Monitoring the application of timber traceability rules

Tool to determine the evolution of the modus operandi and risk factors of illegal timber harvesting

Monitoring Report June 2026

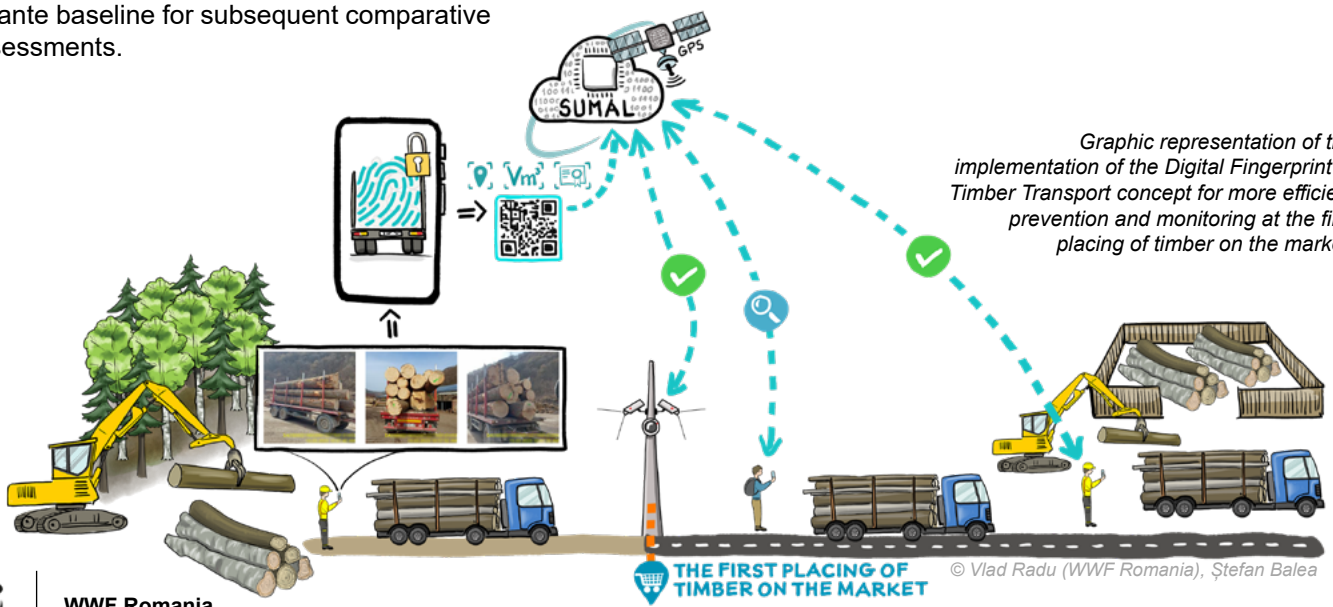
Context

SUMAL is the central pillar of Romania's national system for combating illegal timber harvesting and, arguably, one of the most complex electronic timber traceability tools in Europe. By strengthening transparency and the capacity to track timber materials, it has demonstrated its effectiveness, contributing to a significant reduction in illegal timber harvesting in Romania.

In the context of the continuously evolving practices and challenges facing the forest sector, this report analyses the main vulnerabilities and non-conformities associated with the traceability of timber materials, providing reference points for the future development of the system.

To this end, the report draws in an integrated manner on two complementary monitoring methodologies: the desktop analysis of timber shipments recorded in the Forest Inspector platform and unannounced field monitoring using surveillance cameras placed along the segment of the first placing on the market of timber materials. Moreover, the monitoring carried out in 2026 took place before the national smart camera system became operational, thus providing a valuable ex-ante baseline for subsequent comparative assessments.

The results continue to highlight a significant level of non-compliant timber shipments and confirm the relevance of further developing the Digital Fingerprint of Timber Transport concept, enabling expeditious field measurement and the automated analysis of data and images recorded in SUMAL. In the context of the SUMAL 3 revision, this approach can support expeditious field checks, the automated generation of risk alerts and the prioritisation of controls, contributing to the development of a simpler, more transparent and more efficient system - a system for combating illegal timber harvesting that is more strongly oriented towards prevention and control at the first placing of timber on the market, in line with the reforms already committed to and with the requirements of Regulation (EU) 2023/1115 on deforestation-free products (EUDR).



Graphic representation of the implementation of the Digital Fingerprint of Timber Transport concept for more efficient prevention and monitoring at the first placing of timber on the market.

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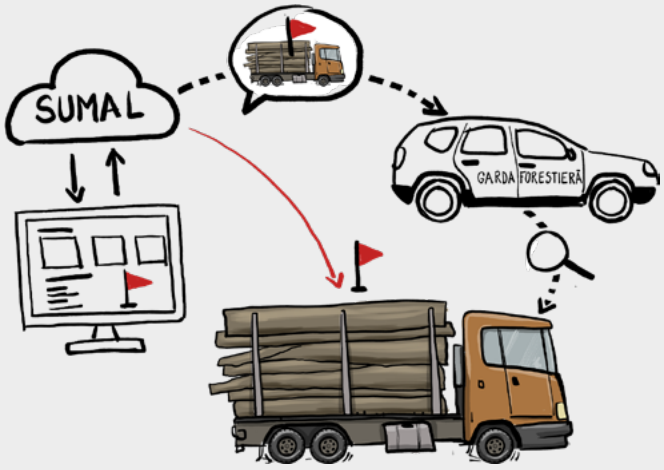
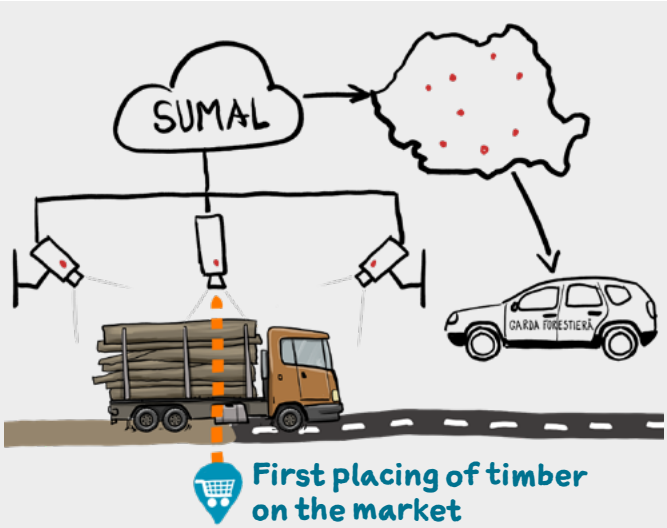
Specific objectives

THIS ANALYSIS AIMS TO:

To identify the main types of non-compliance related to the origin, movement and marketing of timber materials, with a focus on risks associated with overloading and volume discrepancies;



To promote the use of automated desktop monitoring in the Forest Inspector platform as a tool for screening and prioritising high-risk timber shipments as part of a risk-based control approach;

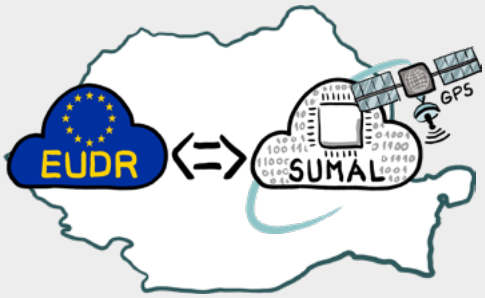


To promote the use of unannounced field monitoring with surveillance cameras as a tool for verifying, on the ground, the actual behaviour associated with these risks, **particularly at the stage of first placing on the market;**

Testing and conceptually substantiating a "Digital Fingerprint of Timber Transport" mechanism (DFTT), based on the integration of declarative data from SUMAL, images, and estimates of the loading capacity of transport vehicles.

Assessing the potential use of this mechanism for the automated identification of timber shipments presenting a risk of volume discrepancies compared with the volume recorded in the timber accompanying document, in relation to the relevant control threshold of 10%. This would **support the expeditious volume assessment carried out by the competent authority**, as well as the prioritisation of cases requiring further checks or the application of the full measurement procedure, in accordance with Article 163 of Law no. 331/2024 – the Forestry Code.

To improve control procedures by shifting from a reactive model towards a preventive, data-driven model based on images and automated analysis;



To provide the basis for the appropriate **operationalisation of an integrated national monitoring system**, aligned with the need to strengthen the traceability, transparency and verifiability of the timber supply chain, in the context of European requirements, including the EUDR, and the modernisation of forest data and monitoring systems;

To develop a methodology for estimating the volume of illegally harvested timber.

Methodology for unannounced field monitoring using surveillance cameras – Fourth Monitoring Campaign 2025-2026

ENSURING METHODOLOGICAL CONTINUITY WITH PREVIOUS MONITORING CAMPAIGNS

The same general principles and procedures for data collection and interpretation used in previous WWF campaigns were maintained, so that the results could be analysed in methodological continuity. At the same time, this campaign aimed to test the relevance of the selected monitoring points in relation to the future national monitoring infrastructure and to assess its potential to capture timber shipments along the segment of first placing on the market.

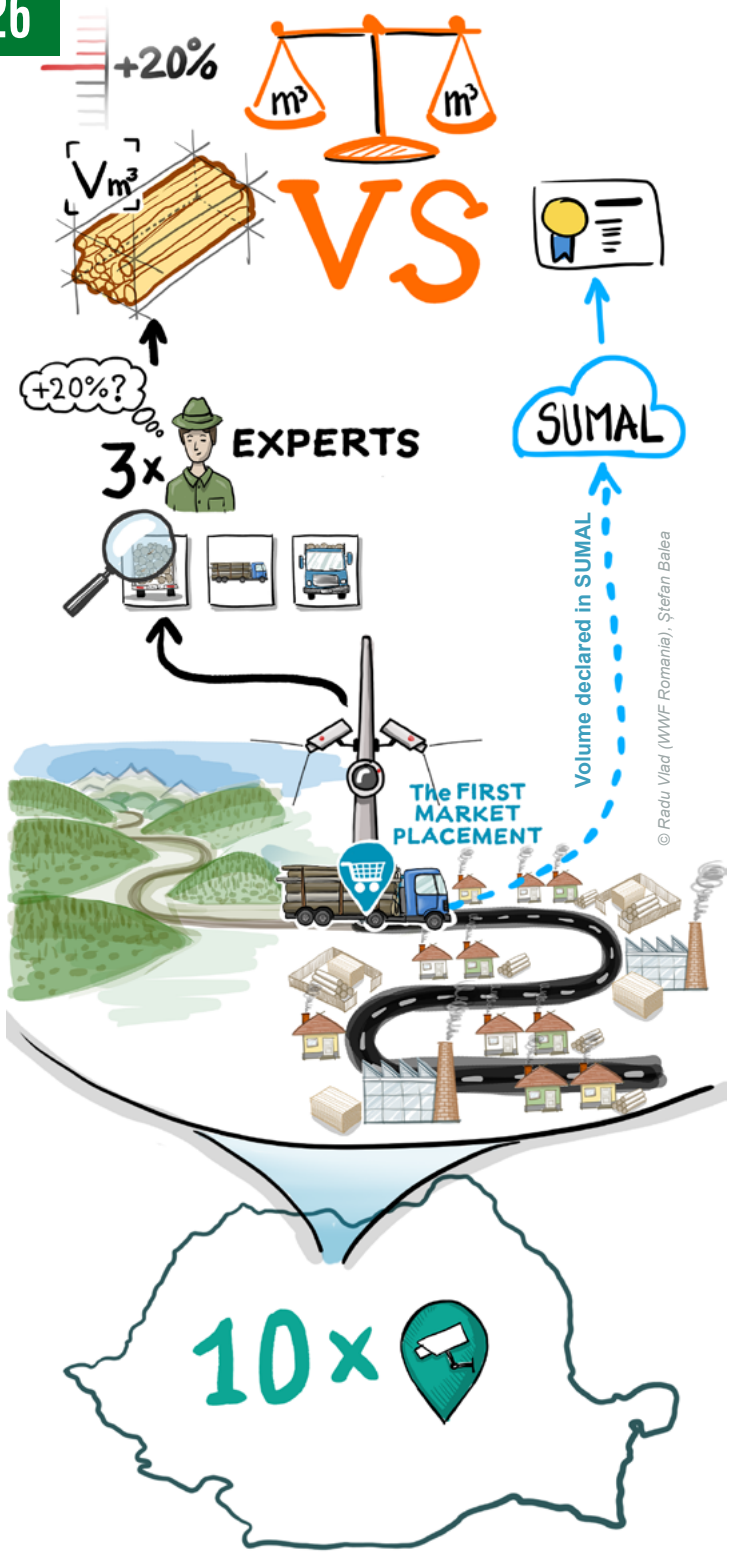
10 FIELD MONITORING POINTS

The selection of the 10 monitoring points was not, at this stage either, based on a definitive statistical monitoring protocol. Such a protocol remains under development and should be informed by repeated rounds of verification and calibration. The selection was conditioned both by the need to ensure comparability with previous monitoring campaigns and by the opportunity to correlate field observations with the locations considered for the national monitoring system, on the assumption that these locations had been selected through a risk-based approach. Consequently, the number of timber shipments captured and their distribution do not constitute a nationally representative sample, and the results are not statistically relevant for reflecting the overall picture of illegal timber harvesting. Instead, they capture only specific situations encountered during the monitored period and at the monitored locations.

FIRST PLACING OF TIMBER ON THE MARKET – THE CRITICAL SEGMENT FOR VERIFICATION

The methodology proposes monitoring the movement of timber materials through a system of surveillance cameras placed unannounced at fixed points, on forest roads or at locations relevant to the exit of timber from the harvesting area, covering the segment of the first placing of timber on the market, including in order to avoid “double” reporting.

The selection of monitoring points took into account the access network in harvesting areas, avoiding, as far as possible, any potential unloading or transshipment point between the harvesting site and the location of the monitoring system. This was intended to capture, as accurately as possible, the timber shipment corresponding to the first placing of timber on the market.



Graphic representation of field monitoring using surveillance camera systems.

Disclaimer

The results obtained from camera-based field monitoring are not statistically representative of the overall situation at national level. The figures presented refer exclusively to the timber shipments captured at the monitored locations and during the monitored periods under this project.

COMPARATIVE FIELD-SUMAL VERIFICATION

The monitored timber shipments were verified exclusively using publicly available data from the Forest Inspector – SUMAL 2.0 platform, desktop version. The methodology continues to be based on a comparative analysis between the information collected in the field, using images captured by the cameras, and the data officially recorded in SUMAL. The aim is to identify timber shipments without documents proving legal origin, multiple shipments carried out under the same origin documents, as well as overloaded shipments, where there are **clear discrepancies between the actual volume transported and the volume recorded in SUMAL**. These elements replicate the methodological core used in previous monitoring campaigns.

QUANTITY ESTIMATION BASED ON THREE INDEPENDENT EXPERT ASSESSMENTS

For the estimation of quantities, species and assortments, three independent assessments were carried out by specialists in the field, based on the images collected by the cameras and, where applicable, corroborated with the images uploaded to the Forest Inspector platform, in cases where these had been properly taken. A non-compliance was recorded only if all three independent assessments confirmed overloading, and if the lowest positive difference exceeded both the absolute threshold of 1 m³ and the relative threshold of 20% of the declared volume. Following the logic of previous monitoring rounds, the interpretation threshold was intended to record only clear and significant discrepancies, and the values.

RELEVANCE FOR THE ASSESSMENT OF THE NATIONAL MONITORING SYSTEM

With reference to the implementation stage of the national monitoring system, this campaign also has an additional methodological role: to enable an ex-ante/ex-post comparison of **the capacity of the monitoring points to capture relevant timber shipments**, types of non-compliance, and possible changes in the modus operandi after the national system becomes operational. In this respect, the results obtained in the present campaign may contribute to the subsequent calibration of the monitoring protocol and to the assessment of the effectiveness of the new national monitoring infrastructure.

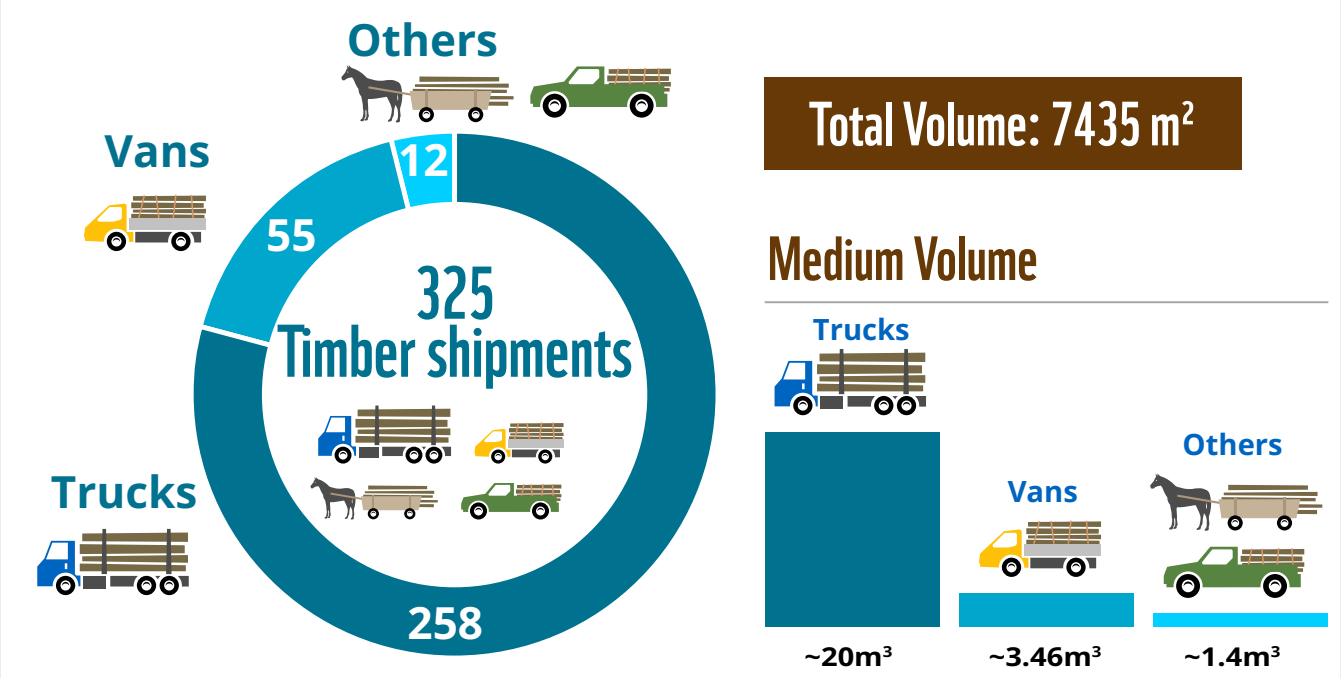
The process of operationalising the national monitoring system is ongoing after the completion of WWF monitoring, including through the installation of the necessary field infrastructure.

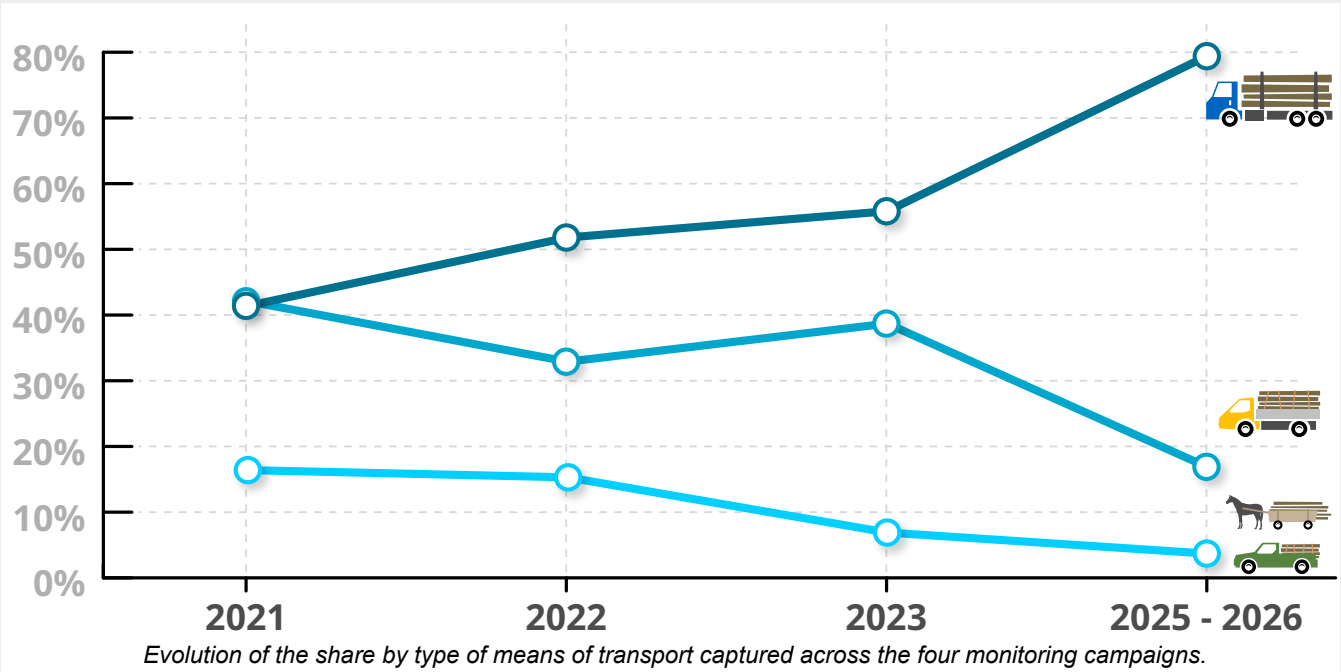
Field monitoring results using surveillance camera systems

The monitoring was carried out in three distinct periods between 08/12/2025 and 24/03/2026, covering a total of 32 monitoring days.

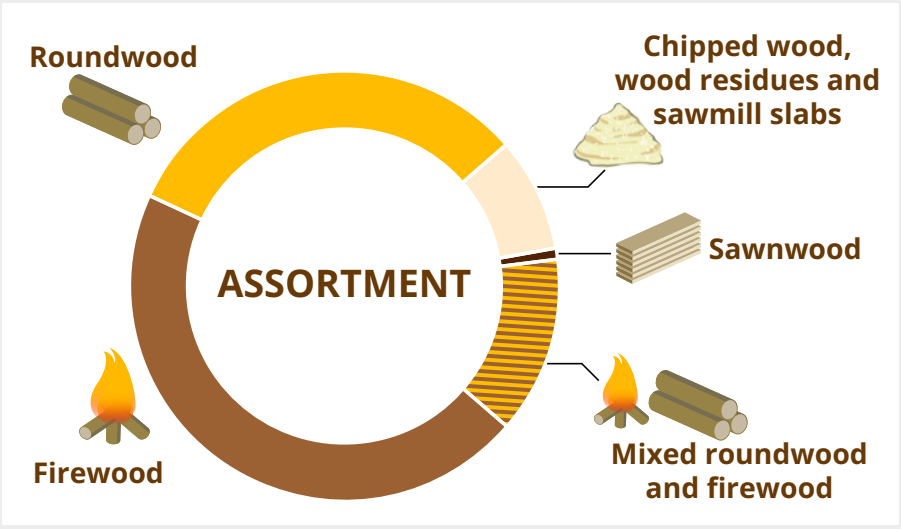
General Results

DISTRIBUTION BY TYPES OF TRANSPORT VEHICLES:

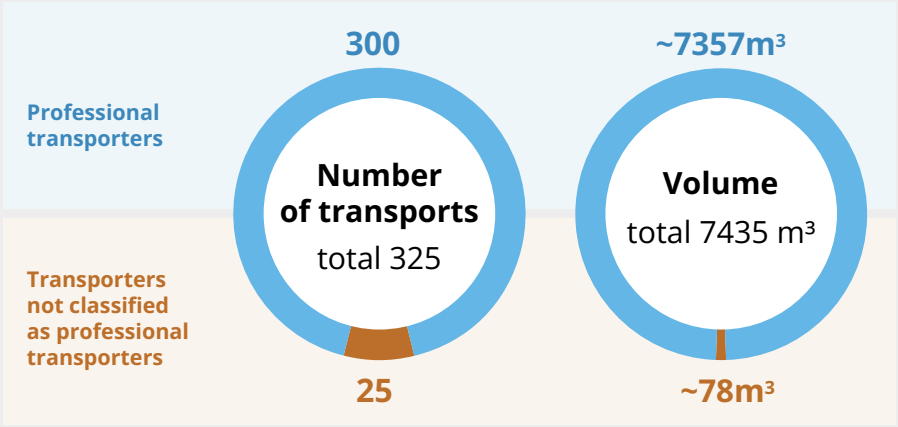




Evolution of the share by type of means of transport captured across the four monitoring campaigns.

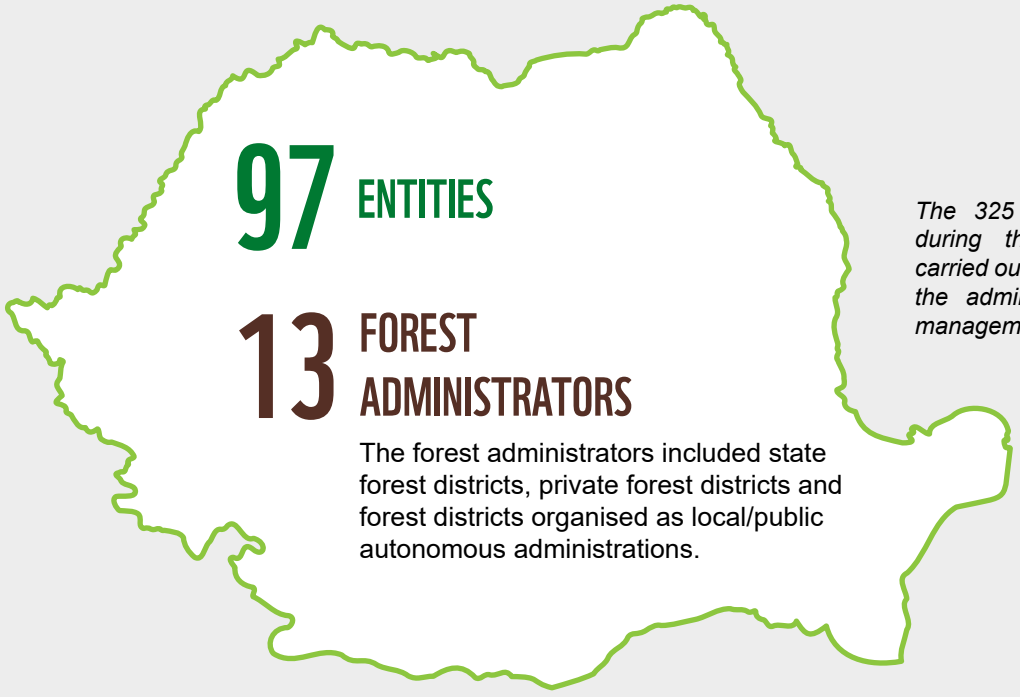


Based on the data collected, an increase was observed in the share of firewood volumes transported during the monitored period, which corresponds to the market trend marked by a decrease in demand for industrial timber.



NOTE

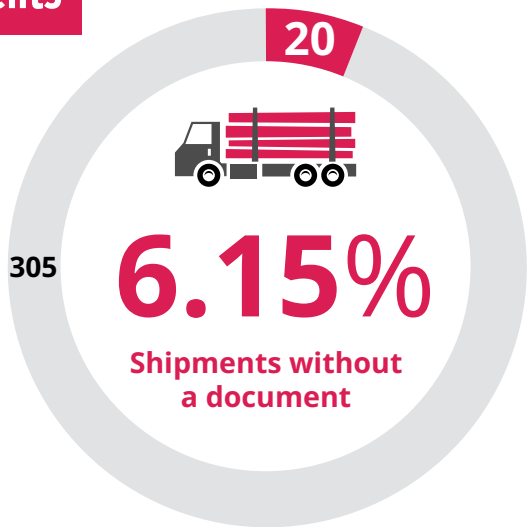
At this stage of monitoring, a lower share of shipments carried out by NON-SUMAL transporters was captured. This category is not required to record photographs of the load in SUMAL. These shipments also remain low as a share of the total transported volume.



The 325 timber shipments identified during the monitoring period were carried out by 97 different entities, within the administrative area of 13 forest management units.

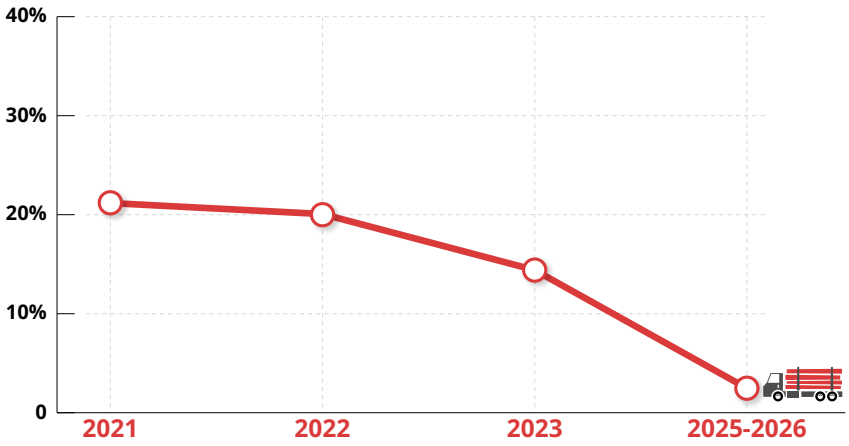
Shipments without timber accompanying documents

Timber shipments without accompanying documents registered in SUMAL.



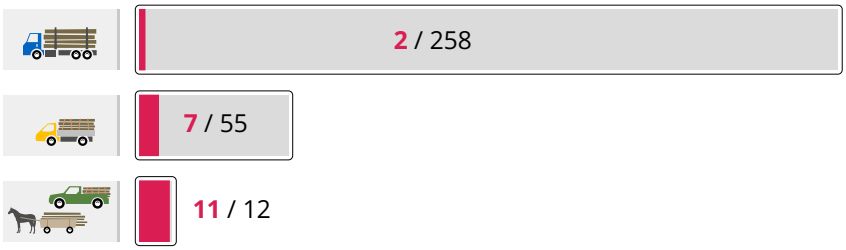
LOW SHARE OF SHIPMENTS WITHOUT TIMBER ACCOMPANYING DOCUMENTS

The downward trend in shipments without documents is due to dissuasive sanctions. The new Forestry Code introduces a stricter framework for the transport of timber materials. Article 151 provides, among other elements, that the transport of timber materials without legal origin becomes a criminal offence from the threshold of **5.01m³**, while transport with a legal document but with a difference of at least **20%** and at least 5.01m³ between the volume recorded in the document and the volume found during verification is subject to criminal sanctions. **The goods** used to commit the offences, **including transport vehicles,** are **mandatorily confiscated** in kind.



The evolution of shipments without documents captured through field monitoring is convergent with the trend observed in the use of public SUMAL / Forest Inspector verification tools and in 112 emergency reports. Although the number of public verifications in Forest Inspector remained very high, at over 2 million verifications annually in the period 2022-2025, the number of 112 reports and confirmed irregularities decreased steadily.

SHARE OF SHIPMENTS WITHOUT DOCUMENTS, GROUPED BY MEANS OF TRANSPORT



Most shipments without a timber accompanying document / SUMAL code consisted of carts, car trailers and vans carrying firewood, most likely intended to meet the basic needs of local communities.

NO MULTIPLE SHIPMENTS USING THE SAME DOCUMENTS IDENTIFIED

The reduction in multiple shipments using the same records and fictitious shipments at this stage, including situations where the origin from a harvesting site document (APV) was used for other harvesting sites, can be explained by two important operational changes: the strengthening of route-tracking mechanisms in SUMAL 2.0, where the intentional disabling of mobile data, the location system or uninstalling the application may constitute a non-compliance detectable in SUMAL; and the modification of the SUMAL application, which no longer allows the document to be registered if the user is located more than 1,000 m from the coordinates of the log landing platform / warehouse.

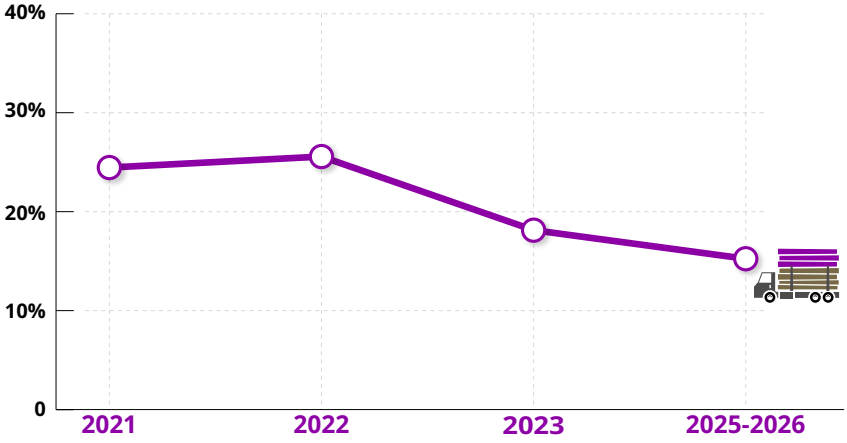
RECOMMENDATION

Develop the **SUMAL Small Owner** module in order to simplify and streamline the legal valorisation of wood belonging to small forest owners, including forest vegetation outside the national forest fund, such as orchards, hay meadows and pastures, for own consumption, including firewood, rural construction and vineyard stakes. This should apply only to small owners who are not operators and **where the wood does not enter the economic circuit.**

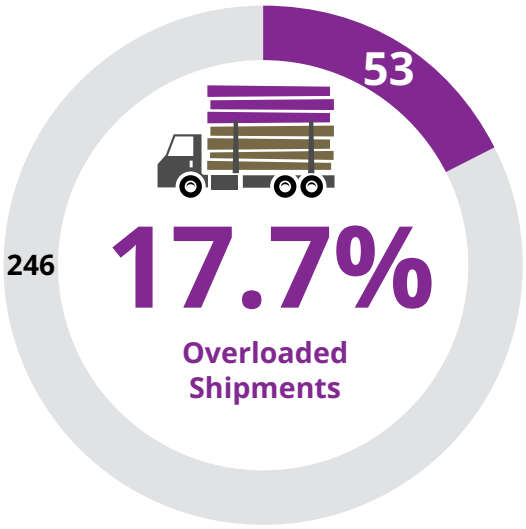
Transport Overloading

Fraudulent declarations regarding the quantities of timber transported - clear overloading.

For the interpretation of the results, an overloading threshold of at least **1m³** and exceeding **20%** of the declared volume was taken into account as cumulative thresholds. We therefore consider that only those shipments showing clear overloading that could be determined through the methodology used were identified.

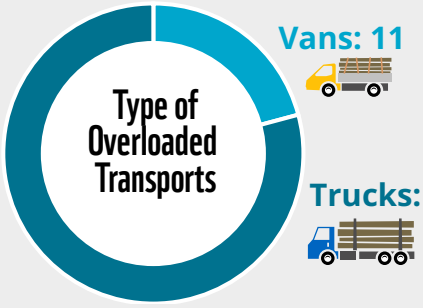


*Although a decrease was recorded for the 20% threshold used in previous years, **overloading is reconfirmed** as the most frequent modus operandi.*



TOTAL ASSESSED: 299 SHIPMENTS

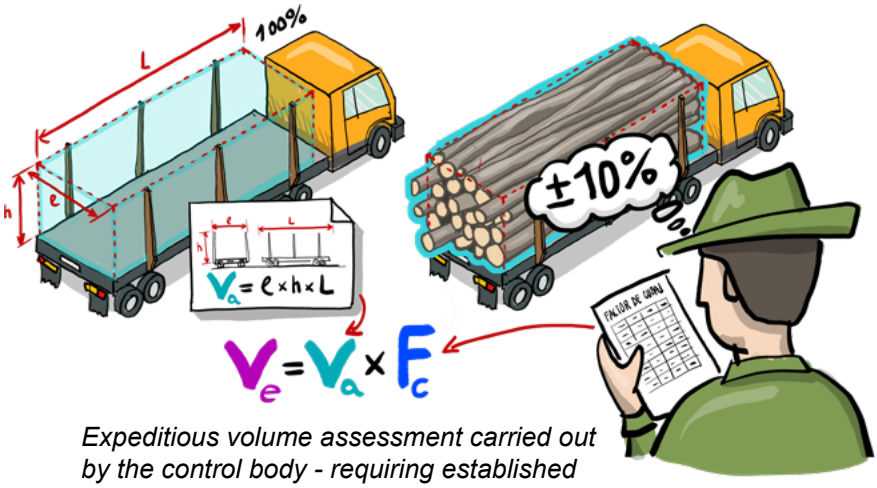
For technical reasons, not all captured shipments could be rigorously analysed for the assessment of overloading, as the quality of the recorded images did not allow volumes to be assessed.



For vans, the 1m³ overloading threshold was applied for the interpretation of results. For a large number of van shipments, 0.3m³ represents 20% of the load, and these are therefore not included in the statistics.

Priority Measure - Operationalizing expeditious volume assessment in control activity

Operationalise the provisions of Article 163 of Law no. 331/2024 - the Forestry Code, concerning the **determination of the volume of transported timber through expeditious volume assessment** carried out by the control body, **in relation to the relevant threshold of +/-10%.** In this respect, **average technical conversion factors must be established**, including for roundwood with diameters over 24 cm. The introduction of this procedure aims to **increase the operational capacity** of the Forest Guards t**o carry out field controls** by checking a larger number of shipments and by prioritising, on objective grounds, the cases requiring the application of the full measurement procedure for transported timber materials.



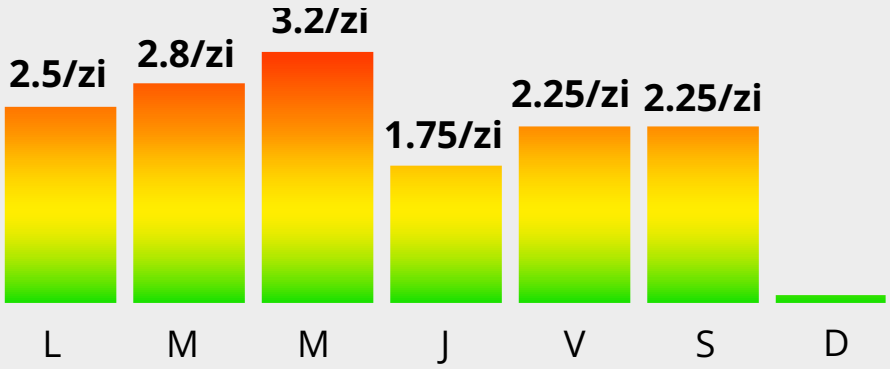
Expeditious volume assessment carried out by the control body - requiring established average technical conversion factors

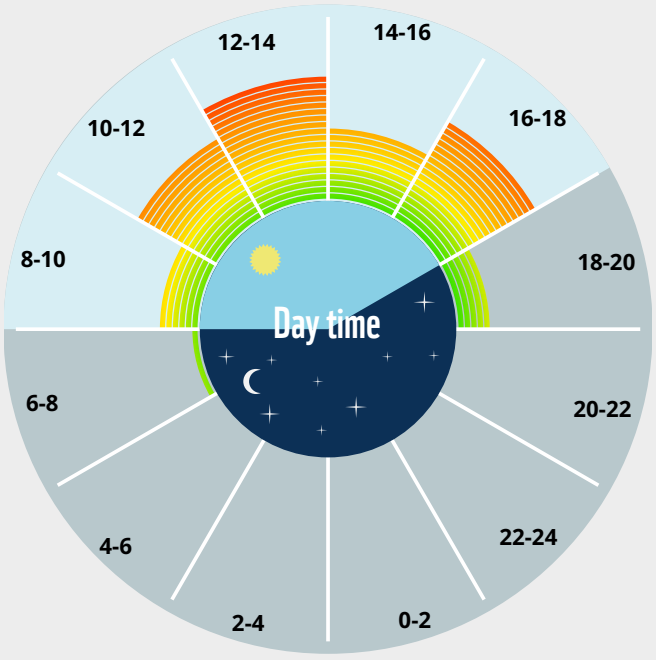
Although real-time analysis solutions based on artificial intelligence and cloud infrastructure are being developed, together with national video monitoring infrastructure, these components are not yet integrated into a coherent automated control mechanism.

Large-scale control capacity remains limited, given that field verification of volumes involves time-consuming and resource-intensive procedures. In practice, the system functions predominantly reactively, focusing on resolving the complaints received, which makes it more difficult to implement own risk-based control plans, especially in the context of staffing shortages.

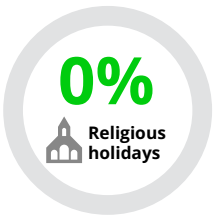
Complexity of the procedures required to verify a shipment of timber.

Distribution of non-compliant shipments by time intervals





Unlike previous monitoring campaigns, this campaign captured a higher share of non-compliant shipments during the normal working hours of control structures. This situation may indicate **a reduction in the effective field control capacity**, against the background of **multiple legal duties and the high volume of bureaucratic administrative tasks** assigned to personnel with control responsibilities within the Forest Guards.



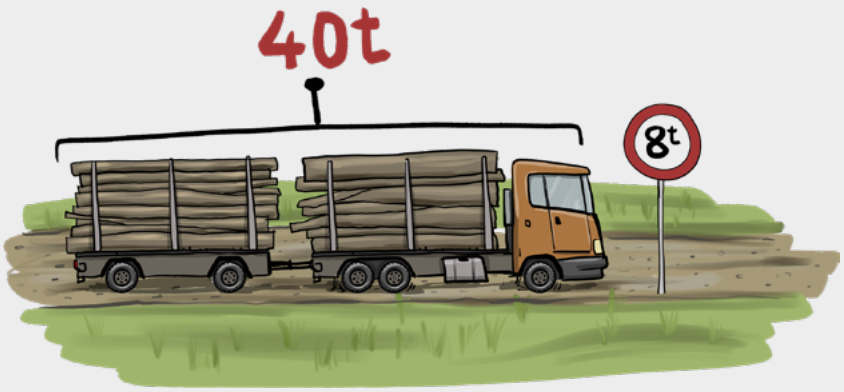
No transport activity was reconfirmed on religious holidays.

Other Identified Non-Conformities

During the monitoring, a series of other non-conformities were identified but were not analysed statistically.

FAILURE TO COMPLY WITH TONNAGE RESTRICTIONS ON PUBLIC ROADS

Failure to comply with tonnage restrictions was observed, including an approximately 40-tonne load on an 8-tonne road, according to road markings.



IMPOSSIBILITY OF IDENTIFYING LOADS OF TIMBER MATERIALS

A significant number of shipments were observed using c**losed or covered means of transport**, which cannot be visually identified from the outside as shipments of timber materials. These included shipments of roundwood/firewood carried out with large-capacity tipper semi-trailers. Although such means of transport may be used under certain conditions, they are not optimal for transporting roundwood, as they are designed primarily for bulk materials.

ALTERNATING SUMAL / NON-SUMAL STATUS

Alternating SUMAL / NON-SUMAL status for the same means of transport represents a potential non-compliance, as it may allow avoidance of the obligation to record photographs of the load and reduce the verifiability of the shipment in Forest Inspector. **SUMAL does not automatically restrict** professional transporters from also operating as non-professional transporters.

Desktop monitoring of timber shipments through the analysis of data and images published in Forest Inspector

SAMPLING METHOD

A national sample of 4,300 primary timber accompanying documents was determined[1], up from 3,047 in 2023. The sample included exclusively professional transporters who, under the rules in force, are required to record in SUMAL 2.0 photographs covering the entire load of timber materials.

The sample was distributed proportionally by county, according to the number of primary documents issued in each county by professional transporters, **in order to ensure uniform statistical coverage at national level** and the possibility of stratifying information at the level of Forest Guards, the institutions responsible for coordinating control activities at regional level.

The aim was to carry out an analysis, based on public information, of how the specific legislation concerning the data and information recorded by operators in SUMAL is complied with.

The working procedure consisted of selecting the documents, downloading them and having them checked by an independent expert from the perspective of:

- conformity of photographs;
- assessment of declared volumes;
- identification of species and assortments.

SAMPLE SIZE

4.300
Primary permits

FROM 3047 IN 2023

MONITORING PERIOD

The monitoring period for this third round of desktop monitoring was the **month of February**, with the day and time of document downloading available for each county.

Compared with previous monitoring campaigns, this stage was carried out over a complete calendar month, which allows the results to be related to the total number of shipments recorded during the analysed period. At the same time, the sample size was significantly expanded, contributing to the increased robustness and statistical relevance of the conclusions. This adaptation preserves the methodological procedure used in previous monitoring campaigns, while **focusing the analysis on the full month of February 2026**, providing a stronger basis for assessing how shipments are recorded and declared in SUMAL. Consequently, the results obtained provide a representative picture of the situation of timber shipments registered in SUMAL in February 2026.

EVALUATION METHOD

When assessing volumes, only overloading **cases exceeding 30%** of the declared volume were taken into account. Each shipment was re-queried in order to verify any possible reuse of photographs. These criteria and this threshold were also used in previous desktop monitoring campaigns.

Random sampling and a single national procedure were applied for each county, as follows:

- Within the sample established for each county, all primary documents were successively included in the study and systematically checked, starting, as the first option, from the north-eastern corner of the county, applicable only to forested areas;
- Where there was no forest in the respective area or where not enough primary documents had been issued in relation to the county sample size, areas from the north-western, south-western or south-eastern corners were successively included in the study, in trigonometric order;
- The same sampling rule was followed, including by systematically including and checking all primary documents issued during the last five publicly available days at the date and time of sampling;
- The identification of analysis regions and sample locations was carried out using the SUMAL 2.0 - Forest Inspector platform, desktop version.

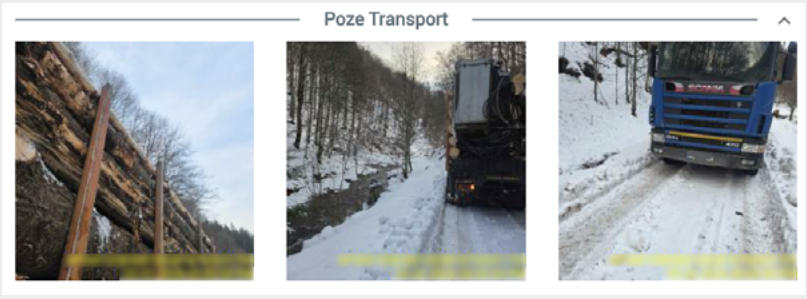
[1] The sample size, approximately 4% of all shipments registered in SUMAL in February, was conditioned by the available resources. The study aimed to further calibrate and verify the potential of this methodology and to strengthen the analytical basis by expanding both the sample and the monitoring period.

Desktop monitoring results

Following the monitoring, the following situations were identified concerning breaches of the rules on the origin, transport and sale of timber materials:

1

Non-compliant photographs from which the load in the means of transport cannot be distinguished or focused, in accordance with the interpretation of Law no. 171/2010, Article 19;

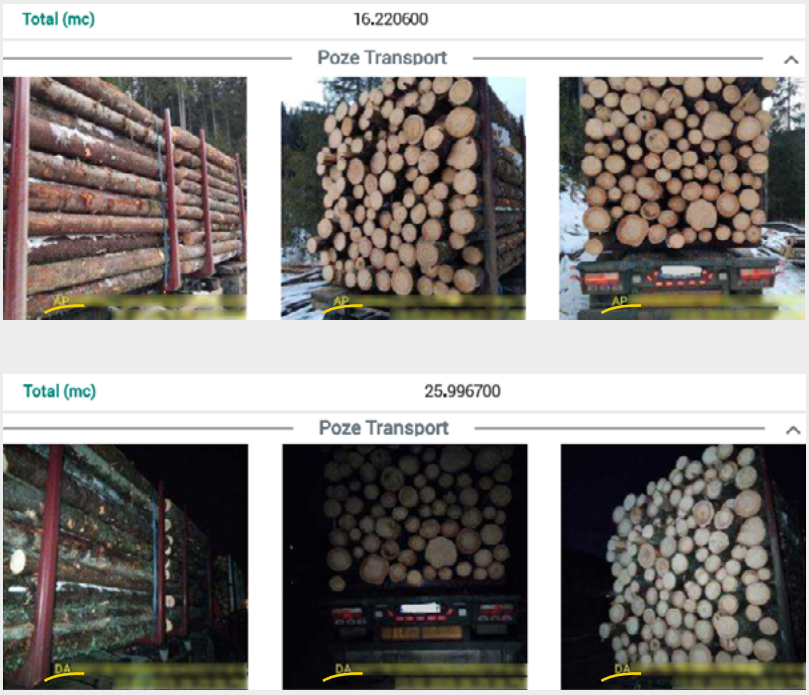


2

Obvious overloading cases, where the estimated volume exceeds 30% of the volume declared in the timber accompanying document.

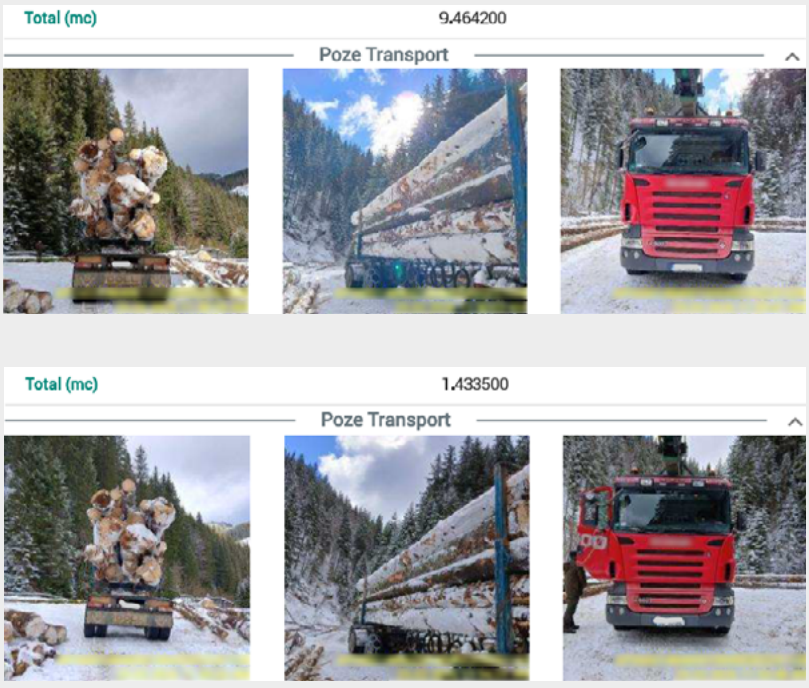
3

Shipments where **two documents were issued with different volumes for the same load**, one from the harvesting site (AP) and the other from the warehouse (DA);



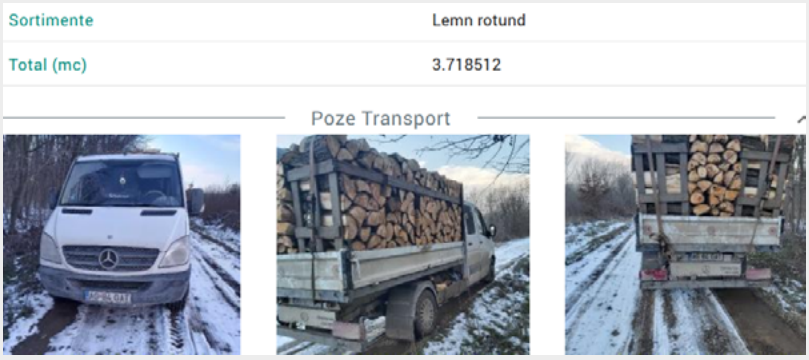
4

Identical photographs showing the **same load** used for documents with **different volumes** and origins.

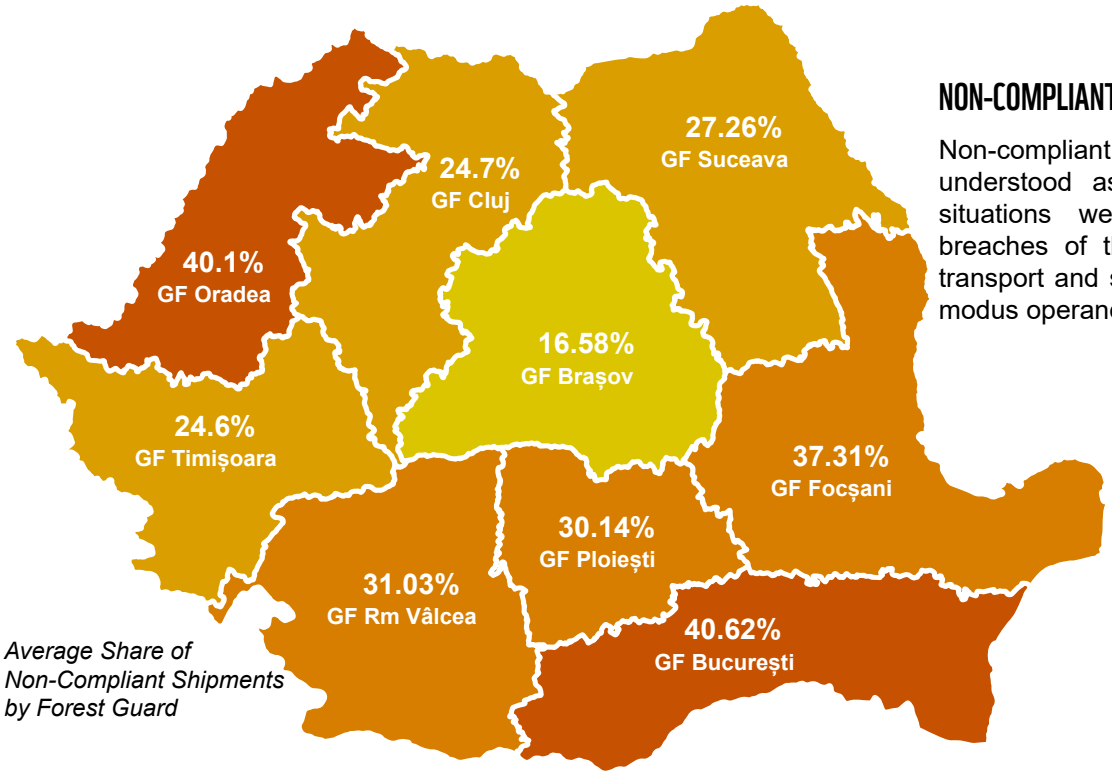


5

Incorrectly declared timber materials, in terms of **assortments or species;**



The analysis of the data obtained through monitoring resulted in an average of 29.22% non-compliant shipments.



Average Share of Non-Compliant Shipments by Forest Guard

NON-COMPLIANT SHIPMENTS

Non-compliant shipments are understood as all shipments where situations were identified involving breaches of the rules on the origin, transport and sale of timber materials, modus operandi.

DISCLAIMER

The analysis covers only the shipments registered in SUMAL that were subject to monitoring and does not reflect the full situation on the ground. Shipments not registered in SUMAL or shipments carried out by non-professional transporters, for which photographs are not recorded in SUMAL under the applicable rules, cannot be captured through this methodology. For this purpose, video monitoring at the first placing on the market and field controls are necessary.

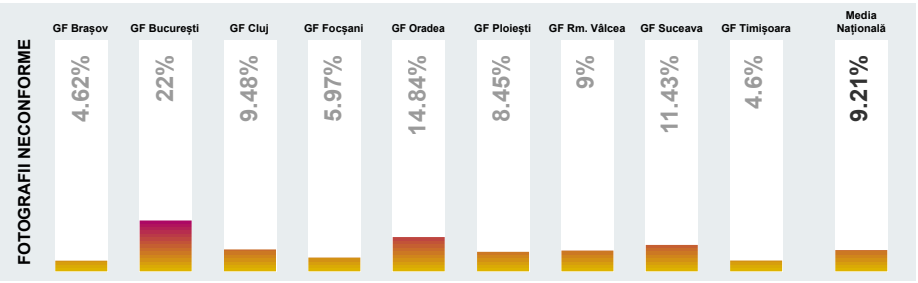
Data analysis and interpretation

A significant level of non-compliant practices is observed, among which the following stand out:

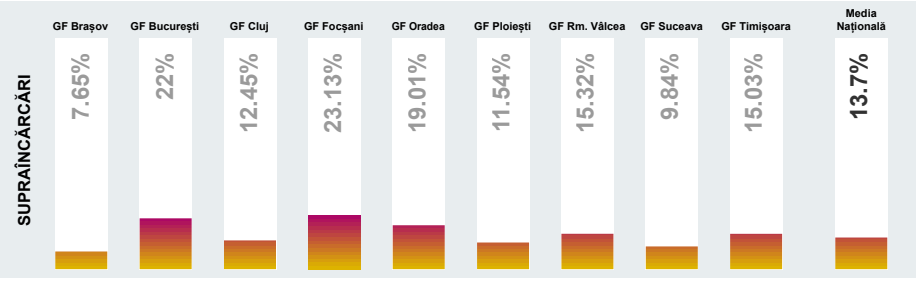
DISCLAIMER

The monitoring results reflect the situation of non-compliant shipments identified at national level, within the limits and conditions of the present methodology, for the analysed period, namely February 2026. The conclusions apply exclusively to shipments carried out by professional transporters and registered in SUMAL, and do not include shipments not registered in the system or other categories of users that could not be covered by this analysis.

1 REGISTRATION OF NON-COMPLIANT PHOTOGRAPHS;



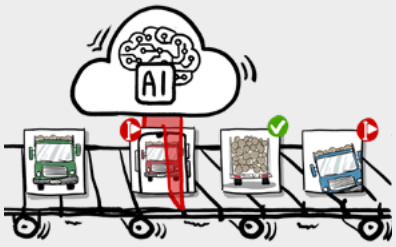
2 OVERLOADING



Explanation:

Although real-time analysis solutions based on artificial intelligence and cloud infrastructure are being developed, together with the national video monitoring infrastructure, these components are not yet integrated into a coherent automated control mechanism:

1. The SUMAL 2.0 application does not support automated and expeditious verification of recorded data and photographs;
2. SUMAL cannot prevent fraudulent recording of declared quantities/ qualities, i.e. overloading as the main modus operandi related to the placing on the market of timber harvested in breach of the applicable legislation;
3. The system is not designed to **automatically generate** alerts that would allow the prioritisation of controls and the implementation of risk-based planning using objective and transparent criteria.



THE POWER OF ARTIFICIAL INTELLIGENCE: NO PICTURE-TO-PICTURE CASES

No cases of documents with photographs taken of electronic devices were identified. The significant reduction may be correlated with the targeted automated analysis of SUMAL data and images for 2024 using cloud and AI technologies; however, these functionalities have not yet been permanently operationalised within a coherent automated control mechanism.

Conclusions and Recommendations

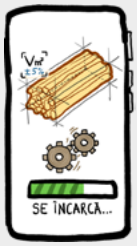
Limitations of the current SUMAL system and the added value of video monitoring. Implications for the reform of the control and traceability system.

Structural limitations in the current control model

The analysis highlights that the current architecture of SUMAL, although representing remarkable progress in the traceability of timber materials, remains predominantly based on declarative data and on a subsequent reactive control model, with significant operational limitations:

Transport overloading remains one of the main systemic vulnerabilities, facilitating the placing on the market of undeclared volumes;

Field verification of volumes is based on time-consuming procedures, such as piece-by-piece control, which limits control capacity at scale;



Although real-time analysis solutions based on artificial intelligence and cloud infrastructure are being developed, together with video monitoring infrastructure, these components are not yet integrated into a coherent automated control mechanism;

The system does not yet operationally integrate standardised and automated tools for validating transported volumes;

The prioritisation of controls remains insufficiently anchored in an integrated risk analysis combining SUMAL data and direct observation, which reduces the efficiency of interventions;

Moreover, the capacity to strategically plan and prioritise controls on the basis of internal institutional risk assessments remains limited, as a significant part of the available resources, both time and staff, is allocated, in accordance with legal obligations, to managing and verifying complaints received from citizens, regardless of their level of substantiation.

The system is **not yet designed to operate as a prevention mechanism**, where automated analysis of data and images would prevent or discourage the registration of non-compliant shipments. In its current form, the focus remains on the subsequent identification and sanctioning of non-conformities, rather than preventing them through automated validations, alerts and real-time checks;

Paradigm Shift assumed through the National Forest Strategy 2030

This shift entails moving the focus from **the predominantly administrative verification of standing wood, where volumes are** by their nature **estimated** using dendrometric methods, towards **the recording and control of the actual quantities resulting after harvesting**, at the moment when timber becomes economically, fiscally and traceability-relevant (the point at which harvested **wood** is identified and recorded **as timber material** / as a raw wood assortment **at the primary landing platform**, in accordance with Law no. 331/2024 – the Forestry Code).

In this respect, it becomes a priority to operationalise the provisions of Article 104(8) of the Forestry Code and of Ministerial Order no. 396/2026 concerning "**the pilot zones**", where special marking devices are not used and the assessment of the harvested timber volume is carried out according to the methods provided in Annexes 5, 8 and 11 to Ministerial Order no. 1323/2015.

These pilot zones may represent a concrete step towards testing a simpler, more transparent and more efficient model, in which the APV retains its role as a technical-estimative document, while SUMAL records relate more clearly to the quantities effectively resulting from harvesting.

THE RESULTS SUPPORT THE NEED TO ACCELERATE THE TRANSITION FROM THE TRADITIONAL CONTROL MODEL, BASED ON MARKING AND SUPERVISING TREES IN THE FOREST, TOWARDS A MODEL CENTRED ON CONTROLLING VOLUMES AT THE FIRST PLACING OF TIMBER ON THE MARKET.

THIS SHIFT ALLOWS:

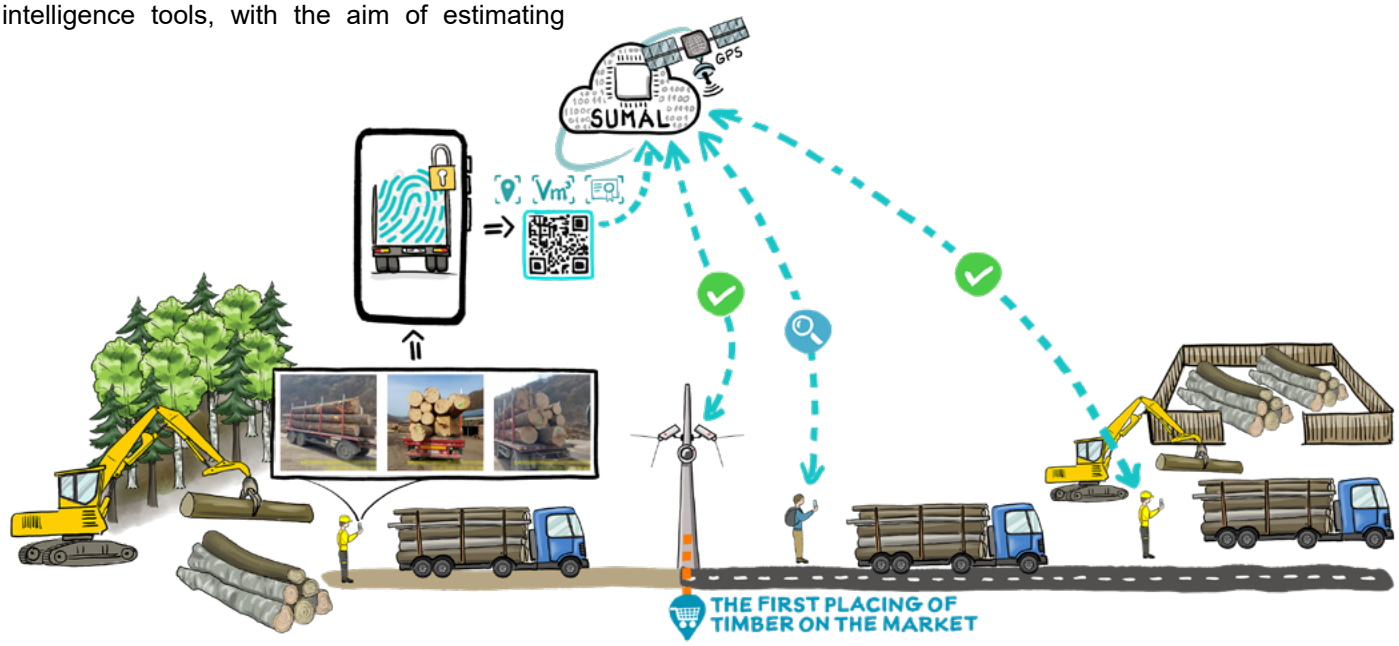
- Verification of volumes at the point where they become economically and fiscally relevant;
- Recognition of the estimative character of volumes calculated for standing wood;
- Recording in SUMAL of the actual quantities resulting from harvesting;
- Reduction of unnecessary administrative burdens and simplification of registration procedures;
- Increased efficiency of control at the first placing on the market;
- Substantiation of a scalable and digitalised risk-based control system.

Operationalising the DFTT Concept - Digital Fingerprint of Timber Transport

For the purpose of capitalising on the opportunities created by the new provisions on expeditious control of transported volumes, the development and integration into SUMAL of the DFTT concept - Digital Fingerprint of Timber Transport is proposed.

The concept is based on the use of images recorded in SUMAL, declarative data associated with the documents, and automated analysis / artificial intelligence tools, with the aim of estimating the load volume through a digital expeditious cubing mechanism, identifying shipments at risk of overloading, and generating alerts for targeted controls.

DFTT should function not only as a detection tool, but also as a prevention mechanism, by introducing an electronic seal of the load, capable of confirming the uniqueness of the shipment and limiting a number of non-conformities from the outset.



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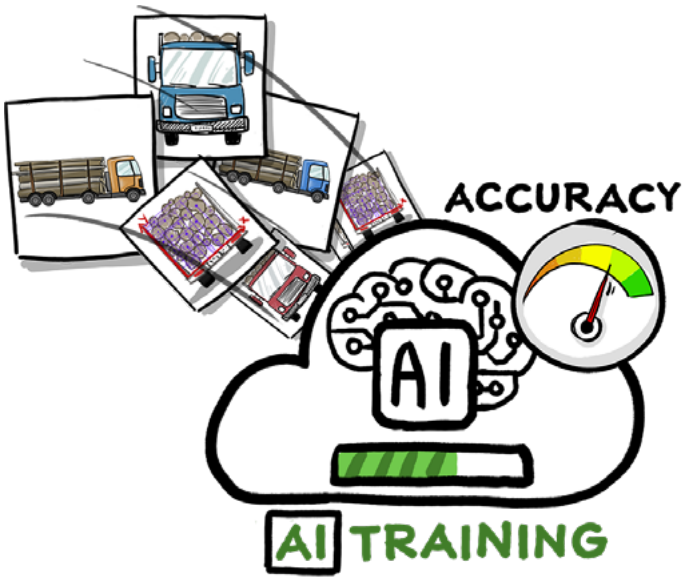
THIS CONCEPT INVOLVES THE FOLLOWING OPERATIONAL STEPS

Training the AI Model

- Using image datasets corresponding to shipments with diverse loads for which the volume has been physically verified;
- Correlating images with conversion factors and apparent volume, taking into account the type of means of transport and its technical capacity;
- Building standardised reference points for the maximum degree of loading, relative to the technical capacity and legal tonnage limits applicable to each vehicle category.



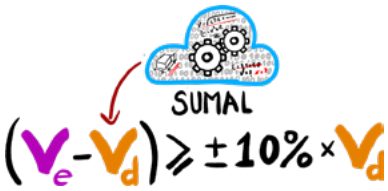
Automated evaluation of shipments based on images

The artificial intelligence-based application must be able to automatically determine, on the basis of images taken in the field or recorded in SUMAL, the **apparent volume** (V_a) of the load for each shipment.

The estimate should be made in relation to the standardised **total capacity** (T_c) of each means of transport, determined on the basis of **the standardised dimensions** of the trailer / semi-trailer / vehicle, as indicated by **the technical book or by the technical data recorded in the system.**

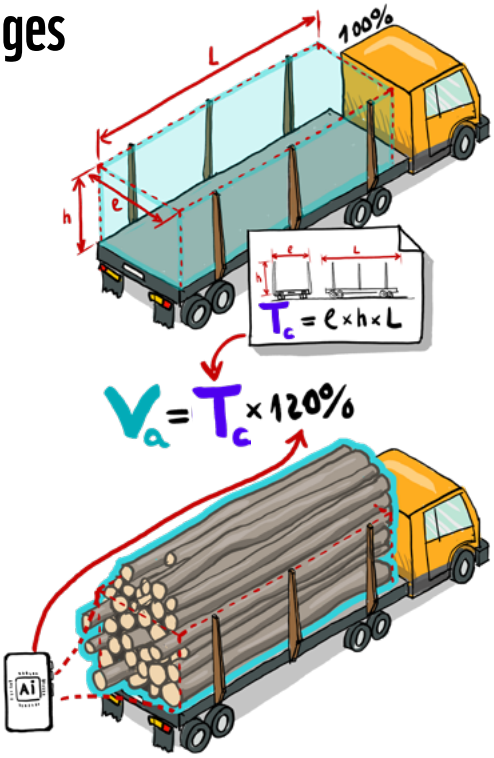
Based on the automatically determined apparent volume, the application must be able to calculate the **estimated volume** (V_e) of the transported timber material by applying the **conversion factors** (F_c) established by norms, depending on the species, assortments and dimensions of the declared timber material.

$$V_e = V_a \times F_c$$



In this way, the application can automatically assess whether the estimated volume exceeds by more than 10% the **volume declared/recorde** (V_d) in the timber accompanying document.

If this threshold is exceeded, according to the Forestry Code, the shipment must be flagged for the application of the full verification procedure, by measuring the timber materials piece by piece.



Automated validation of photographs and prevention of non-compliant photographs

- Automatic verification of the quality of photographs uploaded to SUMAL before finalising the registration of the shipment;
- Identification of photographs that do not allow effective verification of the entire load;
- Requesting photographs to be retaken or blocking completion of the registration when:
  - » the entire load cannot be distinguished or focused;
  - » the photograph does not properly capture the load from the front, back, side or top, as applicable;
  - » the image is unclear, incomplete, obstructed or taken from an angle that does not allow verification of the volume;
  - » the photograph appears to be reused or does not correspond to the current shipment;
  - » there are indications that the image was not taken directly of the load, but of another support or device.
- Transforming photo analysis from a subsequent verification tool into **a prevention mechanism** by preventing the registration of non-compliant photographs **from the moment the document is issued or operated.**

NOTĂ Ultimately, we are referring to professional transporters who have the capacity and responsibility to enter data correctly in SUMAL. Therefore, the system should support them in preventing involuntary errors through automated mechanisms for validating data and images before the registration of the shipment is finalised.

Generating Automated Alerts in SUMAL

- **Automatic issuance of alerts for shipments where the estimated volume exceeds the +/-10%** margin compared with the volume declared and **recorded in SUMAL**, in accordance with Article 163 of Law no. 331/2024 - the Forestry Code;
- Integration of these alerts into the control prioritisation mechanism;
- Efficient targeting of field controls towards the entities with control responsibilities in high-risk cases.

Video monitoring and the National Smart Camera System

CONTROL AT THE FIRST PLACING ON THE MARKET

Video monitoring has distinct added value compared with the analysis of photographs uploaded to SUMAL. While the Digital Fingerprint of Timber Transport (DFTT) allows the verification and analysis of shipments already registered in the system, field video monitoring can also capture the **reality outside the system**, including shipments without documents or multiple shipments using the same records, as well as fictitious shipments that cannot be identified solely through the analysis of SUMAL data.

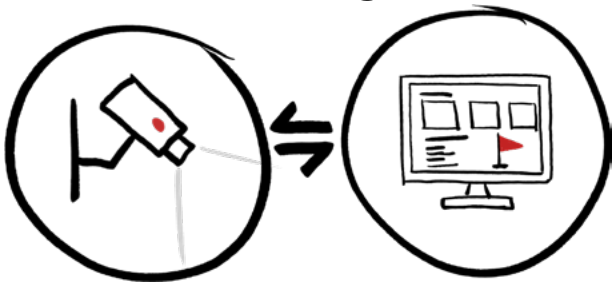
From this perspective, the national smart camera monitoring system must be viewed as a strategic tool for the effective verification of shipments at the first placing on the market, as close as possible to **the moment when timber materials leave the harvesting area.**

The location of the cameras is essential. To have operational relevance, they must be positioned on the access network in harvesting areas, **which is also a precondition for pilot zones**, at points that allow shipments to be captured before the timber material reaches warehouses, households, intermediate platforms or processing points. As far as possible, any unloading, transshipment or processing point between the harvesting site and the camera location should be avoided.

The process of operationalising the national monitoring system is ongoing after the completion of WWF monitoring, including through the installation of the necessary field infrastructure.

The national smart camera system can directly contribute to increasing the operational capacity of the Forest Guards through:

- Identification of shipments without timber accompanying document / SUMAL registration;
- Field verification of shipments flagged as risky through SUMAL or DFTT;
- Independent validation of the data declared in SUMAL;
- Visual documentation of loads at the moment of first placing on the market;
- Support for thematic controls and risk-based control plans;
- Reducing dependence on random or exclusively reactive controls.



Verificarea în teren a transporturilor semnalate ca risc prin SUMAL / Amprenta digitală.

In this respect, video monitoring does not duplicate SUMAL; it complements it. SUMAL can show what has been declared, while video monitoring can show what actually happened in the field. This difference is essential for identifying shipments not registered in SUMAL and situations where the declared data do not reflect the reality of the shipment.

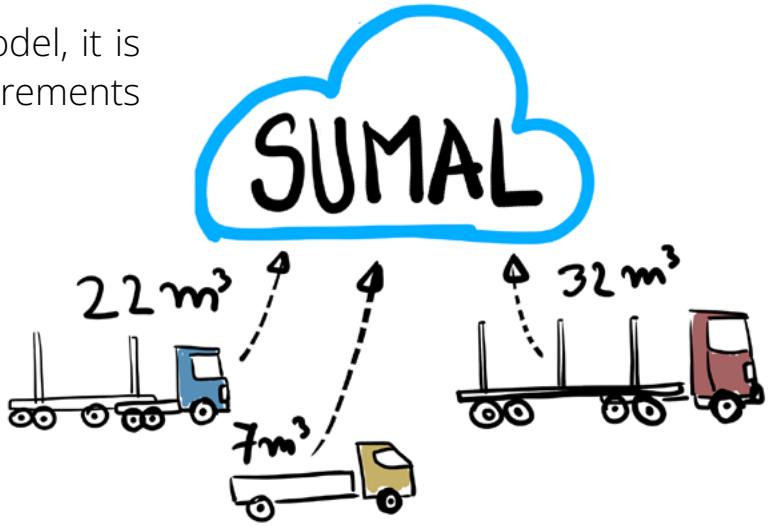
For the national video monitoring system, the delivered technical solution must include the possibility of estimating the effective volume transported at the surveillance points and automatically comparing it with the volume declared by the operator in the document.

The volume estimate must be carried out in line with the best available practices. In a first stage, a maximum deviation of up to +/-20% from the volume recorded in the document may be accepted. The AI-assisted system must be trainable through machine learning mechanisms, so that estimation errors are progressively reduced as data and field validations accumulate.

Conditions Necessary for Implementation (SUMAL 3)

For the operationalisation of this model, it is essential to introduce additional requirements into the SUMAL 3 architecture:

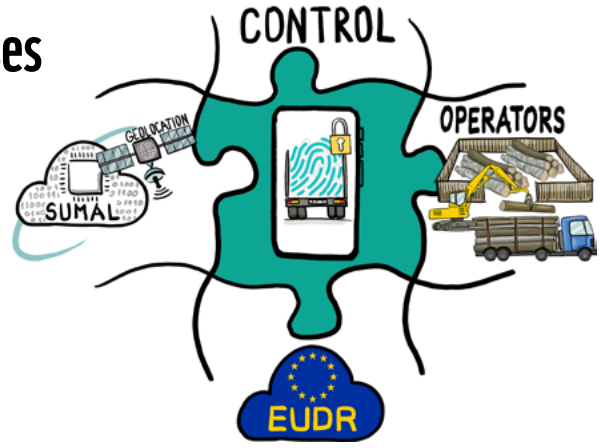
- **Standardised recording of the loading capacity and dimensions of transport vehicles** as a mandatory part of user profiles;
- Creation of a structured database of **vehicle types and relevant technical parameters** for estimating volumes;
- Ensuring interoperability between declarative data (SUMAL), collected images (video monitoring) and AI analysis modules.



SUMAL interoperability with Other Databases

In addition, SUMAL 3.0 must ensure **data interoperability** with other databases in order to provide the information needed for **economic operators to develop their own record-keeping systems** at the first placing of timber on the market and to track the traceability of timber materials, while also contributing to alignment with the requirements of Regulation (EU) 2023/1115 (EUDR).

Interoperability must be ensured both with the **economic operators' own databases** and with the **Information System** developed by the European Commission for the implementation **of the EUDR**, including for managing and tracking **the reference numbers** associated with due diligence statements when placing timber products on the market.



SUMAL interoperability with third other databases

Implications for reforming the system for combating illegal timber harvesting

The integration of the Digital Fingerprint of Timber Transport and video monitoring into SUMAL allows the evolution towards a control system that is:

Preventive and risk-based, rather than reactive, through the operationalisation of Article 163 of Law no. 331/2024 - the Forestry Code, concerning the determination of the volume of transported timber materials through expeditious volume assessment carried out by the control body in relation to the relevant threshold of +/-10%;

Transparent and auditable, through the use of visual evidence provided by images recorded by professional transporters, unannounced video monitoring and standardised algorithms for generating alerts and objective control criteria;

Proportionate and equitable in practice towards small owners, through the development of the SUMAL Small Owner module, designed to simplify the legal valorisation of wood from small owners for whom forest management planning is not mandatory, including from forest vegetation outside the national forest fund, exclusively for own consumption and without placing the timber material into the economic circuit;

Aligned with European good practices on traceability, legality verification and due diligence, including from the perspective of EUDR requirements;

Automated and scalable, reducing dependence on exhaustive controls;

At the same time, the modernisation of digital tools cannot substitute the need to strengthen the effective field control capacity. The Forest Guards must be supported by increasing the number of staff with control responsibilities and by reducing bureaucratic administrative tasks that consume important operational resources. At present, the capacity to implement their own control plans, built on a risk-based approach, is limited by the large number of complaints that must be resolved as a priority, by the multitude of legal duties and by the shortage of specialised personnel.

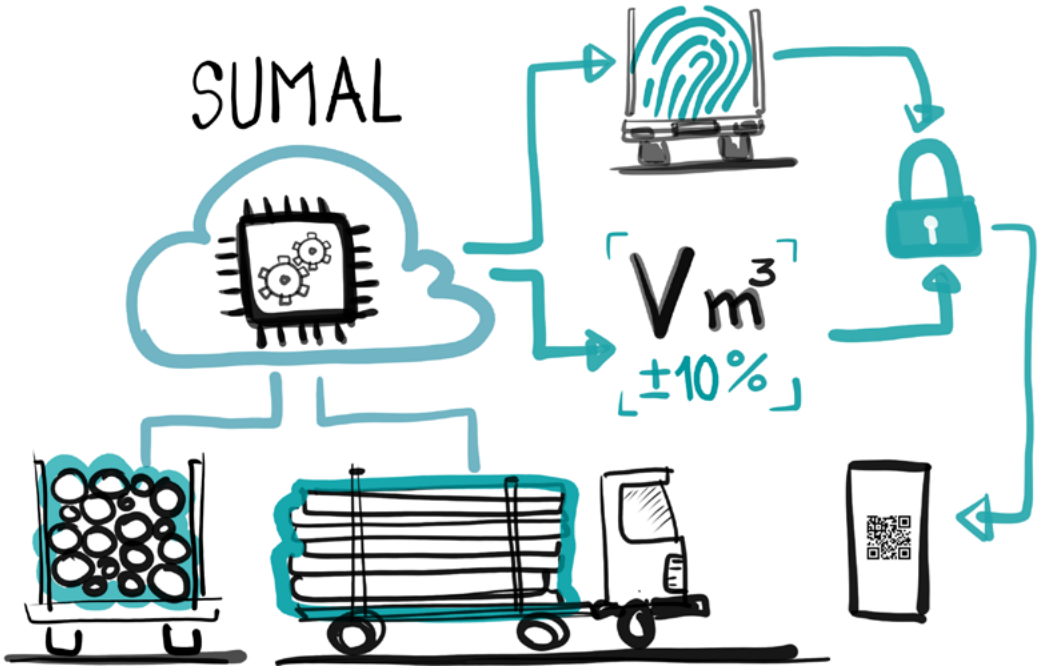
Strategic Conclusion

The proposed development direction turns the current limitations of the system into an operational advantage by moving towards a control model:

- Based on transparency and integrated data;
- Centred on the first placing on the market;
- Built on algorithms and modern tools that limit subjectivity and support competitiveness.

This model represents an essential component for increasing the efficiency of the system for combating illegal timber harvesting and for strengthening the credibility of the national timber traceability system.

Operationalising expeditious volume assessment, integrating the Digital Fingerprint of Timber Transport into SUMAL and connecting the national smart camera system can make it possible to prioritise controls on high-risk shipments without substituting the role of the enforcement officer. This model strengthens the operational capacity of the Forest Guards, reduces dependence on reactive controls and increases the credibility of the national timber traceability system.



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