



TRACE

inTegration
& haRmonizAtion
of logistiCs
opErations

Guidelines for Public Authorities

on Synchromodal and Shared Logistics and Autonomous Delivery

Non-technical brochure



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About TRACE

The principal inefficiencies in urban freight, such as empty running, duplicated journeys and underused capacity, arise between logistics operators rather than within individual fleets. Addressing them requires horizontal collaboration among competing companies, and such collaboration requires a neutral coordination platform through which it can take place.

TRACE has developed and demonstrated a platform for synchromodal and shared logistics. It gives participating operators a shared view of cargo and available capacity, recommending the most suitable mode of transport, route and handover sequence for each shipment. The platform automates planning, scheduling, routing and event management, while blockchain-based smart contracts govern settlement between parties without disclosing commercially sensitive information to competitors.

The platform was demonstrated in Greece, Italy and Slovenia, integrating rail, vans, cargo bikes, drones and autonomous delivery robots. The demonstrators recorded reductions in energy use, fuel consumption, emissions and operating costs, together with improved vehicle utilisation.

Purpose of the Guidelines

This brochure provides a brief overview of the TRACE guidelines for public authorities. These guidelines were developed based on the project's socio-economic assessment of synchromodal and shared logistics, as well as autonomous delivery.

Public authorities can influence their development through funding, procurement, permitting, public-space management and regulatory interventions. The fourteen guidelines summarise how these instruments can support more efficient, sustainable and inclusive logistics with the implementation of synchromodal and shared logistics, and autonomous mobility.

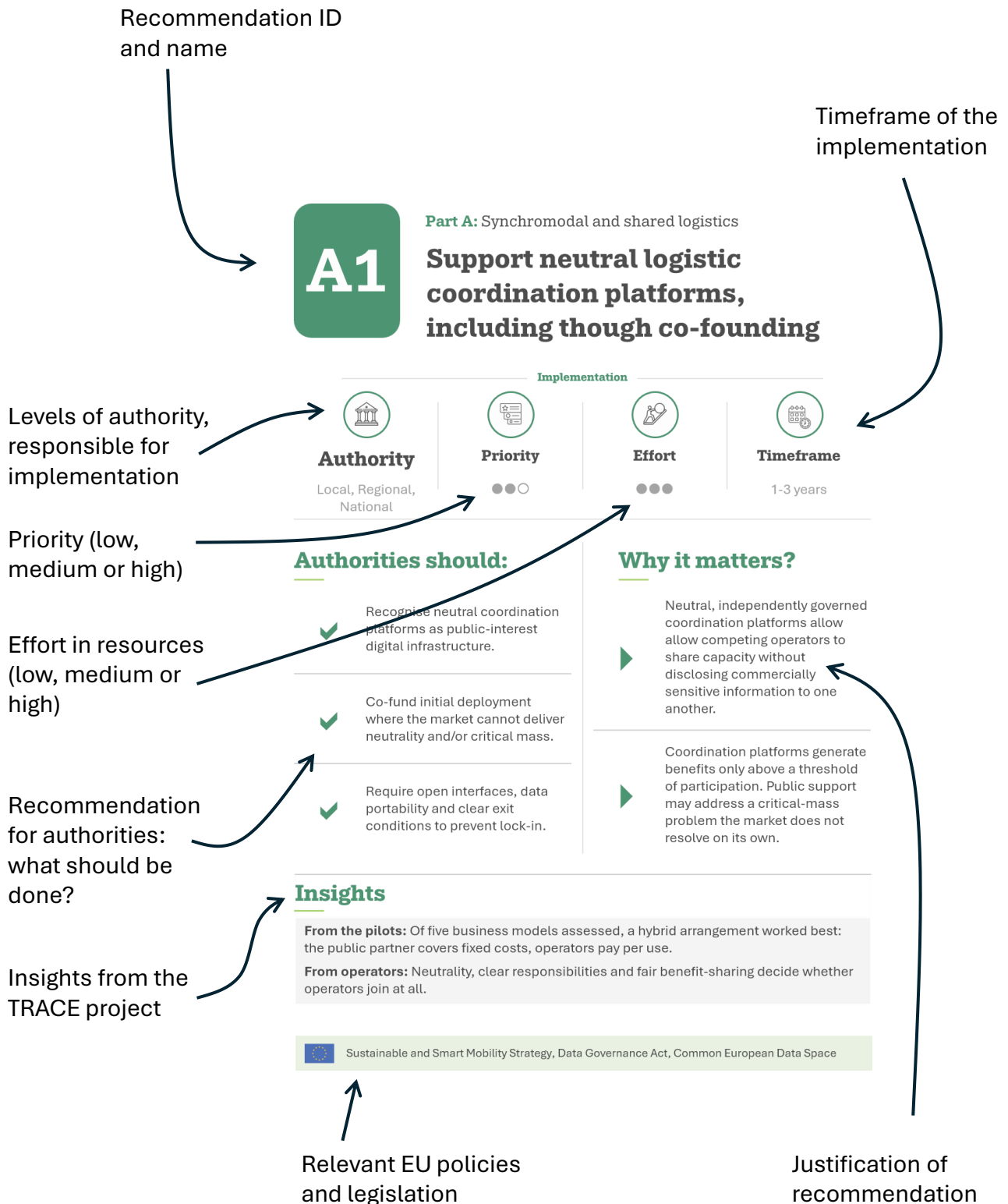
As the expected benefits are not automatic or evenly distributed, each guideline therefore identifies the recommended action, why it matters, the responsible level of authority, implementation effort and timeframe, and supporting evidence from TRACE.

List of guidelines

ID	Guideline	Implementation			
		Authority	Priority	Effort	Timeframe
A	Synchromodal and shared logistics				
A1	Support neutral logistics coordination platforms, including through co-funding	L, R, N	Medium	High	1-3 years
A2	Lower entry barriers for small/local logistic operators	L, R, N	High	Low	< 1 year
A3	Require pre-agreed operational and governance protocols as a precondition for public support	L, R, N	High	Low	< 1 year
A4	Make public support conditional on transparent benefit-sharing, operator reporting and environmental commitments	L, R, N	Medium	Medium	< 1 year
A5	Treat urban consolidation centres as a conditional policy instrument and consider co-funding	L	Low	High	> 3 years
B	Autonomous delivery				
B1	Prepare a local socio-spatial assessment and define appropriate operating areas and infrastructure for autonomous delivery systems	L	High	Medium	< 1 year
B2	Use regulatory sandboxes and pilot funding to support phased AV/ADR deployment	L, R, N	Medium	High	1-3 years
B3	Enable hybrid mixed-fleet deployment alongside existing delivery methods	L, R, N	High	Low	< 1 year
B4	Support workforce transition through reskilling and social protection	N	Medium	High	1-3 years
B5	Support the transition of AV/ADR innovation from pilots to market through co-investment and innovation procurement	N EU	Low	High	> 3 years
C	Cross-cutting guidelines				
C1	Integrate social inclusion criteria across urban logistics policies	L	Medium	Medium	< 1 year
C2	Require proportionate impact monitoring and evaluation as a condition for continued public support	ALL	High	Medium	< 1 year
C3	Establish a single point of contact, convene a local smart-delivery network (LSDN)	L	Medium	Low	< 1 year
C4	Require deployment-specific AI, data-protection and cybersecurity safeguards	ALL	High	Medium	< 1 year

Levels: L-local / R-regional / N-national / EU-European union

How to read the Guidelines?





Synchromodal and shared logistics

A1

Part A: Synchromodal and shared logistics

Support neutral logistics coordination platforms, including through co-funding

Implementation



Authority

Local, Regional,
National



Priority



Effort



Timeframe

1-3 years

Authorities should:



Recognise neutral coordination platforms as public-interest digital infrastructure.



Co-fund initial deployment where the market cannot deliver neutrality and/or critical mass.



Require open interfaces, data portability and clear exit conditions to prevent lock-in.

Why it matters?



Neutral, independently governed coordination platforms allow competing operators to share capacity without disclosing commercially sensitive information to one another.



Benefits grow with the number of participating operators, and below a certain level of participation they may not appear at all.

Insights

TRACE business model analysis: Of five models compared, a hybrid arrangement came out most sustainable: the public partner carries fixed costs, operators pay per use.

From operators: Neutrality, clear responsibilities and fair benefit-sharing decide whether operators join at all.



A2

Part A: Synchromodal and shared logistics

Lower entry barriers for small/local logistic operators

Implementation



Authority

Local, Regional,
National



Priority



Effort



Timeframe

< 1 year

Authorities should:



Require non-discriminatory access conditions on any platform receiving public support.



Require open interfaces, common data standards and simple onboarding.



Offer technical assistance to smaller operators.

Why it matters?



Digital readiness and investment capacities differ substantially across operators, and integration costs may be limiting for SMEs.



In the absence of specific access conditions, shared platforms may reinforce the position of already dominant operators.

Insights

Pilots: Modular integration let operators connect without replacing their existing IT systems.

Operators: The level of digital readiness and investment capacity differ between logistics operators, particularly among SMEs.



A3

Part A: Synchromodal and shared logistics

Require pre-agreed operational and governance protocols

Implementation



Authority

Local, Regional,
National



Priority



Effort



Timeframe

< 1 year

Authorities should:



Make public support conditional on documented operational and governance protocols.



Require protocols to cover handovers, roles, liability, data access, service standards and dispute resolution.



Require acceptance before joining, and revise protocols based on operational experience.

Why it matters?



In multi-operator and intermodal environments, shipments, data and liability transfer between actors. Undocumented arrangements may raise coordination costs and leave responsibility contested.



Agreed protocols allow the authority to establish operating conditions and accountability before public support is committed.

Insights

Pilots: Dispatch criteria and handover rules had to be agreed before operation could start.

Operators: Partnerships were described as difficult to manage.



A4

Part A: Synchromodal and shared logistics

Make public support conditional on transparent benefit-sharing, operator reporting and environmental commitments

Implementation



Authority

Local, Regional,
National



Priority

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Effort

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Timeframe

< 1 year

Authorities should:



Require agreed rules for sharing costs, revenues, risks and benefits.



Require reporting on the use of public support and the distribution of benefits.



Attach measurable environmental commitments, and define consequences for non-compliance.

Why it matters?



Public support should generate shared value rather than reinforce the commercial position of individual participants.



Operators identify transparent allocation of costs, revenues and risks as a condition for sustained cooperation.

Insights

Operators: Transparency and clear rules on sharing costs and benefits were named as conditions for cooperation.



A5

Part A: Synchromodal and shared logistics

Treat UCC as a conditional policy instrument and consider co-funding

Implementation



Authority

Local



Priority

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Effort

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Timeframe

> 3 years

Authorities should:



Assess whether an Urban consolidation centre (UCC) outperforms direct delivery before supporting one.



Do not mandate use by default; allow selective use against agreed criteria.



Co-fund the start-up phase, and continue support only where monitoring shows public benefit.

Why it matters?



Consolidation introduces an additional handling stage and fixed operating costs, and delivers public benefit only where it measurably reduces vehicle-kilometres or enables cleaner last-mile transport.



Where freight volumes, siting or last-mile options are unsuitable, a consolidation centre increases delivery cost, time and operational complexity.

Insights

Pilots: In one of the pilots UCC was one routing option, not a mandatory step.

Research: Critical mass and long-term financial viability are the recurring challenges for UCCs.





Autonomous Delivery

B1

Part B: Autonomous delivery

Prepare a local socio-spatial assessment and define appropriate operating areas and infrastructure for autonomous delivery systems

Implementation



Authority

Local



Priority



Effort



Timeframe

< 1 year

Authorities should:



Require a local socio-spatial assessment before authorising deployment in public space.



Define operating areas, routes, time windows, speed limits and restricted zones.



Verify maps, connectivity and infrastructure on site, and adjust conditions accordingly.

Why it matters?



The suitability of autonomous delivery is determined by the vehicle, the operating environment and the intensity of competing uses of public space.



Prior assessment reduces risks to pedestrians and users with reduced mobility, and provides operators with predictable deployment conditions.

Insights

Pilots: Delivery robots operated in controlled or semi-controlled settings. TRACE-developed Suitability Framework tool was applied (see TRACE D2.4, Ch. 7).

Research: Sidewalk delivery robots compete for space with pedestrians, cyclists and users with mobility impairment.



B2

Part B: Autonomous delivery

Use regulatory sandboxes and pilot funding to support phased AV/ADR deployment

Implementation



Authority

Local, Regional,
National



Priority



Effort



Timeframe

1-3 years

Authorities should:



Establish a phased pathway from controlled testing to limited and then wider deployment.



Set progression criteria on safety, reliability, accessibility, cybersecurity, supervision and liability.



Provide pilot funding and feed the learning into future regulation.

Why it matters?



Producers identify regulatory uncertainty and the cost of real-world testing as the principal barriers to deployment.



Supervised, phased authorisation allows applicable requirements to be clarified and progression criteria to be evidenced before wider operation is permitted. However, sandboxes brings clarity, not exemptions.

Insights

ADR producers: Regulatory uncertainty and the cost of real-world testing are the main barriers among interviewed producers.

Pilots: The TRACE pilots were not formal sandboxes, but they produced the kind of operating and regulatory learning a sandbox is meant to generate.



AI Act, New EU Urban Mobility Framework, ADS Regulation (2022/1426, 2026/481), UAS Regulation (2019/947), EGUM Innovation Uptake Recommendations, Machinery Regulation

B3

Part B: Autonomous delivery

Enable hybrid mixed-fleet deployment alongside existing delivery methods

Implementation



Authority

Local, Regional,
National



Priority



Effort



Timeframe

< 1 year

Authorities should:



Design funding and permits so autonomous assets can be introduced gradually.



Support mixed fleets: autonomous units on predictable segments, people where judgement or assistance is needed.



Require interoperable interfaces where a shared platform coordinates the fleet.

Why it matters?



Autonomous assets are currently suited to predictable and repetitive segments, while human operation remains necessary in complex environments, for exceptions and for assisted delivery.



Mixed-fleet deployment maintains service continuity, contains operational risk and allows workforce adjustment to proceed incrementally.

Insights

Pilots: in the pilots, several different vehicles and robots were used inside one system.

Operators/producers: mixed fleets were named as the most realistic near-term model.



B4

Part B: Autonomous delivery

Support workforce transition through reskilling and social protection

Implementation



Authority

National



Priority



Effort



Timeframe

1-3 years

Authorities should:



Assess employment and skills impacts as part of any publicly supported deployment.



Require transition plans agreed with workers and social partners.



Consider funding reskilling for remote operation, fleet supervision, maintenance and technical support.

Why it matters?



Automation may relieve recruitment difficulties and generate supervisory and technical roles, while also reshaping existing courier and driver tasks.



Without anticipatory measures, transition costs fall disproportionately on workers with limited retraining opportunities.

Insights

Operators: Their focus is not on cutting jobs, but on filling existing employment gaps.

Citizens: they identify employment as the principal negative impact of autonomous delivery.



European Pillar on Social Rights, Union of Skills, EGF for Displaced Workers, Social Climate Fund

B5

Part B: Autonomous delivery

Support the transition of AV/ADR innovation from pilots to market through co-investment and innovation procurement

Implementation



Authority

National, EU



Priority

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Effort

●●●



Timeframe

> 3 years

Authorities should:



Match the instrument to maturity: pre-commercial procurement, innovation partnerships or procurement of innovative solutions.



Fund shared test infrastructure, certification and first reference deployments.



Keep support competitive, time-limited and compliant with procurement and State-aid rules.

Why it matters?



Demonstrated technical feasibility does not constitute a business case: certification, production capacity and continued operational support require investment beyond the pilot phase.



Innovation procurement establishes initial demand and a reference deployment, retaining the industrial value of earlier public research investment within Europe.

Insights

ADR producers: Scale-up financing counts for more than regulation at this stage was weighted at least as heavily as regulation.



Directive on Public Procurement, EU Startup and Scaleup Strategy, EGUM Recommendations on Urban Logistics/Accelerated Deployment of Innovative Sustainable Solutions, New Industrial Strategy for Europe, State Aid rules



Cross-cutting guidelines



Part C: Cross-cutting guidelines

Integrate social inclusion criteria across urban logistics policies

Implementation



Authority

Local



Priority

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Effort

●●○



Timeframe

< 1 year

Authorities should:



Assess how logistics measures affect peripheral areas, low-income households, older and disabled users.



Set coverage, affordability and accessibility requirements in publicly funded delivery services.



Require non-digital alternatives and involve affected users in service design.

Why it matters?



Services optimised for cost and demand density provide lower coverage and service quality in peripheral and low-volume areas.



Digitally mediated and automated services introduce further barriers for users without smartphones, digital skills or independent access to automated pickup points.

Insights

Pilots: TRACE platform already routed shipments by pre-agreed rules. Minimum coverage or service levels can be written into those same rules.

Data: People with mobility disabilities report having to compete with delivery robots for pavement space. Digital skills drop steeply with age. A service reachable only through an app leaves the oldest users out.



New EU Urban Mobility Framework, European Pillar of Social Rights, European Accessibility Act, Directive on Public Procurement, Recommendations on Urban Logistics / Accelerated Deployment of Innovative Sustainable Solutions



Part C: Cross-cutting guidelines

Require proportionate impact monitoring and evaluation

Implementation



Authority

ALL



Priority

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Effort

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Timeframe

< 1 year

Authorities should:



Define baselines, indicators, targets and review points before committing support.



Cover economic, environmental, inclusion, employment and acceptance effects.



Use the results at review points to continue, adjust, expand or discontinue support.

Why it matters?



Effects observed under pilot conditions change with scale; coverage disparities, rebound effects and barriers to smaller operators typically emerge only later.



Monitoring provides the evidential basis for adjusting, extending or discontinuing support, while keeping requirements proportionate to the scale of the initiative.

Insights

Pilots: Baseline and target values were agreed before operations began (KPIs), which is what allowed the results to be assessed and compared.





Part C: Cross-cutting guidelines

Establish a single point of contact and a local smart-delivery network

Implementation



Authority

Local



Priority

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Effort

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Timeframe

< 1 year

Authorities should:



Designate a named point of contact for logistics innovation.



Publish consolidated information on procedures, requirements, responsible authorities and timelines.



Convene a light local smart-delivery network, and keep records of past pilots and conditions.

Why it matters?



Competences for permitting, public space and data protection are typically distributed across departments and levels of government.



A designated contact point reduces coordination costs and administrative burden, which fall disproportionately on smaller operators.

Insights

Pilots: Preparing each deployment required coordination between site owners, operators, providers, and several authorities.

Operators: Fragmentation and weak coordination between authorities and logistics actors were recurring barriers.





Part C: Cross-cutting guidelines

Require deployment-specific AI, data-protection and cybersecurity safeguards

Implementation



Authority

All



Priority

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Effort

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Timeframe

< 1 year

Authorities should:



Require a deployment-specific AI risk and obligations assessment before operational use.



Map data flows, carry out a DPIA where the risk is high, and require human oversight, logging and incident reporting.

Why it matters?



Obligations attach to the deployment, not to the product. The same vehicle may fall under different requirements depending on where, how and by whom it is operated.



Public acceptance depends on these safeguards as much as compliance does. Concerns about surveillance and data use can stop a deployment.

Insights

Citizens: Cybersecurity, privacy and trust in automated decisions were the top concerns.

Pilots: Careful technical design did not by itself produce transparency or accountability. Those had to be specified separately.



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