery notes, damage reports, supplier invoices, certificates.

12.2 Connecting systems that were never designed to talk

What it is. Purpose-built integration between the systems an operator already runs, including the ones with no modern API, plus the mailbox, the spreadsheets and the counterparty portals.

Why it is overlooked. This is not a product, so nobody sells it at a conference. It appears on no analyst quadrant. Decision makers therefore assume the choice is between living with the gap and replacing a core system, when the third option, building the join, is typically an order of magnitude cheaper and faster than replacement.

Where it applies. Everywhere in this report. Roughly half the opportunities described here are integration work with a thin layer of intelligence on top, not AI projects.

12.3 Agents that research and calculate before they act

What it is. A software agent that, given a task, gathers what it needs from several sources, performs the required calculations and comparisons, applies the rules, and then either executes or presents a recommendation with its reasoning.

Why it is overlooked. This is the capability decision makers most consistently do not know exists, because it does not resemble anything the sector has bought before. The mental model of automation in transport is still "a system that moves data from A to B". An agent that reads a charter party, pulls the statement of facts, calculates laytime, checks the time bar, drafts the claim and presents it for approval is a different category of thing.

Where it applies. Demurrage and laytime claims. Disbursement account verification. Detention claim assembly. Quote preparation. Return load evaluation. Toll cost calculation. Tender response drafting. Customs classification support. Compliance evidence gathering. Counterparty vetting.

The important constraint. These agents should prepare and recommend, with a human approving anything that leaves the business or carries regulatory weight. That is not a limitation. It is the design that makes them adoptable.

12.4 Deterministic rules for judgement that must be auditable

What it is. Written, testable, version-controlled business rules that check data and flag exceptions, with no model involved.

Why it is overlooked. In the current climate every operational improvement gets labelled AI, which triggers reasonable resistance in a safety-critical, heavily regulated industry. A large share of the value in this report comes from rules, not models: a code list check, a weight tolerance, a missing mandatory field, a hazard class validation, a deadline comparison. Rules do not change their mind, can be read by a regulator, and can be tested before deployment.

Where it applies. Manifest and declaration validation. Dangerous goods checks. Train composition and braking rules. Invoice, toll and tariff verification. Customs data completeness. Compliance deadline monitoring.

Why it matters commercially. Framing this work correctly is often the difference between a project being approved and being blocked. The reading is AI. The judging is rules. Saying so plainly makes the whole proposition easier to govern.

12.5 Prediction where a decision must be made before the fact is known

What it is. A model that estimates an outcome from patterns already present in the operator's own history, used to make a decision that currently has to be made blind, or on someone's impression.

Why it is overlooked. Prediction in this sector is usually associated with demand forecasting and predictive maintenance. The higher-value application is operational: predicting what will happen to *this* unit, so a decision made now is better than a guess. It is also the direct answer to section 2.3, because it converts accumulated experience into something the whole business can use and test.

Where it applies. Container dwell time and collection windows at discharge. Probability of a vessel arriving in a given window at this specific facility. Likelihood that a shipment needs an inspection or will be held. Which bookings will convert into actual cargo. Which invoices will be disputed. Which counterparties present a fraud risk. Which customer will miss a collection slot.

What the customer is actually asking for. The standard cargo owners hold their carriers to is more demanding than on-time delivery. The carrier collects and delivers on time, and where something outside its control prevents that, it informs the customer before the agreed collection or delivery time, as soon as the delay becomes foreseeable. The second half of that standard is the difficult half, and it is a prediction requirement rather than an operational one. A delay discovered when the slot is missed cannot be notified in advance, however good the operation is. Early warning is the one part of the standard that cannot be met by working harder, and it is the part customers remember.

The realistic standard. Prediction does not need to be right about everything. The terminal research cited earlier is a good model: the middle of the distribution was predicted poorly, the extremes were predicted well, and knowing the extremes was enough to change stacking policy.

12.6 Exception-only working

What it is. Reversing the default. Instead of people processing everything and escalating problems, the system processes everything and escalates only what fails a check.

Why it is overlooked. It sounds like a workflow preference rather than a capability. It is the design principle that determines whether any of the above delivers a return, because it is what converts capability into recovered hours. It also produces something most operators lack: a single record of which document arrived, from whom, when, and in what state, which makes it possible to prove where a delay actually began instead of arguing about it.

Opportunity catalogue

The table below summarises the opportunities identified in this scan. Where the same opportunity, capability and status apply across several modes, they are combined into one row. Where the status differs by mode, they are kept separate, which is itself informative: driver compliance tracking is partly solved in road, while the equivalent certificate tracking in maritime and authorisation tracking in rail are not.

"Known" means actively sold and widely understood in the sector. "Overlooked" means we found little evidence of systematic adoption.

#	Modes	Opportunity	Primary capability	Status
1	Deepsea, Shortsea	Manifest and bill of lading reading with rules-based validation before arrival	Document reading + rules	Overlooked
2	Shortsea, Breakbulk	Same-day error feedback to agents on non-standard manifests	Document reading + agent	Overlooked
3	Deepsea, Shortsea	Cargo dues and wharfage accuracy from validated manifest tonnage	Rules + integration	Overlooked
4	Deepsea (bulk, tanker)	Laytime and demurrage claim preparation and time-bar management	Agent + rules	Overlooked
5	Deepsea, Shortsea	Disbursement account verification against tariff, proforma and history	Agent + integration	Overlooked
6	Deepsea, Shortsea	Per-voyage carbon cost exposure surfaced at quotation	Integration + rules	Overlooked
7	Deepsea, Shortsea, Terminal	Booking description screening for misdeclaration patterns	Prediction	Emerging
8	Deepsea, Shortsea, Terminal	Own-facility vessel arrival probability model	Prediction	Overlooked
9	Deepsea, Shortsea	Port state control exposure and certificate deadline tracking	Rules + agent	Overlooked
10	Terminal	Dwell-time banded stacking using own historical data	Prediction	Overlooked
11	Terminal	Pre-clearance status pulled forward into the stacking decision	Integration	Overlooked
12	Terminal	Export pre-advice validation, catching problems before the crane	Rules	Partly known

#	Modes	Opportunity	Primary capability	Status
13	Terminal, Road	Image-based damage detection connected through to estimate and dispute	Prediction + integration	Emerging
14	Terminal	Housekeeping moves scheduled into idle windows	Optimisation	Partly known
15	Terminal	Truck appointment and gate data entry consolidation	Integration	Known
16	Rail	Path request preparation, variant generation and change monitoring	Agent + document reading	Overlooked
17	Rail	Train composition and braking calculation with auditable rules	Rules	Overlooked
18	Rail	Wagon status, hire, revision and authorisation reconciliation	Integration	Overlooked
19	Rail	Cross-border train data reconciliation between national systems	Integration	Overlooked
20	Rail	Empty wagon repositioning against forecast demand	Optimisation + prediction	Partly known
21	Road	Return load evaluation against hours, equipment and margin	Agent	Overlooked
22	Road	Detention entitlement claims assembled from telematics and contract terms	Integration + rules	Overlooked
23	Road	Vehicle registry data verified against fleet records for toll classification	Rules + integration	Overlooked
24	Road	Toll cost per route and vehicle calculated inside the quotation	Agent + integration	Overlooked
25	Road	Toll statement reconciliation against trips driven and allocation to customers	Rules + agent	Overlooked
26	Road	Subcontractor rate, self-billing and invoice verification	Rules + agent	Overlooked
27	Road	Driver compliance document and deadline tracking	Rules	Partly known
28	Road, Rail, Multimodal	eFTI and e-CMR readiness treated as a data-quality programme	Integration	Overlooked
29	Inland waterway	Rotation planned against predicted terminal handling windows	Prediction + integration	Overlooked
30	Inland waterway	Loadable capacity per voyage recalculated against water level forecasts	Agent + rules	Overlooked

#	Modes	Opportunity	Primary capability	Status
31	Inland waterway	Low-water surcharge and modal-alternative exposure per voyage	Agent	Overlooked
32	Inland waterway, Rail	Call and train consolidation from own booking visibility	Optimisation	Overlooked
33	Multimodal	Own-side handover reconciliation across counterparty data	Document reading + integration	Overlooked
34	Deepsea, Shortsea, Rail, Road	Booking conversion predicted by customer and lane	Prediction	Overlooked
35	Deepsea, Shortsea, Rail, Road	Fixed versus variable capacity mix set from multi-year demand history	Prediction + optimisation	Overlooked
36	All	Proactive delay notification raised before the agreed collection or delivery time	Prediction + integration	Overlooked
37	All	Shared mailbox classification, extraction and routing	Document reading + agent	Overlooked
38	All	Counterparty and carrier vetting against fraud patterns before release	Agent + prediction	Overlooked
39	All	Quotation assembly and time-to-quote reduction	Agent	Emerging
40	All	Tender response drafting with retained pricing rationale	Agent	Overlooked
41	All	Claims below the manual threshold raised automatically	Agent + rules	Overlooked
42	All	Decision logic captured from experienced staff before they retire	Rules	Overlooked

What usually goes wrong

Five patterns, all avoidable, all common.

Automating a process that should not exist. This is the first question, before any of the others, and it is the one most often skipped. Plenty of steps in transport administration exist because a system once required them, because a customer asked for something in 2014, or because a colleague who left in 2019 preferred to see it. Before automating a report, ask who reads it. Before automating a check, ask what happens if it fails. Before automating a re-keying step, ask whether the second system needs that field at all. A process that can be deleted costs nothing to run and never breaks, and eliminating three steps from a 9-step process usually beats automating all nine. Automation applied to unnecessary work makes the unnecessary work permanent, because it becomes cheap enough that nobody ever revisits it.

Buying the platform before understanding the process. The largest failures in this sector come from replacing a system when the problem was the join between two systems. Replacement takes two years, costs a multiple, and reproduces the same gaps in a newer interface.

Automating the wrong end. Optimising a process that should sit with someone else. Before automating manifest re-keying, ask whether the counterparty can be persuaded to send it differently. Sometimes they can. Usually they cannot, which is when reading it becomes the right answer.

Going live in control rather than advisory. A system that starts by instructing experienced operators will be overridden, and the overrides will degrade its data until it is abandoned. A system that starts by advising, is measured against what the operators actually chose, and earns its way into control, survives. Capture deviations to learn from them, not to police them: an operator who overrides a recommendation usually knows something the model does not, and that something is worth capturing.

Treating data quality as a prerequisite rather than an output. Waiting for clean data before starting means never starting. The reading and checking layer is what produces clean data. It is the first step, not the reward for finishing.

One more, specific to this moment: **calling everything AI**. In a regulated, safety-critical industry, that framing invites resistance, slows governance and obscures the fact that a good share of the value comes from deterministic rules and plain integration. Naming each part accurately is not pedantry. It is what gets the work approved.

Next step

This report is a sector map. It is deliberately not a set of claims about your business, because we do not have your volumes, your systems or your cost base. You know your processes better than we do.

If a section here described something you recognise, the most useful next step is a conversation rather than another document. Going through your operation, where the work piles up, which handovers cause the most rework, and what your systems can and cannot do today, will tell us both more than anything we could write from the outside.

You will get our honest view on what is worth automating, what is not, and where a process is better simplified or dropped before anyone automates it.

We would be pleased to set up a call. [Book a time that suits you](#)

Sources and how they were checked

Every figure in this report was checked against the most authoritative source we could reach. Sources are graded: **A** for regulators, EU agencies, official bodies and peer-reviewed research; **B** for classification societies, insurers, industry associations and established trade press; **C** for supplier-published material. Nothing graded C is presented as fact.

Several widely circulated industry figures were removed during that check, including freight invoice error rates, aggregate demurrage market size, and e-CMR administrative savings estimates. In each case the number traced only to parties selling the related service, or to trade press citing an unpublished original. Where we have kept a supplier figure, it is attributed in the text.

Maritime

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- Paris MoU, [Annual Report 2025](#) (A)
- Allianz Commercial, [Safety and Shipping Review 2026](#) (B)
- TT Club, [Campaign for greater container safety must focus first on dangerous goods](#), 2019 (B)
- Digital Container Shipping Association, [Member carriers commit to a fully standardised eBL by 2030](#) and [Understanding soft barriers to digital adoption](#) (B)
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Note on regulatory status. Every regulatory item describes the position as at September 2026, with in-force dates that have passed stated as fact and future dates stated as scheduled. Toll rates and charging schemes change frequently and should be checked against the national operator before being used in a calculation.

Note on currency. All figures are stated in euro. Where a source published in US dollars, the figure was converted at the European Central Bank euro reference rate of 1.159 USD per euro, 1 September 2026, and rounded.