Just Four Coloured Lines on the Ground

By Alessandro Negrini

According to popular belief, anyone can paint "just four lines on the asphalt", but the perspective changes with the context: in industrial settings, those same "four lines" become the silent backbone of an information system that requires careful planning, close attention to detail and, above all, a decidedly pragmatic approach to identifying issues directly in the field.

Let's pretend that...

Let's imagine for a moment that we get into the car and set off towards a familiar destination. We probably will not need to use the sat-nav if we have a good memory, but let's also suppose that – already after the first two or three junctions – it becomes clear that the road markings on the asphalt have completely disappeared.

Now, if you too – like me – enjoy the joys and sorrows of provincial life, you probably would not be all that surprised[1]; if, however, the situation were to continue all the way to the motorway entrance, it is likely that you would start to be taken aback.

If your journey were not at all short and in fact ended up taking you to another region or even across the border, the complete absence of road markings would almost certainly begin to make you feel uneasy, if not actually alarmed. After that bend, will you still be in the correct lane? Does the center line allow overtaking at that point or not? At the next turn, will you be able to merge safely? Being an excellent driver and knowing your car well does not entirely reassure you that, in your absence, things have not changed compared with what you remember from the last time you were in the area. In short, you are not at ease even though you now have the sat-nav's directions in your ears and, in any case, the

[1] It is common knowledge that resurfacing major roads is a strictly pre-election phenomenon, especially in the northern Milan area. In the absence of elections, carriageways undergo a meticulous process of destruction carried out through a drip-feed of small mobile roadworks and, in some cases, through ambitious mobility plans driven by the introduction of bike lanes "on credit". The result resembles the routes once used for the Camel Trophy, but with no prize waiting at the end.

road signs and traffic lights have not also vanished into thin air.

Let's now suspend our imagination, but hold on to that sense of unease and try to transpose it into a more complex context than a melancholic roundabout at the junction between hypermarkets and car dealerships. Let's imagine that we have to move around on our own (and without a sat-nav this time) inside a large – huge – industrial plant such as the former ILVA site in Taranto, which covers more than 1,500 hectares. Put very briefly, it is likely that the ground markings will be our main lifeline (together with the other signs put in place to keep us from getting lost among blast furnaces and storage yards, of course), ensuring not only that we actually manage to reach the offices (or one of the main exits), but also that – in doing so – natural selection does not get to assert its rights over us: that we do not end up being crushed by heavy vehicles, parking where a tonne of coal is about to be dumped, or entering high-risk areas, perhaps just as a critical process is under way.

In this light, one could say that those "four colored lines on the ground", obvious as they may seem, provide an effective aid to managing (and safeguarding) the flow of resources and people across a wide range of contexts, much like other, perhaps more sophisticated, tools[2]. How, then, is an information system of this kind created (and preserved)?

What does the legislation establish?

In Italy, even though it may seem self-evident, the first major regulatory source on the subject is Legislative Decree 81/08[3], which draws part of its content in this area from the well-established EU Directive 92/58/EEC on safety signs and signposting[4].

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[2] In recent years, many have rightly embraced the mantra of a "safety culture" built on training, but the usefulness of consistent information activities carried out through simple, straightforward visual communication is often overlooked..

[3] Articles 161-164 (grouped under Title V) and Annexes XXIV to XXVIII, in particular. In essence, around a dozen pages that mix legal obligations with practical guidelines of measured vagueness, which also include a handful of lines on the criteria for marking hazardous areas, escape routes and traffic routes.

[4] Originally transposed into Italian law by Legislative Decree No. 493 of 14 August 1996 and marked by an approach that is anything but specific, it should be noted that – over roughly twenty pages – the concept of true "horizontal road markings" is never actually addressed, limiting itself instead to mentioning the possible use of "permanent marking" of obstacles, hazardous points and traffic routes using safety colours and stripes.

UNI EN ISO 7010 follows with the customary measured detachment typical of publications from our national standardization body, collecting, clarifying and – most importantly for certification enthusiasts – harmonizing the key concepts related to "Graphical symbols | Safety colours and safety signs | Registered safety signs" at intervals of roughly a decade.

In short? Once the necessary risk assessment has been carried out and subject to the preliminary considerations set out in Article 161[5], "the employer shall make use of safety signs" in a compliant manner and, "also with reference to good practice standards, shall adopt the necessary measures according to the nature of the work, experience and technology."

Without prejudice to the great trust that the legislator clearly places in the notion of "technology", it then goes on to clarify the need to inform (and train) workers about the meaning – if not indeed the usefulness – of the specific forms of signage that have been chosen for use within the company.

And what about actual horizontal road markings? As it turns out, "in order to regulate traffic within the company or production unit, the employer shall, where appropriate, make use of the signage provided for by the legislation in force on road, rail, inland waterway, maritime or air traffic[6], without prejudice to the provisions of Annex XXVIII" (which, incidentally, amounts to no more than twenty lines, headings and paragraph breaks included).

Article 165 then brings this Title to a characteristically terse close by setting out the penalties for non-compliance.

If we wish to delve a little further into the technical and functional side, we can look – at least in part – to standards such as UNI/TR 11670 ("Guidelines for defining the technical and functional requirements of horizontal road markings"), UNI EN 1824 ("Road marking materials – Road trials") and UNI EN 1436 ("Road marking materials

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[5] Clarifying – so as to avoid any misunderstanding or potential inter-ministerial conflict – that "the provisions of this decree do not apply to signage used to regulate road, rail, inland waterway, sea or air traffic."

[6] We are, however, in something of a regulatory grey area, since within a production site (for example a steel plant, a petrochemical facility or even just a cluster of warehouses in a logistics hub) the Highway Code applies only to those traffic routes that are, in practice, open to public use (where present). In internal areas with controlled access, by contrast, company rules apply, without prejudice to occupational safety regulations and civil liability provisions.

– Performance for road users and test methods"), which focus on performance-related aspects such as durability, wear resistance and minimum expected performance levels.

UNI 7543-1/3 focus on "Colours and Safety Signs", while – finally – the "good practice standard" ISO 16069 ("Graphical Symbols – Safety Signs – Safety Way Guidance Systems[7] (SWGS)") appears to give some room to the topic that concerns us most, although only within an emergency context and leaving aside indications on tactile, acoustic and photoluminescent components.

Those who are more determined can even go on to consult UNI/TS 11886-1/2 (devoted to impact protection systems) which do not directly regulate horizontal signage, but refer to it as a functional element of internal traffic routes and safety in handling areas considered significant.

What the judges think

If, up to this point, the overall picture does not seem particularly clear, it is, by contrast, all too evident that non-compliance with these aspects of occupational safety has been the subject of several noteworthy court rulings, which are useful at least for understanding the point of view of those who actually apply the law.

Let us start with Criminal Court of Cassation (Fourth Division) judgment no. 8489 of 14 March 2022, concerning a worker who was run over by a forklift truck in an area lacking adequate signage to distinguish traffic routes for work vehicles from pedestrian pathways; in this case, the Court held that the omission had a "clearly causal significance" in the occurrence of the accident.

Judgment no. 27758 of 27 June 2023, by contrast, concerns an employee who was struck by a forklift truck in front of a coffee vending machine; here too, the Court of Cassation reiterated that the absence of clearly marked pedestrian routes violates the employer's obligations and is a decisive factor in creating the conditions that led to the accident.

Finally – though only for the purposes of our discussion, not in absolute chronological terms – it is worth mentioning earlier judgment no. 10110 of 10 March 2023, which not only reiterates the same employer obligations in cases of "mixed traffic" (for example workers, visitors, forklifts, pallet trucks, etc.), but also clarifies that ap-

[7] "Graphic symbols. Safety signs. Guidance systems for escape routes".

pointing a supervisor (perhaps seen by the employer as a sort of in-house traffic warden) and adopting other practical measures (such as routinely sounding the horn to draw attention) do not replace the structural obligation to provide appropriate signage.

A pragmatic approach

With this, at the end of this brief regulatory and legal overview, one is left with the impression that a clear line of guidance is missing or, at the very least (if you will pardon the expression), the equivalent of a bold, reassuring "X" on the ground showing us where to start digging to unearth the tools needed to achieve our aim – namely, to fulfil those employer obligations laid down in Article 163 by means of "necessary" and compliant measures.

If the legislator, for their part, places such trust in "technical expertise", it does not seem unreasonable for us to adopt an approach based on individual know-how – that practical "know-how" which characterizes so many safety professionals[8].

From this follows an essentially pragmatic first observation: the flow of resources within a large production site is not merely a "logistical" issue, but a rather delicate interplay of priorities in terms of production management and protection of those same resources. This in turn creates the need for effective (one hopes) and systematic planning of the movements of people, vehicles and materials, so as to prevent accidents and interference arising, for example, from unauthorized access (being where one should not be – say, switching off one's brain and choosing to spend a cigarette break in an ATEX Zone 0) or from ill-timed access (being where one should be, but at the wrong moment – turning a corner and finding oneself in the path of a bundle of billets being carried at head height by an overhead crane).

The step from "logistics" to "logic" is a short one and it is, at least on paper, logical to begin by defining objectives and a perimeter – both conceptual and physical – that clarify what one intends to achieve with a realistic approach (we have known since university that "zero risk" does not exist), as well as which areas to include (for example workshops, warehouses, yards, car parks, access roads, loading and unloading bays, etc.), keeping one eye on ADR requirements and the other on ATEX zoning, as

[8] Those who lack expertise generally waste their own time (and everyone else's) wandering aimlessly, like in Minos's labyrinth.

necessary. This phase is often underestimated and is frequently seen as a "mere surveillance issue" to be addressed, at most, by investing in new access-control gates, colour-coded badges and the inevitable array of next-generation CCTV cameras[9], but it usually does not take long before attention shifts back to simpler measures based on mapping flows and, above all, identifying movement patterns (routine, emergency, etc.), establishing whether some parts of the site in fact fall within areas that can be classed as open to public use or whether all traffic can be regarded as strictly internal.

Since "the map is not the territory", however, consulting layouts and as-built drawings must sooner or later give way to on-site inspections[10], which means monitoring actual flows at different times of day and on different shifts, identifying pedestrians' natural paths and critical vehicle manoeuvres with the aim of pinpointing the inevitable blind spots and the interferences with process or maintenance activities[11].

The core of the plan lies in designing the network of routes so as to define hierarchies of internal roads, directions of travel, minimum widths, manoeuvring areas and junction points, establishing right-of-way rules and, where necessary, control systems. In parallel, pedestrian paths and escape routes are mapped out which, wherever possible, will be physically separated by barriers and impact-protection systems. Throughout this process, it is essential to keep in mind both the level of distraction that typifies the average pedestrian, usually hypnotised by their smartphone, and the carefree creativity of many drivers, convinced that any area not explicitly surrounded by chevaux-de-frise and barbed wire is effectively an implicitly authorised parking space.

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[9] This first phase is usually followed by a brief moment of embarrassment when management and the more zealous supervisors are politely reminded that the Workers' Statute, in fact, prohibits the installation of audiovisual systems and other devices "from which it is also possible to monitor workers' activity remotely" where the sole purpose is to control performance. Once the prospect of "optimizing" the investment by simultaneously introducing a strict internal social-monitoring model has faded, the discussion (albeit without great enthusiasm) returns to signage and traffic-management plans.

[10] Ignoring this obvious observation can sometimes cost you dearly.

[11] At this point, very often, you end up wrestling with the confirmation bias of the various people involved in the survey, each firmly convinced – in their own way – of the safety (or, conversely, the extreme danger) of different and opposing situations.

At the design stage, it is all too easy to fall prey to the "low-emission-zone urban planner syndrome", coming up with solutions that look very elegant at 1:50 scale but are far less convenient for the tankers trying to reach the loading bays[12]: one of the key reminders is, and remains, not to forget that those famous "four lines on the ground" are a form of communication and, as such, must use language that is coherent, immediate and intuitive.

Next come the procedures: the usual internal traffic rules for workers and—if we want to wink at the logic of ISO 45001 – for any "interested or affected party" authorised to access production or storage areas. This is not out of love for bureaucracy, but in order to prepare, in parallel, other informational tools that help people understand how to move around (quite literally). Each route must then be re-checked on site to make sure everything adds up and that the tankers in our example do not grind to a halt halfway because the pipe rack crossing their path is too low and nobody updated the construction drawings[13] before passing them on to HSE and the plant manager for their assessments.

Finally, the greatest effort of all: making this system work even after the novelty has worn off and the photos for company branding have been posted on social media, together with the videos of yet another motivational management event staged on the brand-new loading yard. In short, internal traffic management has to be kept "alive": asphalt, resin and concrete wear out in different ways, layouts change, flows evolve. This creates the need – right from the outset – to establish (and maintain) tools for monitoring, reviewing and improving (in a word, managing) signage, so as to avoid plunging, in just a few months, into a chaos of patch-ups, dead-end routes and markings faded by mud, solvents and tyre tracks.

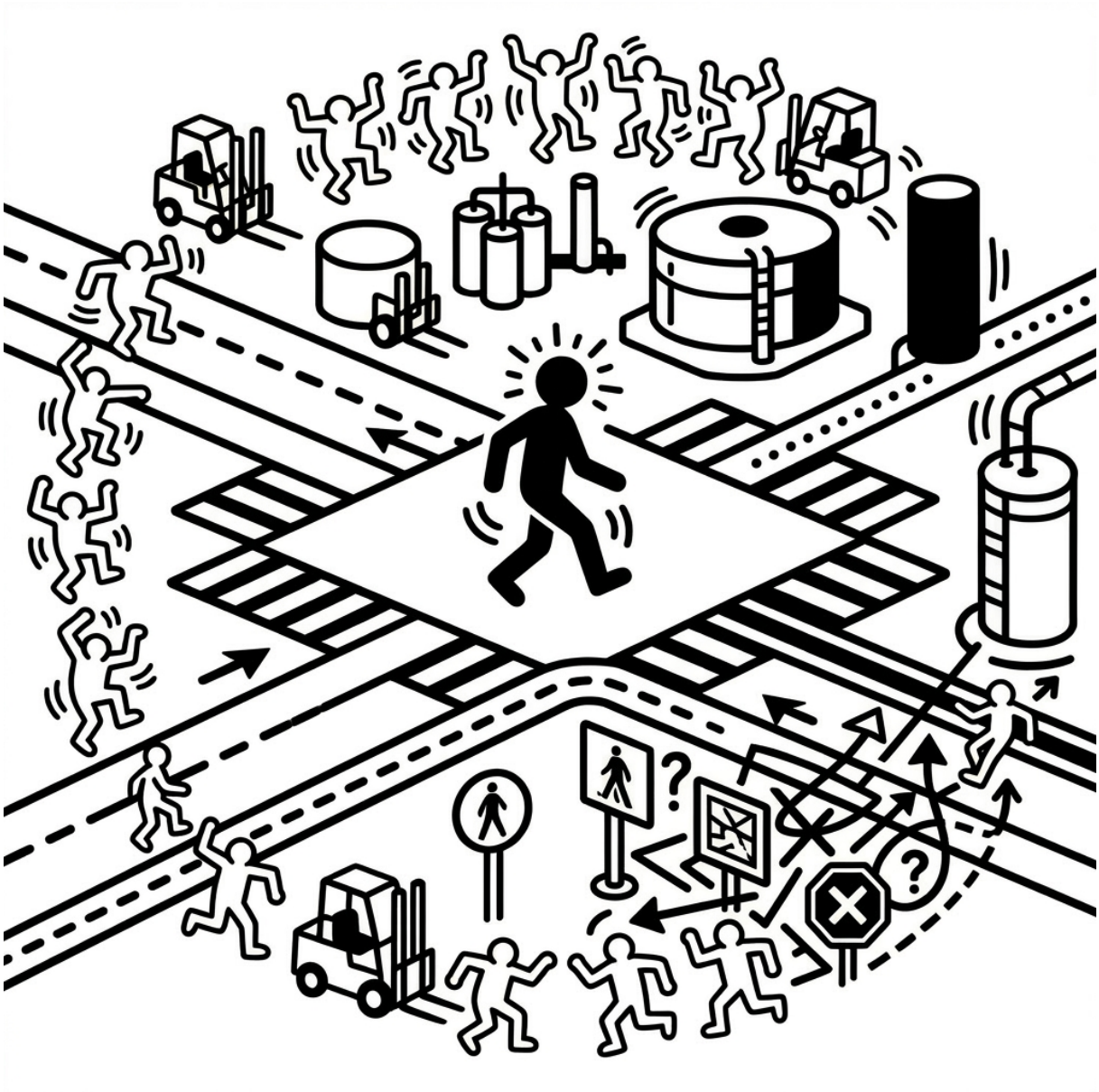
Future perspectives?

At this point, sector experts usually wrap things up by outlining the enticing prospects that await us in the very near future but – with perhaps the sole exception of

[12] The next mistake, when it becomes clear that things are not working, is to expect people to conform neatly to the map, as if they were nothing more than blocks taken from a CAD symbol library.

[13] Recalling that, in 2025, a forklift in manoeuvre struck the PSV of a tank containing ammonia at the Thatcher Company plant in Sacramento, causing a gas leak that led to the evacuation of the area and the hospitalisation of a worker.

dynamic signage systems projected by laser or LED in indoor environments – the positive aspect is precisely this: although research into durability and improved visibility leads, year after year, to ever-new products, horizontal signage remains a simple yet versatile tool that does not readily lend itself to fashion trends and, perhaps for that very reason, has retained its usefulness unchanged from 1911 to the present day[14]. ■



[14] The first documented example of road markings dates back to 1911, on River Road in Trenton (Wayne County, Michigan, USA), where a white centerline was painted to separate the two directions of travel.