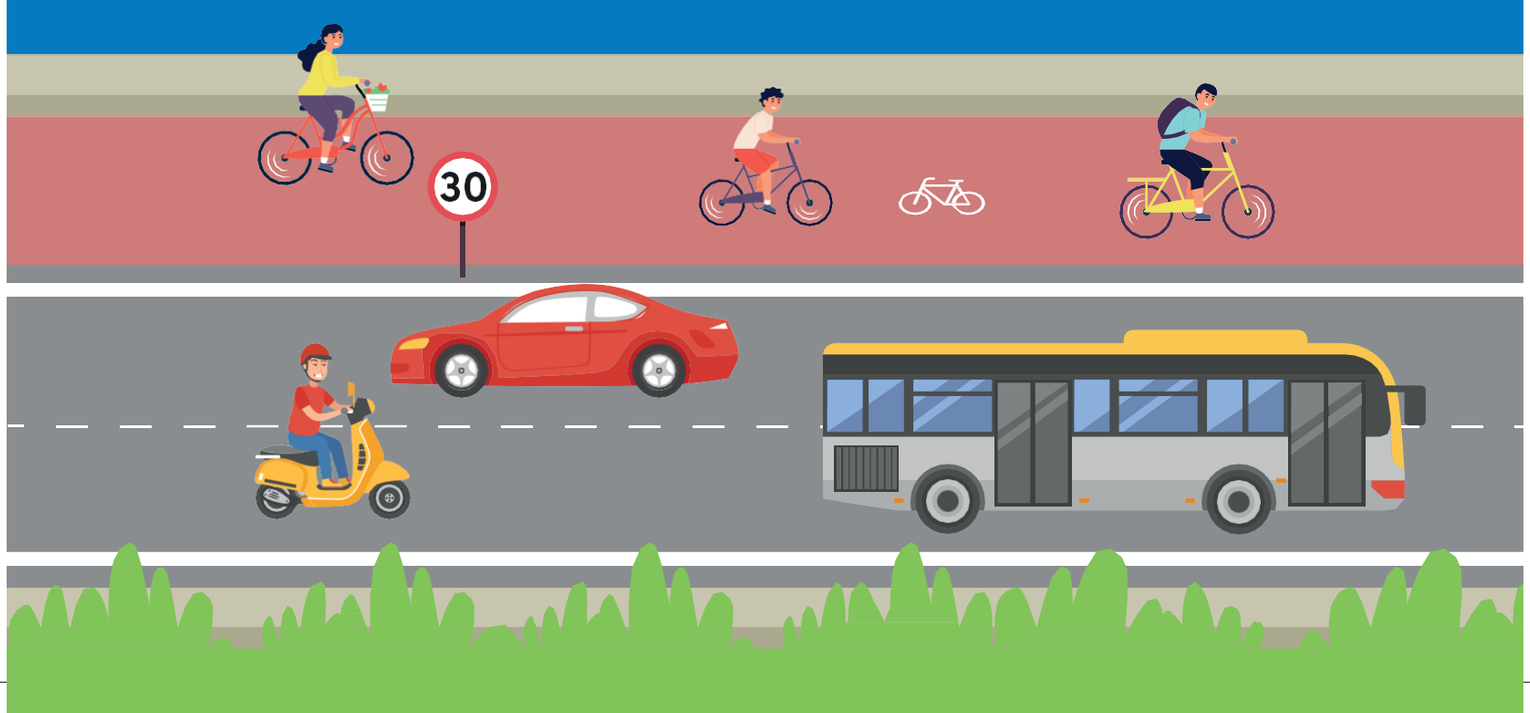
Mims

Ministry of infrastructures
and sustainable mobility

Department for sustainable mobility
Directorate general for road safety and road transport

National Road Safety Plan 2030

(Resolution CIPESS 14 april 2022, n. 13)



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FOREWORD

A significant improvement in road safety is one of the fundamental pillars of the sustainable mobility system that the Government proposes to carry out in the next ten years, in line with international and European guidelines. The '2030 Road Safety Plan' drawn up by the Ministry of Infrastructures and Sustainable Mobility (MISM) is a serious and exhaustive proposal, both in terms of content and time schedule, to carry out a major change in dealing with the issue of road safety, by adopting the *Safe System* approach provided by the United Nations and other international organizations dedicated to this topic.

The strategy and actions described in the Plan thoroughly explain how such an approach needs a holistic view of the road safety issue.

of transport, infrastructures, behaviour of institutions and road users. Attention should be paid to the problems leading road users, and especially drivers, to underestimate the risks and, sometimes, to adopt a highly dangerous driving style, which would affect their and others' safety.

As it has clearly been stated in the Plan, the 'Zero victims' goal is not unrealistic, provided that effective actions are taken to deal with all the facets of the problem. The Plan provides a precise list of things to do over the next 10 years to move steadily towards achieving this goal. In some cases, the Plan correctly refers to general public policies or decisions to be made by local authorities or the private sector.

That is the case of investments on the Italian road system maintenance and the use of new technologies to improve the safety of infrastructures. From this point of view, the 2022-2024 Budget Law marks an important change, by providing 10.8 bn investments for the road system improvement and maintenance, especially for regional and province roads, after over a decade of limited funds for this sector. Likewise, the large investments provided by the NPRR – National Plan for Recovery and Resilience and the Budget Law for sustainable mobility, especially in urban areas, and the development of new services thanks to digital technology are taking a step further in building an innovative, safer, and more environmentally friendly mobility system.

The Plan also provides for a large investment on the culture of safety, starting from schools, to minimise wrong behaviours and increasing respect for others, especially for the most vulnerable categories, like cyclists, riders of new tools for micro-mobility and powered two-wheelers, children and the elderly. The Plan identifies specific actions to reduce the crash rate among the above-mentioned categories, which would significantly contribute to achieving the main purpose of the Plan, namely a 50% reduction in the number of fatalities and serious injuries by 2030 as against 2019.

The Plan's goal is ambitious, but not impossible to achieve. Its implementation is urgent and requires not only financial resources but also a strong spirit of partnership at all institutional levels, especially at regional, province, and municipality level. The Ministry is going to make every effort to take the actions related to the 44 specific strategic lines of action identified by the Plan to mark a great change in the mobility system and make it safe for everybody.

Enrico Giovannini

Ministry of Infrastructures and Sustainable Mobility

EXECUTIVE SUMMARY

The '2030 National Road Safety Plan' develops the strategic lines of action and identifies the main actions to be taken to improve road safety, in line with the 'General Provisions and Guidelines for Implementation' drawn up by the Ministry of Infrastructures and Sustainable Mobility in January 2021, including the comments made about them by the relevant Parliamentary Commissions. The Plan is well integrated with the international context and thoroughly consistent with the UN strategic planning (Resolution by the General Assembly no. 74/299 Improving global road safety – 2/9/2020) and the European Commission strategic planning in the sector (EU Road Safety Policy Framework 2021-2030 – Next steps towards "Vision Zero").

The Plan approach follows international guidelines **and is based on the '*Safe System*'** concept. *Safe System* marks an important change in comparison with the approach used in the past, because it reverts the fatalistic view that road crashes are the price to pay to guarantee mobility**. Instead, the new approach aims at moving towards the target of zero road crash victims and seriously injured in the long term, with mid-term goals to be defined over the years**.

The general goal of a 50% reduction in fatalities and serious injuries by 2030 has already been defined in the Guidelines. Moreover, vulnerable categories have been identified too (children/adolescents, young drivers, over 65, pedestrians, cyclists, two-wheelers), and specific objectives have been proposed for each category, to maximise the efficiency and effectiveness of resources to be invested for road safety improvement. **Specific risk factors have been identified for each category,** relating to the components of the road system (user, infrastructure, vehicle), and relevant **action strategies have been defined and organized at two levels:**

- General strategic lines of action, acting on the whole system and grouped according to the five road safety pillars defined by the UN.
- Specific strategic lines of action for the most vulnerable categories.

The Plan proposes actions to be taken to implement the 44 specific strategic lines of action, by identifying the entities in charge of the actions and providing a first indication on effectiveness. Actions at national level are divided into:

- **Legislative actions**.
- **Measures for increasing checks and enforcement.**
- **Actions to improve the safety of road infrastructures.**
- **Communication and awareness-raising campaigns**.

At local level, the Plan implementation comprises five biennial programmes arranged in three stages, to promote the spread of actions for improving road safety.

Furthermore, a **monitoring system** has been designed, for any adjustments to the Plan to be made as needed when updating the document in the years to come. Such a system shall be based on the definition and collection of four types of indicators:

- **Risk-exposure indicators** (vehicle-km on urban roads, rural roads, and motorways).
- **Process indicators** (progress in implementation).
- **Safety Performance Indicators** describing the safety level of each part of the road network.
- **Impact indicators** (crashes, injuries, and fatalities).

The document contains a **preliminary estimate of costs and resources to implement the 2030 NRSP,** based on the comparison with the actions performed during the previous implementation programmes of the 2002 Plan, by analysing costs and outcomes. When considering the renewed goal of a 50% reduction in the number of road fatalities by 2030 and the new goal of halving the number of serious injuries, the **minimum estimated funds requirement is approximately 1.4 billion euros**.

The document was drawn up in collaboration with:

- The Head of Department for Sustainable Mobility, Adviser Mauro Bonaretti.
- The General Direction for Road Safety of the Ministry of Infrastructures and Sustainable Mobility, namely Mr. Vito Di Santo, Engineer, General Director; Mr. Valentino Iurato, Engineer, Manager of the 1st Division – Action Plans and Programmes for Road Safety Improvement; Ms. Silvia Cherubini; Ms. Lauragrazia Daidone, Engineer; Ms. Nenci Palombo, Engineer.

The Ministry of Infrastructures and Sustainable Mobility also availed itself of the technical and scientific collaboration of a Temporary Special-Purpose Consortium composed of 5 Research Institutes:

- Sapienza University of Rome – CTL, Centre for Transport and Logistics (Prof. Luca Persia, Coordinator; Mr. Roberto Carroccia, Engineer; Prof. Anna Maria Giannini; Ms. Maria Rosaria Saporito, Engineer; Ms. Veronica Sgarra, Architect; Mr. Davide Shingo Usami, Engineer).
- University of DICATAM/CeSCAM (Prof. Giulio Maternini; Mr. Benedetto Barabino, Engineer; Ms. Michela Bonera, Engineer; Mr. Roberto Ventura, Engineer; Ms. Valentina Martinelli).
- University of Cagliari – DICAAR (Prof. Gianfranco Fancello; Ms. Mariangela Daga, Engineer; Ms. Marta Adamu, Engineer; Mr. Alessandro Carta, Engineer.
- University of Florence – LaSIS (Prof. Lorenzo Domenichini; Prof. Francesca La Torre; Prof. Dario Vangi).
- Roma Tre University – LaSS3 (Prof. Francesco Bella; Prof. Andrea Benedetto; Prof. Maria Rosaria De Blasiis; Prof. Alessandro Calvi; Mr Fabrizio D'Amico, Engineer; Ms. Chiara Ferrante, Engineer).

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1 INTRODUCTION

As per the Italian Act of Law no. 144 of May 17th, 1999, the National Road Safety Plan (NRSP) *consists of a multifaceted system comprising guidelines and measures to promote and incentivise plans and tools for owners and managing entities to improve safety levels; infrastructural measures; prevention and control measures; legislative and organisational actions to promote safety in accordance with EU objectives.* Therefore, the Plan is going to be a **planning tool, which in turn will foster the planning and implementation of various types of strategies and measures to improve road safety.** The tool is designed for various kinds of users – owners or managing entities of road infrastructures, public and private research institutes, all in accordance with EU guidelines.

The 2030 NRSP has been conceived to provide Italy with a useful policy document to be transposed to operational implementation plans, to give a major boost to the reduction of road crashes, after a period of significant improvement in the early years of the 21st century, which were followed by a slowdown in more recent years. In particular, the 2030 Plan takes place downstream of the two documents that served as milestones in the process of improving road safety in Italy – the 2010 NRSP and its update named Horizon 2020 NRSP. However, **the lack of adequate funding slowed down the lowering trend in crash rates**, even though similar trends have been reported in other European countries. Even the CIPE (Interministerial Committee for Economic Planning, ICEP) Decision no. 56 of May 13th, 2010, specified that the lack of funding for the Plan implementation would affect the performance in terms of crash rate decrease. Finally, the experience with the previous Plan showed some **inevitable procedural difficulties** in such a complex system, which hindered the effective implementation of some of the actions. Namely, among them, the difficulties in co-funding by local administrations and at the monitoring stage, which has not always been appropriately carried out by the beneficiary bodies in charge of the implementation.

Therefore, the 2030 NRSP has been conceived and shall be carried out, on the one hand, in accordance with international institutions' guidelines and scientific advances, and on the other hand, by considering the specific Italian context and the previous experiences, both in terms of smooth and efficient implementation processes, and in terms of the necessary funding.

1.1 Fundamental principles of the 2030 NRSP

The 2030 NRSP takes into consideration a complex series of factors, namely the analysis of current and future problems, the inputs given by international institutions, past experiences, and the important cultural knowledge acquired in years of research in the sector. The Plan also takes into account the outcomes of

the public consultation on the 'general provisions and guidelines for implementation', which ran on the Ministry website and closed in July 2021, and the favourable opinions with observations by the VIII Permanent Commission of the Italian Senate issued on November 30th, 2021, and by the IX Permanent Commission of the Italian Chamber of Deputies issued on December 10th, 2021, in relation to the above mentioned guidelines. The fundamental principles of the Plan may be summarised as follows.

National and international policy documents

In the years preceding the COVID-19 pandemic, a stagnation in road safety levels was observed in the EU, and the target of halving the number of road fatalities in the 2011-2020 decade was missed. In May 2018, the European Commission presented a new approach to road safety with the *Europe on the Move* package, along with a **Medium-term Strategic Action Plan** based on the spread of the *Vision Zero* philosophy, expressing the principle that no one should be killed or seriously injured in a road crash, and on the implementation of the *Safe System* approach, meaning a road safety policy focusing on prevention of fatalities and serious injuries, by taking into account the challenges arising from new technologies and new mobility trends.

In addition to the EU policy documents, the NRSP refers to the actions promoted by the United Nations and other important international institutions that are active in fostering road safety at a global scale (e.g. World Bank, OECD, WHO). Among them there is the UN 2030 Agenda for Sustainable Development, in which the topic of road safety is a prerequisite for a number of wider sectors, i.e. the economic, social, and sustainable development sectors.

At the same time, the Plan must complement the most relevant national and local policies, which may have positive effects on road safety:

- General Plan for Cycling (Italian Act of Law no. 2 of January 11th, 2018).
- National Strategic Plan for Sustainable Mobility.
- Urban Plans for Sustainable Mobility (SUMP).
- National Action Plan for Intelligent Transport Systems (ITS) adopted by the Ministry of Infrastructures and Sustainable Mobility (MISM) with Ministerial Decree no. 44 of February 2nd, 2014, implementing the European Parliament Directive 2010/40/EU.
- National Plan for Recovery and Resilience (NPRR).
- "Implementation methods and operational tools for road testing of Smart Road and Connected Automated Driving solutions," adopted by the Ministry of Infrastructures and Sustainable Mobility (MISM) with Ministerial Decree no. 70 of February 28th, 2018.

As for **local policies** (SUMP), the Plan will foster the achievement of local targets of road crash reduction, as its implementation would also consist in co-funding road safety operations. At **national level**, the monitoring and assessment activity

provided by the Plan will take into consideration the measures and actions included in other Plans and specifically dedicated to road safety improvement. In this spirit, we should also assess the possibility of extending the reward system to the results achieved in terms of reduction in fatalities, injuries and crashes, or according to road safety Key Performance Indicators (KPIs).

Safe System

Despite the opportunities offered by technological and infrastructural improvements, **road users and their behaviour remain crucial for improving road safety**. However, the *blame the victim* approach (the opinion that the driver is responsible for 90% of road crashes) must be changed into an approach focusing on understanding the interaction between the driver and the road, to identify and remove the 'underlying conditions' causing most crashes.

The *Safe System* is by now a well-established approach that was also adopted by the UN in the *Decade of Action for Road Safety 2011-2020*. It is based on principles like the recognition of human fallibility and vulnerability and the shared responsibility in building the system. An example of initiative compatible with such principles is given by the procedures defining a more systematic approach to improve road infrastructure safety, as per the Directive 2008/96/EC, recently modified with Directive 2019/1936/EC. Introducing inspection procedures based on human factor principles offers a high potential for transforming roads into a Safe System.

Scientific approach

In some cases, the road safety design is still based on an empirical approach, in which the analysis of the issues and the planning of actions are almost exclusively based on the experience of the technicians who manage road mobility and infrastructures. In fact, **road safety should have long been considered a science**, and, as such, it should have been approached with scientific methods and tools, without neglecting the importance of the technical approach, but employing an evidence-based method for action planning, that is based on scientific analysis of data. On the other hand, since **the main risk factor for crashes is indeed the human factor**, the contribution of psychological and sociological studies would be crucial for prevention at all levels.

The Ministry of Infrastructures and Sustainable Mobility (MISM), in line with this approach, availed itself of the support of a Temporary Consortium of University Research Centres for drawing up this document on the basis of a larger pool of knowledge, innovative tools, and the results of multiple international research projects that the European Commission financed in the last two decades, in which the Consortium members took part as Italian representatives.

Focus on risk categories

The Plan focuses on all road users, by trying to reduce risks in all road types and all circumstances of mobility. At the same time, the limited availability of resources requires strategies and actions to maximise process efficiency, by investing resources on high-risk categories who have a higher potential for improvement. On the other hand, **some user categories** must be acknowledged to deserve special attention. For that reason, on the one hand the 2030 NRSP identifies general strategies for an overall systematic improvement, on the other hand it pays special attention to the above-mentioned categories, with specific objectives and actions.

Current trends

The COVID-19 pandemic showed how vulnerable the socio-economic system is to **sudden changes in mobility**. For instance, the lockdown period contributed to reduce the number of road crashes, but its side effect was an increase in average speed on the roads[1], which in fact increased the mortality risk. On the other hand, **vehicle technology is going to become ever more important for road safety in the near future.** Suffice it to observe the progressive introduction of automated driving at the various levels defined by SAE[2], and the problems related to the transition period, when automated vehicles are introduced within human-driven vehicle traffic.

Moreover, the **economic and socio-demographic trends affecting mobility** shall be taken into account, especially in urban areas. For instance, the gradual ageing of the population, the increase of freight traffic in cities owing to e-commerce, the spread of new sharing economy models especially among the young, and new modes of transport (micro-mobility). Road infrastructures in both urban and rural areas shall be assessed and even re-designed on the basis of risks emerging from the gradual spread of new technologies, new modes of transport, and the other previously mentioned trends.

Monitoring the outcomes of the Plan implementation

The 2030 NRSP, covering such a long period as 10 years, cannot be considered as a static document, **but rather as a dynamic document that shall be updated according to the real results achieved.** For this purpose, the results obtained from the Plan funding actions shall be carefully monitored along with national-level

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[1] Katrakazas, C.; Michelaraki, E.; Sekadakis, M.; Yannis, G. (2020) *"A descriptive analysis of the effect of the COVID-19 pandemic on driving behavior and road safety".* Transp. Res. Interdiscip. Perspect. 2020, 7, 100186. *ETSC (2020), COVID-19: the impact of COVID-19 lockdowns on road deaths in April 2020*

https://etsc.eu/wp-content/uploads/PIN-Corona-Briefing_final.pdf

[2] https://www.sae.org/news/press-room/2018/12/sae-international-releases-updated-visual-chart-for-its-%E2%80%9Clevels-of-driving-automation%E2%80%9D-standard-for-self-driving-vehicles

macro data, to understand if the actions taken are on the right track, and, if they are not, what are the reasons for it and how they can get back on track. The monitoring of results was also included in the financial measures of the previous Plan, but in many cases it was not adequately conducted by the beneficiary organizations, which did not have dedicated professionals and resources and therefore often provided the Ministry of Infrastructures and Sustainable Mobility (MISM) with incomplete or poor-quality data. **Therefore, the 2030 NRSP contains specific provisions on how to monitor results, and mechanisms to encourage beneficiary administrations to do so**. Monitoring shall not only be conducted on results in terms of crashes, fatalities and injuries, but also on other indicators, such as:

- **Risk exposure** (mobility level on various modes of transport and various road types).
- **Risk indicators** (*Safety Performance Indicators* or *Key Performance Indicators)*, for both users' behaviour and infrastructure and vehicle features.
- **Implemented strategies and measures** (process monitoring).

Some indicators are going to be monitored on single financial measures, while others are going to be monitored at national level. A pivotal element for a better understanding of the phenomena and the monitoring of results is the digitalization of the collection and analysis process that shall be conducted on various types of data.

1.2 Target users and stringency level

The experience of the previous policy documents revealed some weaknesses of the system, which the 2030 NRSP appropriately tries to solve. A first important element is related to **the target users of the measures provided for in the Plan**. Most of the resources of the previous implementation programmes were allocated to Municipalities and Provinces for various kinds of actions in their areas of jurisdiction. The funding mechanism imposed a previous verification of allocation criteria by the Unified Conference, followed by the approval by the ICEP (existing at that time), and required a specific convention agreement between the State and the Regions/Autonomous Provinces for the distribution of national resources to local authorities. The choice of measures to be implemented was mainly made by means of a competitive procedure and the draw up of ranking lists. After the whole list had been finished, or after an assessment had been conducted by the Region as institution informed of local needs, concerted procedures could be employed, by means of a formal agreement between the Region, UPI (Union of Italian Provinces, UIP), and ANCI (National Association of Italian Municipalities, NAIM), to identify measures that deserved funding.

In some cases, for specific strategic measures, the funding mechanism of Municipalities and Provinces was directly managed by the Ministry of

Infrastructures and Sustainable Mobility (previously named Ministry of Infrastructures and Transport - MIT). On the other hand, public and private organizations dedicated to improving road safety could enter into a partnership with Municipalities and Provinces to contribute to the funding of actions to be taken. This mechanism was useful, among other things, to provide local authorities with technical-scientific support by research organizations, but was only applied in a limited number of cases.

Exceptionally, and only for some specific programmes or part of them, the direct use of Regional economic resources was possible. The most notable example was the creation of Regional Monitoring Centres for Road Safety, which allowed a number of Italian Regions to acquire important tools for understanding and analysing road crashes, while contributing to the improvement of the data collection process.

Such **mechanisms enabled the funding of 1,700 actions**[3]. However, some problems emerged and delayed and/or hindered their implementation, among which the initial difficulty in local authorities co-funding due to a lack of funds, and the difficulties in collecting and processing data for the purpose of conducting a strict monitoring of the financial measures taken.

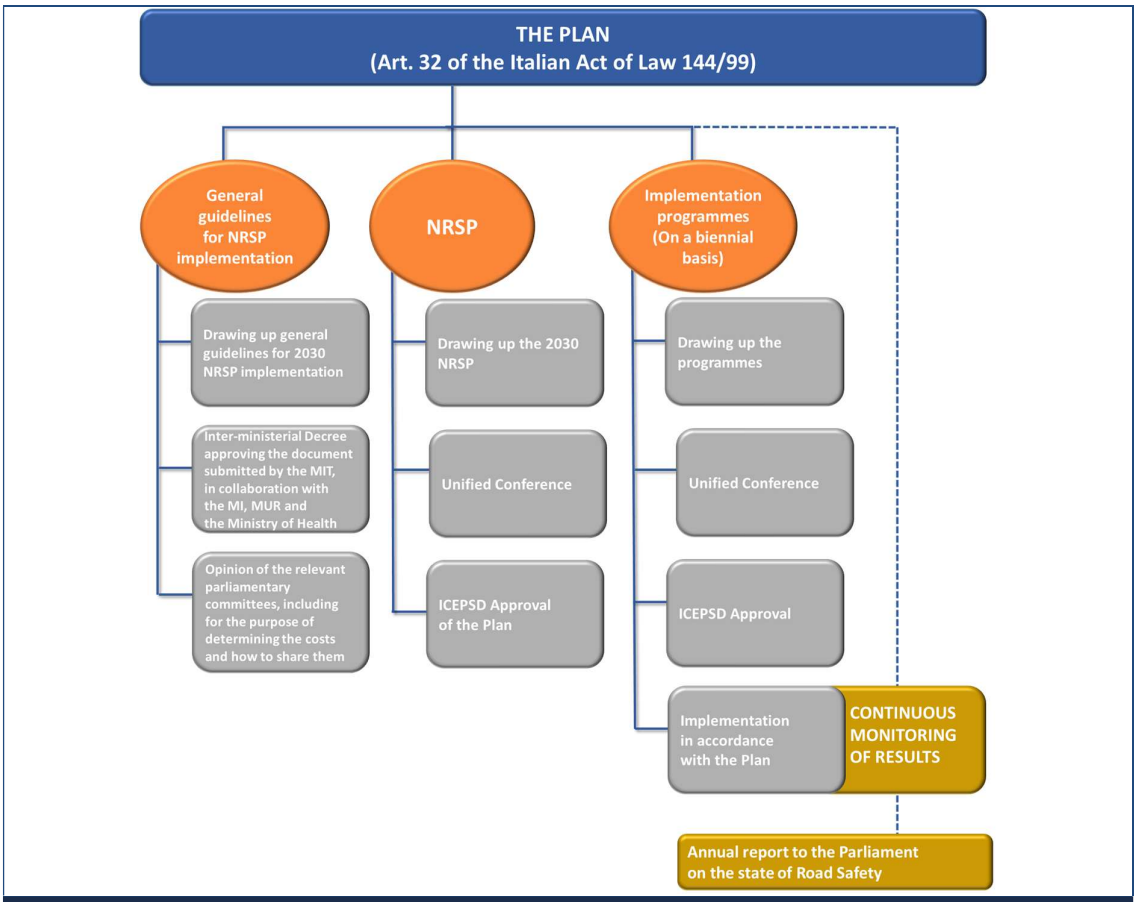
The 2030 NRSP (including its implementation programmes) tries to define funding mechanisms that are both simple and able to reward/disincentivise beneficiaries. Moreover, it makes a distinction between the strategies that need locally-financed projects (e.g. projects for improving road infrastructures, data collection, education for the young and other vulnerable categories), and the strategic actions that need to be managed at national level (information campaigns, checks and sanctions, improving of post-crash care). The Plan will also provide clear directions for actions to be conducted at local level, to promote measures that have been proven more effective and efficient than others as shown by international research, and it will precisely identify the actions eligible to receive funds.

As for the stringency level of the recommendations, the Plan has the role of proposing rather than imposing, because it is a planning tool and not a legislative instrument. However, **necessary measures shall be taken to incentivise beneficiary organizations to carry out projects in a correct and efficient way.** Finally, to encourage the implementation of projects in accordance with innovative and scientific criteria, **the participation of research organizations** should be promoted, by simplifying the partnership mechanism and implementing projects in which research organizations may be co-beneficiaries of part of the funds.

[3] HORIZON 2020 NRSP, Medium-term Revision, December 2017.

1.3 Stages and timing

As per Art. 32 of the Italian Act of Law 144/99, the following documents are comprised in the Plan: General provisions and guidelines for the implementation of the NRSP; NRSP; Implementation programmes (a more detailed description of each stage is contained in Picture 1-1). As for the NRSP, there are the following stages: **Plan draw-up; Opinion of the Unified Conference; Plan Approval by the CIPESS (Interministerial Committee for Economic Planning and Sustainable Development, ICEPSD).** Once the Plan is approved, the implementation programmes will be defined on a biennial basis (the frequency of implementation programmes may be eventually adjusted). **Each implementation programme and its funds shall be approved by ICEPSD after consultation with the Unified Conference** and then implemented in accordance with the mechanisms defined in the Plan. **The Annual Report to the Parliament on the state of road safety** will be based on the monitoring of results achieved.



Picture 1-1 Stages of the 2030 NRSP

2 NATIONAL AND INTERNATIONAL CONTEXT

The ability to identify and implement effective measures to improve road safety was highly encouraged, in recent years, by the 'internationalization' of this phenomenon. International Institutions (the European Commission and UN in the first place, then also the World Bank, OECD, WHO, international development banks, and many more) offered a great contribution by means of:

- Awareness raising, through specific information and education campaigns, especially in low- and middle-income countries.
- Strategic planning, through documents defining precise quantitative objectives of reduction in fatalities and identifying the most appropriate strategies to achieve them.
- Support for research, through dedicated funding programmes, like the European Commission Framework and 2020 Horizon Programmes.

The latter aspect was particularly successful for the European Union, which benefited from a high number of research projects on road safety, which in turn enabled the exchange of knowledge among countries with a different level of expertise in the sector. Moreover, **Italy played a major role in international research on road safety** and took part in the most important international research networks (e.g. FERSI[4], IRTAD[5], CEDR[6]) and the most important European and International Projects (e.g. SAFETYNET[7], DACOTA[8], SAFETYCUBE[9], SAFERAFRICA[10]). For this reason, the 2030 National Road Safety Plan must be highly integrated with the international context and aims to be a benchmark for other countries as well.

2.1 International context

The UN and European Commission are surely the international institutions of reference for international strategic planning. The UN, by General Assembly

[4] https://fersi.org/

[5] https://www.itf-oecd.org/IRTAD

[6] https://www.cedr.eu/

[7] https://cordis.europa.eu/project/id/506723/it

[8] http://www.dacota-project.eu/

[9] https://www.safetycube-project.eu/

[10] http://www.africanroadsafetyobservatory.org/

Resolution of 25/09/2015 [11], adopted the **2030 Agenda for Sustainable Development** (*Transforming our world: the 2030 Agenda for Sustainable Development*[12]), to promote actions in the economic, social, and environmental area of sustainable development for the following 15 years. Such an important strategic document **identifies road safety as a prerequisite to guarantee a healthy life, promote well-being, and make cities inclusive, safe, resilient, and sustainable**, while listing two objectives among others (3.6 and 11.2) relating to this important social problem:

- Halving the global number of road fatalities and injuries by 2020 as against 2011 (3.6 Objective).
- Ensuring that everybody can access safe, affordable, and sustainable transport systems by 2030, especially by improving public transport, with particular attention to the needs of those in vulnerable conditions, children, people with disabilities, and the elderly (11.2 Objective).

Such objectives gave a new boost to the UN strategy that had been defined by Resolution 64/255 proclaiming the *Decade of Action for Road Safety 2011-2020*[13] and encouraging the activity of Member States, which, in November 2017 in Geneva, reached a consensus on 12 voluntary global targets for road safety (Picture 2-1)[14].

In this context, in September 2020, the General Assembly Resolution A/RES/74/299 approved the Stockholm Declaration adopted at the 3rd Global Ministerial Conference on road safety *'Achieving Global Goals 2030'* [15], and proclaimed the *Second Decade of Action for Road Safety 2021-2030*, with the objective of a 50% reduction in the number of road fatalities and injuries

[11] *Resolution adopted by the General Assembly on 25 September 2015 - 70/1. Transforming our world: the 2030 Agenda for Sustainable Development*

https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E

[12] *Transforming our world: the 2030 agenda for sustainable development*

https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

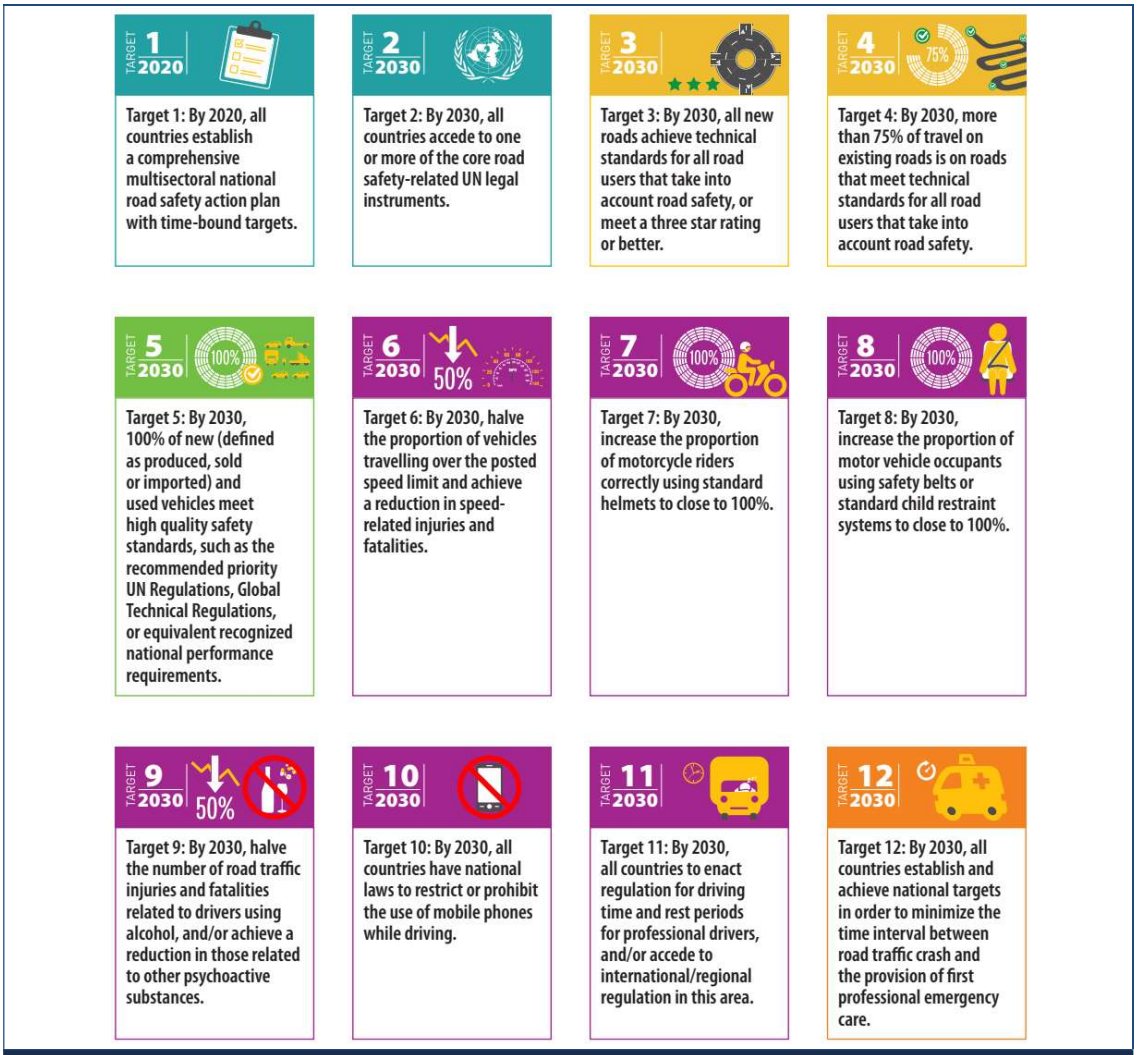
[13] *Resolution adopted by the General Assembly on 2 March 2010 - 64/255. Improving global road safety*

https://www.who.int/violence_injury_prevention/publications/road_traffic/UN_GA_resolution-54-255-en.pdf?ua=1

[14] *Global road safety performance targets*
https://www.who.int/violence_injury_prevention/road_traffic/12GlobalRoadSafetyTargets.pdf

[15] Stockholm Declaration, February 2020.

https://www.roadsafetysweden.com/about-the-conference/stockholm-declaration/



Picture 2-1 12 voluntary global targets for road safety (UN, Geneva 2017)

from 2020 to 2030 and aiming at reaching the other road safety target set by the 2030 Agenda for Sustainable Development[16]. The UNECE (*United Nations Economic Commission for Europe*) collaborated with the World Health Organisation and other United Nations regional commissions to draw up the **Action Plan for the Decade 2021-2030**[17], as a guidance document for the achievement of the agreed

[16] *Resolution by the General Assembly. 74/299 Improving global road safety - 2/9/2020* https://undocs.org/en/A/RES/74/299

[17] *Global Plan - Decade of action for road safety 2021 - 2030 (28 October 2021)*

https://cdn.who.int/media/docs/default-source/documents/health-topics/road-traffic-injuries/global-plan-for-road-safety.pdf?sfvrsn=65cf34c8_27&download=true

objectives. Such Plan was promoted with an event on October 28th 2021 and it highlights the importance of a holistic Safe System approach, based on **continuous improvement in road and vehicle design, law reinforcement and enforcement, and prompt and effective assistance to the injured.** The global Plan also reflects the Stockholm Declaration promotion of **policies to encourage walking, cycling and public means of transport, as inherently healthy and environmentally safe modes of transport.**

As for European strategic documents, it is worth noticing the European Commission Communication 'Europe on the Move – Sustainable Mobility for Europe: safe, connected, and clean'[18] of May 2018, introducing a new approach to EU policies on road safety, along with a middle-term Strategic Action Plan[19] defining specific actions. The Communication confirmed the **long-term objective of zero road crash victims by 2050, while adding that the same objective must be reached for serious injuries as well.**

Moreover, new middle-term objectives have been identified with reference to the 50% reduction in road fatalities from 2020 to 2030 and the simultaneous 50% reduction in the number of serious injuries in the same period, as recommended in the Valletta declaration in March 2017[20] and recently confirmed in the 3rd Global Ministerial Conference on Road Safety, with the Stockholm Declaration in February 2020. To reach these objectives, in June 2019, the Commission published the working paper 'EU Road Safety Policy Framework 2021-2030 – Next steps towards Vision Zero'[21], which confirmed its Safe System approach.

Another important European provision for improving road safety is the Directive 2019/1936 of October 23rd, 2019, modifying the Directive 2008/96/EC on the management of road infrastructures safety. The latter required the establishment of procedures for assessing the impact on road safety, road safety monitoring, road safety inspections, and road safety assessments at network level, limited to the Trans-European Transport Network (TEN-T).

The new Directive provides for the extension of the scope of its provisions to motorways, highways and other roads outside urban areas, by using EU funds.

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[18] European Commission (2018). Communication 'Europe on the Move – Sustainable Mobility for Europe: safe, connected, and clean', COM(2018) 293 final.

https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:52018DC0293

[19] https://eur-lex.europa.eu/resource.html?uri=cellar%3A0e8b694e-59b5-11e8-ab41-01aa75ed71a1.0003.02/DOC_2&format=PDF

[20] Conclusions of the Council on Road Safety approving the Valletta declaration of March 2017 https://data.consilium.europa.eu/doc/document/ST-9994-2017-INIT/it/pdf

[21] *EU Road Safety Policy Framework 2021-2030 – Next steps towards "Vision Zero"*

https://ec.europa.eu/transport/road_safety/sites/roadsafety/files/move-2019-01178-01-00-it-tra-00_0.pdf

https://op.europa.eu/it/publication-detail/-/publication/d7ee4b58-4bc5-11ea-8aa5-01aa75ed71a1

Moreover, it introduces important concepts such as *forgiving roadsides*, *self-explaining roads* and *self-enforcing roads* (further described in other sections of this Plan), the obligation to perform a network-level road safety assessment, and the consideration of the needs of vulnerable road users. The Directive also imposes the **obligation for Member States to perform the first network-level road safety assessment by 2024**. Subsequent assessments are to be planned at least every five years. The assessment results may point to targeted road safety inspections or direct corrective actions.

2.2 Safe System Approach

International institutions dealing with road safety agree on the need to move towards Vision Zero – a road mobility without fatalities and serious injuries. The activities and investments performed until now proved inadequate to stabilize and reverse the upward trend in road mortality at global level. In spite of this, numerous countries (such as Australia, Canada, France, Switzerland, United Kingdom, and the Netherlands) show evidence that a high degree of success in reducing road crashes is achievable.

The OECD adopted the Safe System Approach in 2016[22], observing that its principles are a fundamental change compared to the traditional way of conceiving and managing road safety. In June 2019, the European Commission published a working paper on the topic of "Road safety: Next steps towards «Vision Zero»"[23]. It was the first time that the Safe System Approach had systematically been adopted at EU level. This approach starts from and develops the concepts that had been defined in the last decade of the past century, with the definition of a *Vision Zero* system in Sweden and the *Sustainable Safety* principle in the Netherlands.

The Safe System marks an important change compared to the approach that used to be adopted in the past. It reverses the fatalistic view that road crashes are the price to pay to guarantee mobility. **It sets the long-term target of zero road crash victims and serious injuries, with middle-term targets to be defined in future years**, aiming at developing a more ergonomic and 'forgiving' road transport system. It accepts that people make mistakes, it establishes the need to reduce situations that may induce them to make mistakes, and endorses the 'redundancy' concept applied in industrial safety, which provides a layered combination of measures to prevent people from getting killed because of their mistakes, by taking into account the limits of human vulnerability.

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[22] OECD (2016), *Zero Road Deaths and Serious Injuries: Leading a paradigm shift to a Safe System*, OECD, Parigi.

[23] European Commission (2019), *"EU Road Safety Policy Framework 2021-2030 – Next steps towards "Vision Zero"*, Brussels. Downloadable from website: https://ec.europa.eu/transport/sites/transport/files/legislation/swd20190283-roadsafety-vision-zero.pdf

This approach is recognised by now as the most effective way to control and eliminate the risks of serious and fatal crashes on roads in the long term. The Safe System is a framework unifying the road safety policies and plans that each UN member State needs to prepare and is based on **four guiding principles**:

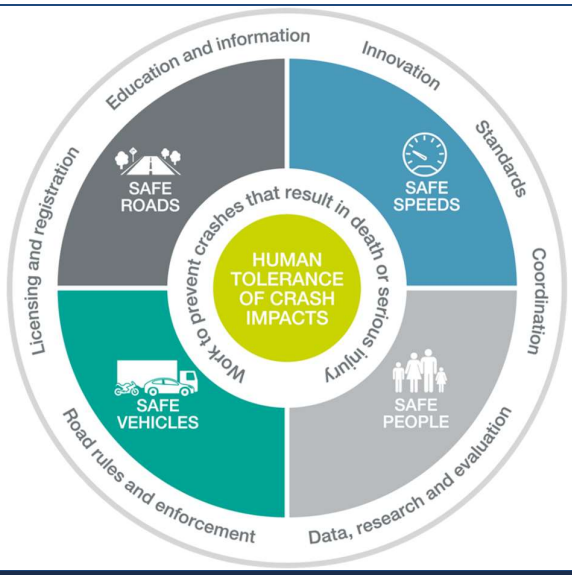
1. Drivers make mistakes that can lead to crashes.
2. The human body has limited physical tolerance for collisions without suffering damages.
3. There is a shared responsibility among those who design, build, manage, and use the road system in its components (human beings, infrastructures, vehicles) to prevent crashes that provoke serious injuries or death.
4. All parts of the system must be reinforced to multiply their effects in a holistic vision, so that, if a part breaks down or fails, the road users are protected anyway.

There are five essential elements for a holistic vision of road safety[24]: safer roads and roadsides; safer vehicles; safer use of the road; speeds that are adequate for the road function and safety level; post-crash care.

A practical example of human body tolerance limits is speed management. To limit the possible consequences of crashes, speed must be limited, by considering possible events, possibly involved subjects, and the physical limitations of the human body. On the basis of research results, the key principles of this approach can be summarised as follows:

- Where there can be collisions involving vehicles and pedestrians, the speed should be limited to 30kmph.
- At uncontrolled intersections, where side impacts may occur, the speed should not be over 50kmph.
- When frontal impacts may occur, the speed should not be over 70 kmph.
- Only when frontal impacts cannot occur (dual carriageway) a speed over 100 kmph is acceptable.

[24] Parliamentary Advisory Council for Transport Safety, 2018



Picture 2-1 *Safe System* principles (Source: Australian National Road Safety Strategy, 2011)

If these principles are suitable for defining general limits, quite a different problem is raised by limits in specific locations. The latter should be limited to cases where the route is not able to lead users to adapt their behaviour to environmental conditions.

To understand the level of implementation of the Safe System around the world, the World Bank and the International Transport Forum (OECD) promoted the creation of an international Working Group on the system implementation, which is working to define an assessment grid based on qualitative indicators describing the state of implementation of the System in each country (Picture 2-2). The grid shall be used for mid-term assessments of the Plan (See Chapter 6.3), to monitor progress towards the implementation of the Safe System in Italy.

Pillar / Key component	Road safety management	Safe roads	Safe vehicles	Safe speeds	Save road user behaviour	Post - crash care
Institutional framework Avoid system failures	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature
Shared responsibility Avoid blaming the victim	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature
Strengthen all parts Avoid isolated measures	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature				
Prevent large forces Crashes shouldn't be fatal	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature
Reduce road user errors Tuning the task to human competences	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature	1. emerging 2. advanced 3. mature

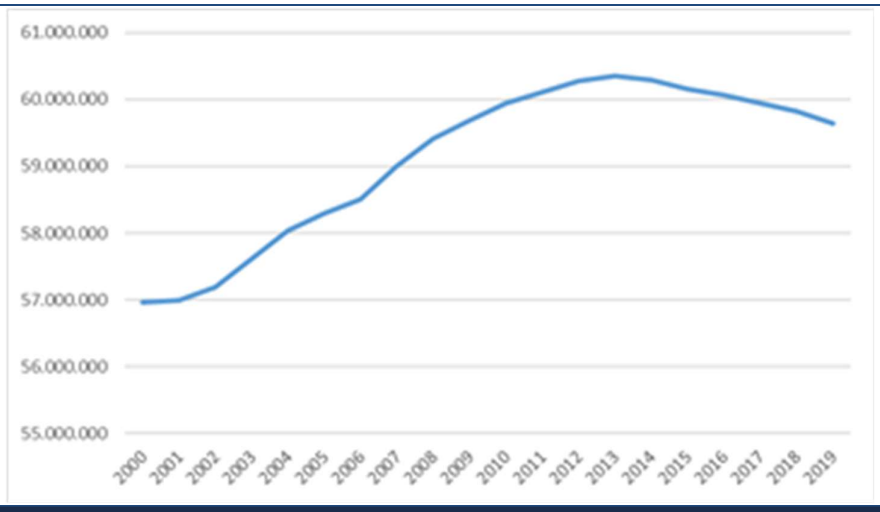
Picture 2-2 Indicators to measure the state of implementation of the *Safe System* – work in progress. (Source: WB, ITF, Working Group on Safe System)

2.3 Current trends

The 2030 NRSP identifies six external factors or relevant trends to be considered for the evolution of road safety: the Italian population demographic trend; the automation of transport; freight traffic and e-commerce; shared mobility and micro-mobility; urban spaces for mobility; and speed management.

2.3.1 Population

The census population in Italy on January 1st, 2020, comprises 59,641,488 residents, distributed on a surface of 301,340 km², with a density of 198 inhabitants/km². The gender distribution shows a higher number of women. In 2019, indeed, there were 30,591,392 women, accounting for 51.3% of the total and outnumbering men by 1,541,296 units. In the same year, the lowest level in natural population change was reported since 1918, with a negative balance between 435,000 births and 647,000 deaths. Moreover, a gradual ageing of the population is reported. The average age used to be 43 years in the 2011 Census, then it moved to 45.7 years in 2019, while the number of elderly people per child is now 5 to 1. In terms of time, a gradual population growth started in the years 2000s (Picture 2-3), with a peak of 60,345,917 units in 2013, followed by a declining rate that still persists.



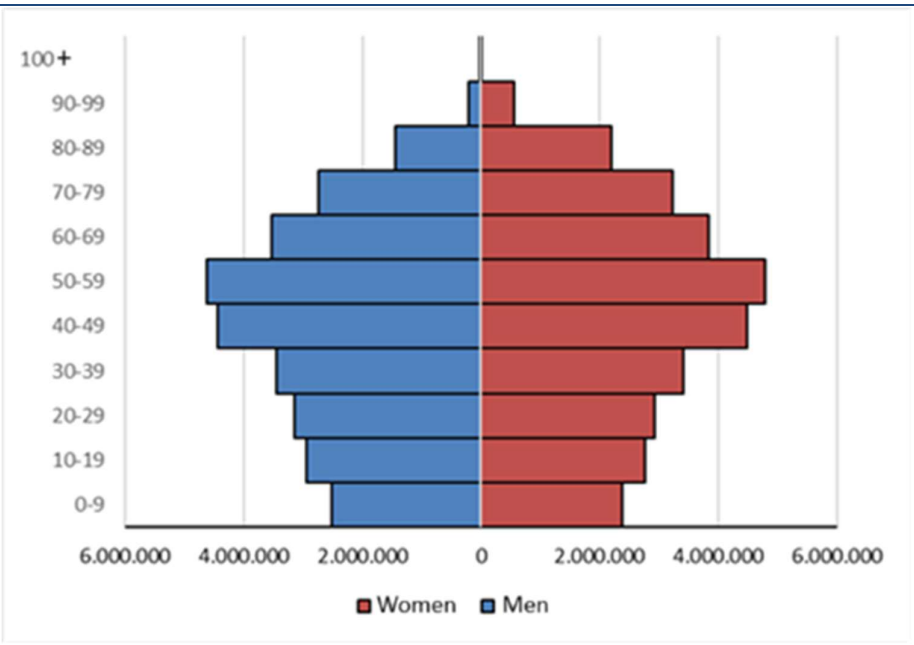
Picture 2-3 Demographic change in the population from 2000 to 2019

The Italian National Statistics Institute (INSI) forecasts[25] a population equalling 60,031,626 inhabitants in 2030, accounting for an overall annual drop by 0.6%. Picture 2-4 shows the age distribution of the population, divided into 10-year age groups. Until the 60ies, the age distribution had the shape of a pyramid, with a high number of children. Today, instead, the group aged between 40 and 60 years is approximately a third of the total population (32.3%), and there is greater longevity amongst women over 60 years old.

When observing the population composition for some age groups, some useful elements for defining the Plan arise. Namely:

- **Children**, identified as people from 0 to 14 years old, hereinafter called 'accompanied users', account for 13.0% of the total population (7,727,554 units). It is an age group requiring special attention, because children are passive subjects of road safety, as they are not eligible to hold a driving license, except for 14-year-olds with an AM driving license category who can drive mopeds. The children category has a road mortality rate of 5 per million of inhabitants (2019 data).

[25] Source: ISTAT (2018) *"Demografia in cifre, Previsioni della popolazione"*, median scenario.



Picture 2-4 Population distribution based on age and gender

- **Adolescents**, identified as users between 15 and 17 years of age, account for 2.9% of the population (1,705,605 units). They are minors who are eligible to hold an AM driving license for mopeds. The road mortality rate involving this category is 39 per million of inhabitants (2019 data).
- **Adults**, identified as users between 18 and 64 years of age, account for 61% of the population (36,349,239 units).
- The **Elderly**, identified as users over 65 years of age, account for 23.2% of the population (13,859,090 units). Their distribution on the national territory varies considerably from North to South, as there is a higher percentage of elderly people in the North and Centre of Italy (24%) than in the South (21.7%). Namely, at regional level, only Campania has a concentration of elderly people lower than 20% (namely, 19.3%), while Liguria and Friuli (28.7% and 26.5% respectively) have the higher values for this indicator. All other regions have values near the national average.

  More precisely, the adult category may be divided into three subcategories:

  - **Users between 18 and 29 years of age** account for 12.2% of the population (9,433,159 units) and have the highest road mortality rate, equalling **77 deaths per million** of inhabitants (2019 data).
  - **Users between 30 and 49 years old** account for 26.5% of the population (15,791,861 units) and have a mortality rate equalling **50 deaths per million** of inhabitants (2019 data).

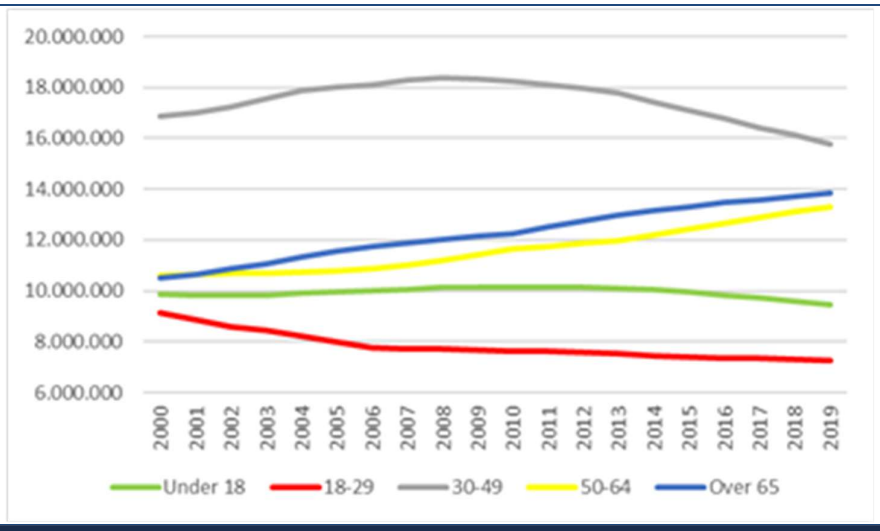
- **Users between 50 and 64 years of age** account for 22.3% of the population (13,307,545 units) and have the highest road mortality rate, equalling **51 deaths per million** of inhabitants (2019 data).

Within the first subcategory, it is also important to analyse the **'young' group,** meaning users between 18 and 25 years of age (7.9% of the total population), who have reached the age of majority, but are considered more at risk because of their inexperience in driving. Indeed, as described in the 2019 INSI-ACI Report on road crashes, this age group has the **highest crash risk** compared to the total number of active driving licenses (39.2 million). The value starts decreasing only after 25 years of age, then it increases again after 70.

The elderly can also be divided into subcategories: 65 to 74 years old – accounting for 11.4% of the population (6,795,374 units); and **over 75 years old**, accounting for 11.8% of the population (7,063,716 units), whose **mortality rate[26] is five times higher than the total average, and whose injury rate is double than the average**. This is also confirmed by 2019 INSI data, showing that 1 out of 5 fatalities involved people aged over 75 (622 deaths out of the annual total of 3,173). When considering the whole category of the elderly (over 65), one of the highest mortality rates is found, equalling 72 deaths per million of inhabitants.

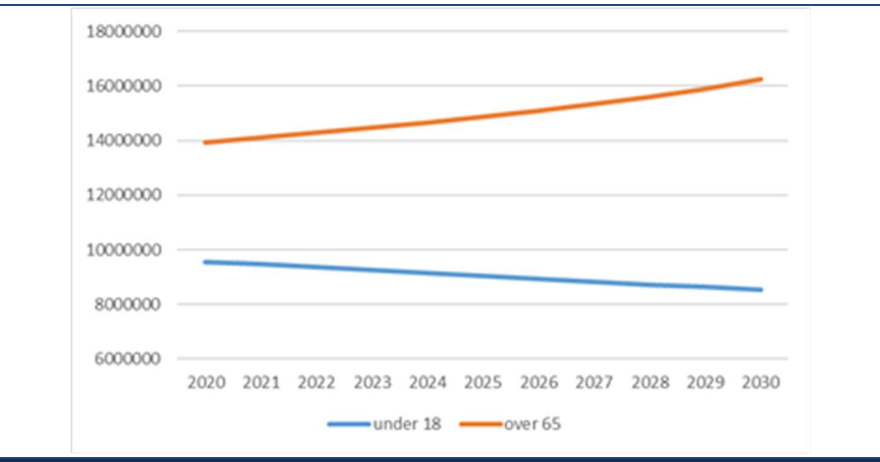
The analysis of demographic change over time since the year 2000 shows that the number of people up to 14 years of age dropped by 4.9%, the number of those between 15 and 17 years old dropped by 2.9%, the number of those between 18 and 64 years old (potential drivers) dropped by 0.6%, while the number of inhabitants over 65 surged by 32% (52.7% if considering only those over 75).

[26]Source: European Commission Report – Mobility and Transport Department



Picture 2-5 Demographic change by age range 2000-2019

These data require attention because they help understand the future composition of vulnerable road users, as confirmed by statistical projections for 2030 (Picture 2-6), which forecast a 10.6% reduction (by 1,013,322 inhabitants) in the number of users under 18 years old, a 4.4% reduction (by 1,614,881 inhabitants) in the population between 18 and 64 years old, and a +16.5% increase (by 2,297,397 inhabitants) in the number of people over 65 years old.



Picture 2-6 Trend forecast for people aged under 18 and over 65 – 2030 forecast

2.3.2 Automation

There is no doubt that automation, especially with reference to level-5 vehicles (totally automated vehicles) may provide significant advantages in various aspects, including road safety. According to the most optimistic estimates, **since human errors contribute to 90% of road crashes, automated driving vehicles will reduce crash rates by 90%**. Such estimates, however, do not take into account additional risks that may be introduced by the automation and connectivity technology (failure of the sensors, signal distortion, software errors, hacker attacks, risk compensation for drivers of non-automated vehicles, additional risks for non-motorized users, etc.). Thus, the reduction will presumably be lower, and it will also be related to the potential increase in demand for road vehicles, which would in turn increase exposure to risk.

The development of automated and connected vehicles is constantly evolving, as it is the subject of national and international research. The Ministry of Infrastructures and Sustainable Mobility and the Ministry for Technological Innovation and Digitalization signed a memorandum of understanding in May 2020 with "*the purpose of developing and supporting applied research, experimentation and prototyping, production, and training of new professionals in the field of innovative automated and connected vehicles and means of transport, in addition to encouraging the creation of services that would have a positive social impact on the country.*" Moreover, a Technical Observatory for Smart Roads and Automated and Connected Vehicles was established in May 2018. Among its activities, it also analyses the difficulties in applying the new technologies in compliance with the current regulations and technical standards.

Various vehicle models now available on the market are equipped with level 1 and 2 technologies[27], such as cruise control, Automatic Emergency Breaking, and

[27] The degree of automation is classified from zero to five in various set-ups, and it is divided into six levels:

- Level 0: No Driving Automation. The vehicle is equipped with warning and emergency systems, but it relies entirely on the user for driving.
- Level 1: Driver Assistance. The system provides driver assistance. The driver intervenes, while being assisted by the system.
- Level 2: Partial Driving Automation. The system provides assistance in case of driver's distraction or scarce ability to check the environment surrounding the vehicle, by ensuring control in both longitudinal and transverse directions for a certain amount of time or in particular situations. The driver, however, must supervise the system and needs to be able to take back control of the vehicle at any time.
- Level 3: Conditional Driving Automation. As in Level 2, the system ensures control of the vehicle in both longitudinal and transverse directions for a certain amount of time or in particular situations. The driver, however, does not constantly monitor the system, but must be able to take back control of the vehicle when the system requests it by emitting a signal.

Park Assist. Level 3 and 4 automated driving vehicles are presumably going to be available on the European market between 2020 and 2030[28]. However, fully automated driving system technologies still need to go through several stages before becoming available, safe, reliable, affordable, and consequently widespread. Most reasonable estimates assume that **fully automated vehicles (Level 5) will only be available on the market in the next decade 2030-2040**, but they will be expensive and will only account for a small amount of the total number of vehicles (1% to 4%)[29].

The impact that the gradual introduction of these vehicles will have on road safety can hardly be predicted. Careful monitoring of the extent of the automotive market penetration over time and its consequences in terms of road safety shall be performed in connection with the Plan, and its Updates and Implementation Programmes shall define the necessary infrastructural and regulatory strategies to maximize the effects on road safety caused by the spread of automated vehicles.

2.3.3 Shared mobility and micro-mobility

Shared mobility may lead to a more efficient use of urban space, reduce traffic jams, encourage walking and cycling, and decrease energy consumption and emissions. It will also be a fundamental component of MaaS (Mobility as a Service), the new paradigm for mobility, intended as a cross-functional service for various public and private means and modes of transport, accessible with one combined transport pass that is expected to have an ever wider spread in future years.

The spread of micro-mobility devices (e.g., segway, monowheel, etc.) and e-scooters (equivalent to bicycles as per the Italian Act of Law no. 160 of December 29th, 2019) is emerging as an important alternative to the current set of means of transport, both for private use and sharing. These new modes of transport are especially suitable for short distance travelling, usually for the first or last mile of a route, in addition to being conveniently stored and transported in a car boot.

The rapid spread of these vehicles, especially e-scooters, surely generated an information/education gap among their users, thus aggravating the crash risk that is already inherent in the characteristics of these means of transport. Since May 2020, INSI has started recording road crashes provoking personal injuries ad

- Level 4: High Driving Automation. The system is able to manage self-driving in some circumstances when there is no need for the driver to intervene.
- Level 5: Full Driving Automation. The system is completely automated, regardless of road type, speed, and environmental conditions. No driver is needed for the whole route.

[28] *Connected & Automated Mobility: For A More Competitive Europe*

https://ec.europa.eu/transport/sites/default/files/3rd-mobility-pack/3rd-mobility-pack-factsheets-automatedconnected.pdf

[29] Litman T. (2021). *Autonomous Vehicle Implementation Predictions: Implications for Transport Planning*, Victoria Transport Policy Institute.

involving e-scooters. 564 cases were reported in 2020, including one fatality. The number seems to be low in comparison with over 13 thousand crashes involving bicycles, and 175 cyclists killed in 2020. However, the rapid diffusion of this category of means of transport is estimated to lead to an increase in their crash rate in future years. Two out of three crashes occurred in just three regions: Lombardy (40% of crashes), Piedmont (14%), and Latium (13%). These figures partly mirror the distribution of the offer of e-scooter sharing services, which indeed have the largest fleet in the three mentioned regions[30].

To better understand the characteristics of the crashes connected with this mode of transport, a comparison with the crash rates of similar modes of transport would be useful, i.e. bicycles and mopeds[31] (Table 2-1). The results show that a quite higher percentage (almost 36%) of e-scooter crashes happened with the lone vehicle (by veering from the carriageway or falling from the vehicle) or by crashing against a parked vehicle or other obstacles on the carriageway. The percentage for the other two means of transport was 17% of bicycle crashes and 23% of moped crashes. This type of collision typically happens in road stretches and also explains the higher percentage of e-scooter crashes happening along the road rather than at an intersection.

Among the possible crash factors, it is worth mentioning the smaller size of e-scooter wheels, which causes more problems with potholes and obstacles. Even the lack of experience in driving these vehicles may increase this kind of crashes, especially in the case of e-scooter sharing services. There was also a high number of crashes with pedestrians, around 6%, as against 2-3% observed in bicycle and moped crashes. There are limited differences depending on weather conditions and road pavements, except for a higher crash rate for mopeds in rainy conditions and on wet roads.

Both shared mobility and micro-mobility are complex to be analysed from the point of view of road safety. On the one hand, the reduction in the number of cars and kilometres driven by cars produces positive effects on crash rates. On the other hand, the increased use of bicycles and micro-mobility vehicles has positive effects on traffic jams and the environment, but requires specific strategies to mitigate crash risks.

The recent amendment to Article 75 of the Italian Act of Law no. 160 of December 27th, 2019, introduced by Act of Law no. 156 of November 9th, 2021, which converted, with amendments, the Decree-Law no. 121 of September 10th, 2021, (Decree-Law on 'Infrastructures'), defined a more complete regulatory framework, and introduced provisions, among other things, on e-scooter mobility,

[30] Cfr. M. Ciuffini, S. Asperti, V. Gentili, R. Orsini, L. Refrigeri (2020). 4° Rapporto nazionale sulla *sharing mobility*. (4th National Report on Sharing Mobility) – Available at: http://osservatoriosharingmobility.it/wp-content/uploads/2020/12/IV-RAPPORTO-SHARING-MOBILITY.pdf

[31] The data on road crashes causing injuries and involving bicycles and mopeds were taken from the CARE/CADaS databases and referred to the latest available year, 2019.

including the correct use of e-scooters, mandatory protective equipment, and/or other measures to increase riders' visibility. To prevent and control the riders' dangerous behaviours, awareness-raising campaigns will be conducted to encourage responsibility, and enforcement measures will be taken to combat risky behaviour. Since the wider spread of e-scooters and micro-mobility devices needs to be considered, specific studies will be conducted on crashes involving this kind of means of transport, and the crash trend will be assessed over the next few years, along with the possibility of including these riders among high-risk categories, like cyclists.

Table 2-1 Characteristics of road crashes causing injuries and involving e-scooters, bicycles, and mopeds

	Accidents involving...		
Accident characteristics	**E-scooters**	**Bicycles**	**Mopeds**
Number (reference year)	**564 (2020)**	**16,723 (2019)**	**9,371 (2019)**
Collision type			
Between vehicles while running	58.7%	80.6%	73.8%
Between a vehicle and a pedestrian	5.7%	2.1%	3.5%
A running vehicle crashing against a parked vehicle or other obstacle	14.0%	8.1%	7.2%
A running vehicle, without any collision	21.6%	9.3%	15.6%
Road conditions			
Dry	90.4%	89.7%	86.1%
Wet	8.9%	9.7%	12.5%
Slippery	0.5%	0.5%	1.2%
Other	0.2%	0.1%	0.2%
Place of the crash			
Roundabout	6.0%	9.9%	7.2%
Other type of crossroads	36.5%	39.3%	42.0%
Not at a crossroads	57.4%	50.9%	50.7%
Weather conditions			
Clear sky	89.0%	89.8%	87.2%
Foggy	0.4%	0.5%	0.5%
Rainy	5.0%	5.5%	7.4%
Other	5.7%	4.3%	4.9%

2.3.4 Freight traffic and e-commerce

In Italy, the freight traffic on roads increased by 18% from 2015 to 2019, from approximately 117 million tons-km of goods transported in 2015 to 131 million in 2019[32]. In the 2015-2019 five-year period, the traffic of heavy-goods vehicles[33] on motorways in terms of vehicles-km increased by almost 12%. In the same period, the kilometres driven by light vehicles increased by 5.2%.

The rising number of heavy-goods vehicles on roads may increase the risk of crashes and serious consequences. In the United States, the risk of fatal and non-fatal crashes (number of fatal and non-fatal crashes per vehicle-km) in connection with freight transport is increasing more rapidly than the overall crash rates in connection to road traffic, especially in urban areas[34]. The first ones to pay the price on urban roads are the most vulnerable users, especially cyclists and pedestrians, because of blind spots in the driver's field of vision.

In 2020, global trade showed a relatively good amount of resilience in the face of the difficulties arisen by the COVID-19 pandemic, and the positive trends reported in the last months of 2020 were reinforced at the beginning of 2021. In the first quarter of 2021, the value of the global trade in goods and services grew by approximately 4% on a quarterly basis, and approximately 10% on an annual basis. It is worth highlighting that global trade in the first quarter of 2021 was above the pre-crisis level, accounting for an approximate 3% growth as against the first quarter of 2019[35].

As for Italy, according to the Italian Confederation of Commerce Observatory for Transport (*Osservatorio Congiunturale Trasporti Confcommercio*)[36], the effects of restrictions on mobility and manufacturing in 2020 owing to COVID-19 resulted in a significant reduction of transport. The Confcommercio Transport Indicator (ITC) shows a sharp drop in passenger mobility by almost 50%, with a 32.2% reduction on roads, a 41.7% reduction on railways, a 73.3% reduction on ships, and a 72.6% reduction in air travel. Smaller variations occurred in freight transport, which dropped by 18.7% overall in 2020, with a 25.8% reduction in road transport, a 7% reduction in railway transport, a 7.3% reduction in maritime transport, and a 23.6% reduction in air transport (Table 2-2).

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[32] Ministry of Infrastructures and Transport (2020), *"Conto Nazionale delle Infrastrutture e dei Trasporti" ("National count of infrastructures and transport")*.

[33] Including both two-axle vehicles with height from the ground at the front axle higher than 1.30m, and all vehicles with three axles.

[34] McDonald, N., Yuan, Q., & Naumann, R. (2019), *Urban freight and road safety in the era of e-commerce. Traffic injury prevention*, 20(7), 764-770.

[35] UNCTAD, *Global trade update*, May 2021.

[36] Confcommercio Study Office, "Osservatorio Congiunturale Trasporti Confcommercio 5" **(Italian Confederation of Commerce Observatory for Transport no. 5),** February 2021.

Table 2-2 2017-2020 trend in the Transport Indicator by Confcommercio (Source: *Osservatorio Congiunturale Trasporti Confcommercio* – Italian Confederation of Commerce Observatory for Transport)

% Variation Trend				
PASSENGERS				
Mode of transport	2017	2018	2019	2020
Road (Motorways)	1.8	-0.1	-2.6	-32.2
Railways	3.5	4.4	3.8	-41.7
Sea	-5.4	15.5	15.5	-73.3
Airways	6.5	5.9	4.0	-72.6
Transport Indicator by Confcommercio for passengers	**3.7**	**3.0**	**1.0**	**-48.7**
Goods				
Mode of transport	2017	2018	2019	2020
Road (Motorways)	3.3	2.3	-1.7	-25.8
Railways	11.5	-1.1	-2.5	-7.0
Sea	1.0	-0.2	-0.4	-7.3
Airways	9.2	0.0	-3.2	-23.6
Transport Indicator by Confcommercio for Goods	**3. 4**	**1.2**	**-1.6**	**-18.7**

The COVID-19 pandemic significantly contributed to the growth of e-commerce. Global e-commerce sales are expected to reach a total value of 4,891 trillion dollars in 2021[37], and this value is expected to grow even further in the next few years, showing that **e-commerce is becoming an ever more widespread and profitable option for businesses in trade**. By 2024, global e-commerce sales are expected to reach a value of 6,388 trillion dollars, and the overall portion of retail sales is expected to reach 21.8%. In Italy, e-commerce shipping increased by 103% during the lockdown, and by 68% after the lockdown, showing that the trend is still ongoing.

Consequently, **the data point towards a future growth of freight transport on roads,** particularly in terms of freight distribution in urban areas. This will require special attention both to mobility planning and management, aiming at moving an ever-larger portion of traffic flows from roads to safer modes of transport, and to risk factors for vehicle categories involved in road mobility.

[37] https://www.emarketer.com/content/global-ecommerce-update-2021

2.3.5 Urban spaces for mobility

The COVID-19 pandemic experience, along with the above-mentioned socio-demographic and mobility trends, clearly shows that a new concept of urban areas' structure and functionality is necessary. A number of experiences at national and international level proved the ability to respond swiftly to temporary mobility needs at a given point in history due to restrictions and health requirements.

Such an experience, however, should be an occasion to redevelop and improve public spaces, with a view to the integration of urban and mobility planning, focusing on an ever safer and more attractive sustainable mobility. The urban space shall be improved so that all mobility components – pedestrians, cyclists, public transport, cars, electric micro-mobility devices, etc. – may be integrated to guarantee a high level of accessibility and usability of areas and services.

As suggested by recent national and international experiences, **urban spaces need to be redesigned** for promoting the vision of a City of Proximity, also defined as '15-minute city', thus re-designing cities and their functions to strike a better balance between urban functions, mobility and well-being of people living in cities. Moreover, special attention shall be paid to 'sensitive areas' within urban areas (e.g. schools, services for the elderly, clinics, etc.), because they generate and attract vulnerable road users (pedestrians and cyclists, especially children and the elderly). The organization of the road environment surrounding such 'sensible areas' and the regulation of mobility in those areas shall be subject to specific actions to guarantee safe and usable urban spaces.

There are multiple possible action strategies, at various levels of planning. Urban Plans for Sustainable Mobility (SUMP) regulated by Ministerial Decree 397/2017, as modified by Ministerial Decree 396/2019, and Urban Plans for Cycling (Biciplan) as sectoral plans within the SUMP, introduced by Art. 6 of the Italian Act of Law no. 2 of January 11th, 2018, are the benchmark planning tools for reaching those objectives. From a design and implementation point of view, some well-established techniques like traffic calming, 30-kmph zones, and 'green home zones' are effective solutions to redevelop cities of proximity and design safe, high-quality, highly accessible, and usable urban and public spaces for all users, by respecting all the various functions of a city. **Traffic calming techniques, which have long been used to mitigate the negative effects of motor vehicle traffic in urban areas, have proven to be the most effective in terms of improved road safety.**

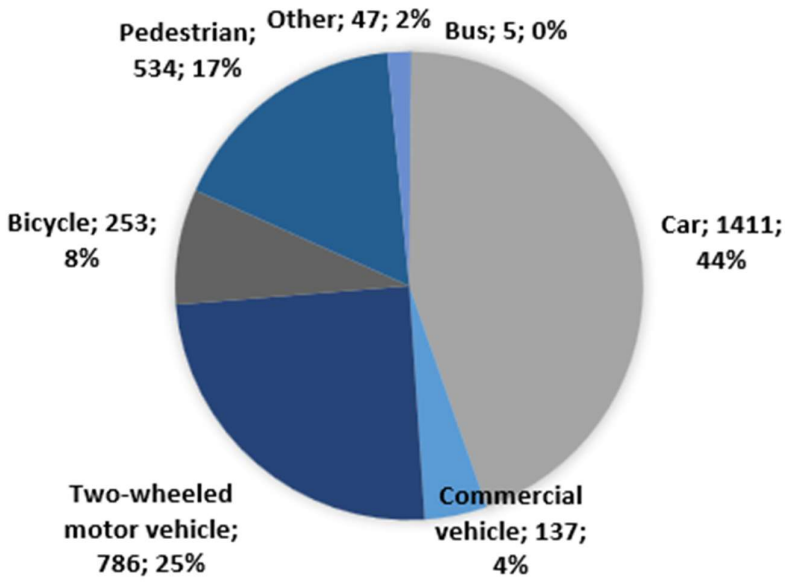
3 MAIN ISSUES AND ROAD SAFETY PROBLEMS IN ITALY

Accident rate trends are different in the various geographical areas. The overall number of road fatalities at global level is growing at a steady pace, as well as the number of injuries and consequences in terms of social cost. From the geographical point of view, on the one hand, there are high-income countries, including European countries, where the phenomenon has been improving over the years, on the other hand there are middle- and low-income countries whose performance is consistently worse year after year[38]. **With reference to the Italian and European general situation, after a period of significant reduction in crash rates between the years 2000 and 2013, a noticeable slowdown occurred, which led the country to miss the targets established by the international community.** Obviously, in consideration of the anomalous situation provoked by the pandemic, the analysis hereby refers to the year 2019.

3.1 Analysis of crash rate trends in Italy

According to INSI data, **the number of road fatalities in Italy was 3,173 in 2019, while the number of injuries was 241,284.** The user category with the highest number of victims is made up of car drivers and passengers (1,411 victims, 44%), followed by powered two-wheelers (786 victims, 25%), pedestrians (534 victims, 17%), cyclists (253 victims, 8%), occupants of commercial vehicles, trucks and tractors (137 victims, 4%), bus passengers (5 victims, 0.2%), and other modes of transport including agricultural tractors, motorcars, and quadricycles (52 victims; 1.5%). As shown in Picture 3-1, **the most vulnerable road users (pedestrians, cyclists, and two-wheeled motor vehicle riders) make up almost half of road crash victims**.

[38] It is worth reminding that measurements and analyses performed on crash data are affected by a high level of uncertainty on the reliability of the data collected. On the one hand, mortality figures are reliable in our country (but we still do not have access to the number of serious and non-serious injuries provoked by each crash). On the other hand, the data on developing countries, especially African countries, show huge discrepancies between national and WHO estimates, even 10 to 12 times higher or lower.



Picture 3-1 Road crash fatalities for each mode of transport, 2019 (Source: INSI – Italian National Statistics Institute)

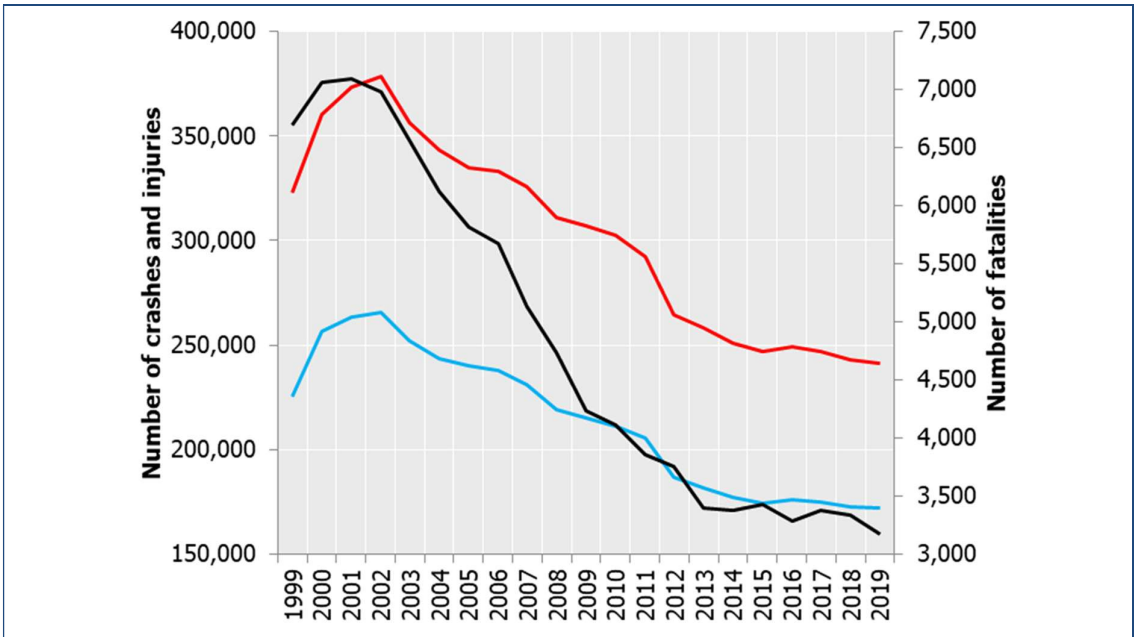
The temporal analysis of the number of road fatalities shows a noticeable 55% reduction since 2001 (Picture 3-2). The number of injuries decreased too (-35%), though it showed a smaller decrease than the number of deaths. An equivalent reduction was observed in the total number of crashes provoking injuries.

A totally different trend is observed for serious injuries, which have been estimated in Italy since 2012, based on the information contained in the Hospital Discharge database of the Ministry of Health[39]. A 42% increase was registered in the 2012-2018 period, as against the 8.2% decrease in the total number of injuries in the same period (Picture 3-3). In 2018[40], the number of serious injuries in Italy was 18,614 units, equalling 5.6 serious injuries per fatality (the rate was 3.5 in 2012). The observed trend was surely influenced by a gradual improvement in the

[39] The common definition of serious injury proposed by the European Commission is based on the Abbreviated Injury Scale (AIS). AIS is a measurement scale based on the use of International Classification of Diseases codes ICD9 -CM or ICD10, and on a general scale for injury severity depending on the degree of damages and the region of the body that is affected. The level of severity is measured on a 6-point scale. Serious injuries are identified with the MAIS 3+ score (Maximum Abbreviated Injury Scale), which means the maximum AIS score in each region of the body, equal or higher than 3.

[40] *Osservasalute* Report (Health Observatory) 2019
https://www.osservatoriosullasalute.it/osservasalute/rapporto-osservasalute-2019

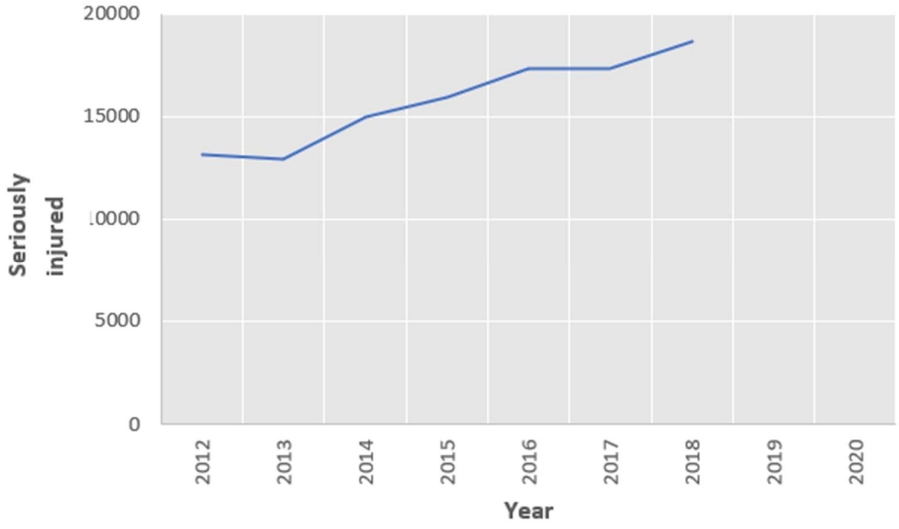
quality and coverage of specific information that allow us to identify hospitalizations caused by road crashes.



Picture 3-2 Trend in the number of road crashes, fatalities and injuries in Italy, from 1999 to 2019 (Source: INSI – Italian National Statistics Institute)

When observing the percentage variation of fatalities and injuries between 2010 and 2019 for each mode of transport, an uneven trend for the various road user categories can be noticed (Picture 3-4). As for commercial vehicles, a 29% reduction in fatalities and a 28% reduction in injuries was reported. A moderate decrease in the number of fatalities is reported for buses too (-44%). In this case, however, the small size of the phenomenon can affect its statistical reliability. Indeed, buses are hardly present in crash statistics, as they are the safest means of transport among those running on roads. As a consequence, **those travelling by bus have half the risk of being involved in road crashes, as compared with those travelling by car**[41]**.** Generally speaking, investing in promoting the use of public transport means investing in road safety.

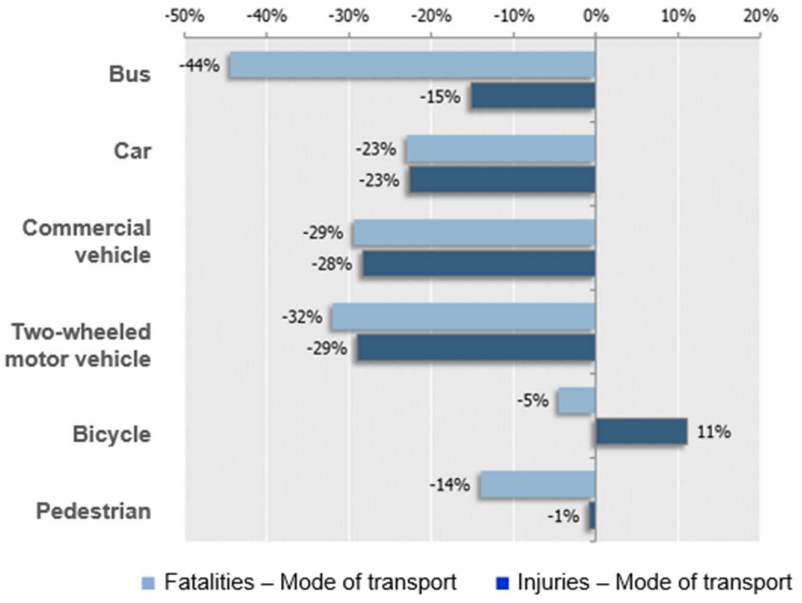
[41] Elvik et al. (2009), *The Handbook of Road Safety Measures*. Elsevier.



Picture 3-3 Number of the seriously injured in Italy from 2012 to 2018 (Sources: Ministry of Health and INSI – Italian National Statistics Institute)

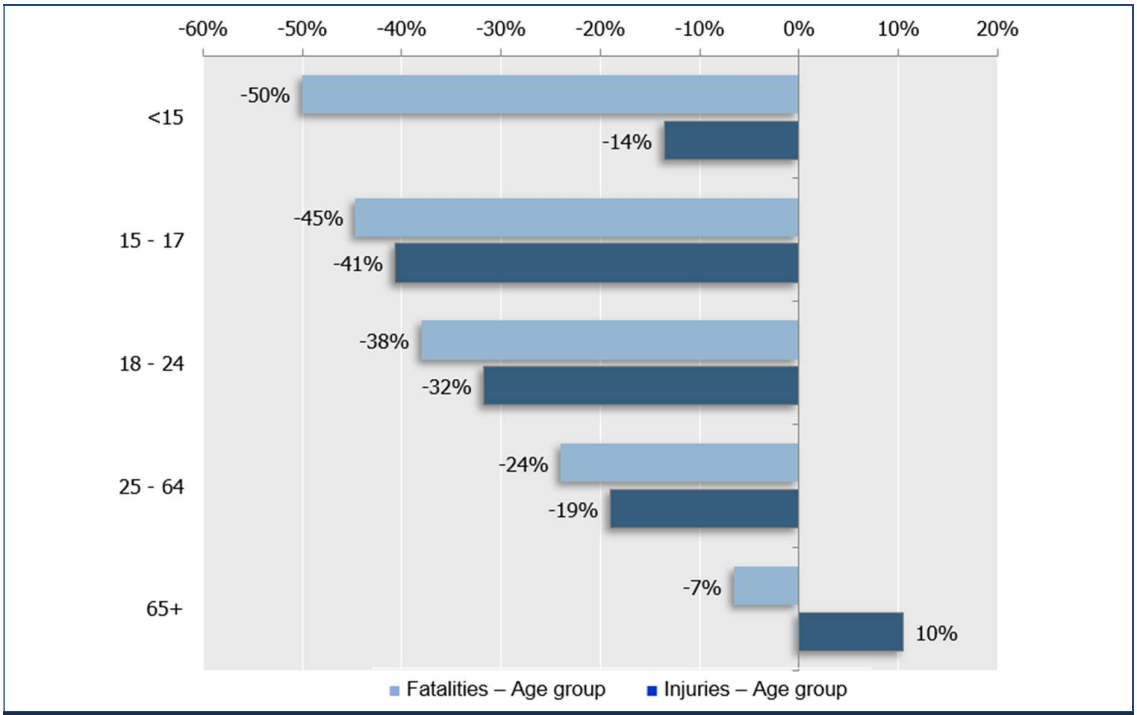
As for cars, the reduction in the number of fatalities is almost the same as the reduction in injuries (-23%). As for powered two-wheelers, accounting for around 25% of the total number of victims in 2019, a 32% reduction is observed in the number of fatalities, along with a 29% reduction in the number of injuries. When differentiating between mopeds and motorcycles, the decrease is sharper for mopeds (-57% fatalities and injuries), while it is more moderate for motorcycles (-27% fatalities and -17% injuries). However, the significant reduction in the total number of mopeds on roads over the last few years should be taken into account.

As for cyclists, there is just a slight reduction in the number of fatalities (5%), while the number of injuries has risen by 11%. Such data confirm that cyclists must be considered as a high-risk category, especially in the post-COVID context, when mobility systems are going to encourage the use of bicycles as means of transport, particularly in urban areas, but also in rural areas (cycle routes). The data related to e-scooters and personal electric mobility devices should be added too, as their use is becoming widespread. **Even pedestrians are to be considered as a high-risk category**, because, despite a 14% reduction in terms of fatalities over the last decade, they account for 17% of the total number of victims.



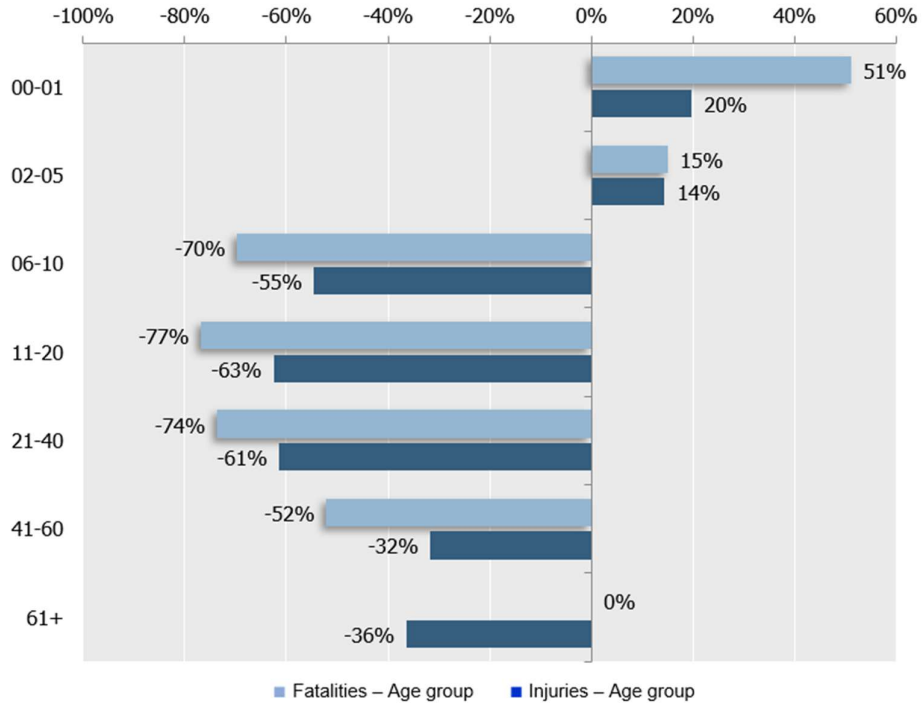
Picture 3-4 Percentage variation in fatalities and injuries in Italy from 2010 to 2019 for each mode of transport. (Source: INSI – Italian National Statistics Institute)

As for the percentage variation of fatalities and injuries by age group from 2010 to 2019 (Picture 3-5), we can notice that **the age of the victims has increased over the last decade**. In particular, all age groups under 65 had a sharp decrease in both categories. Instead, people over 65 have a slight reduction of fatalities (7%), and an increased number of injuries (10%). Moreover, the victims belonging to this age group account for 31% of the total number of victims reported in 2019.



Picture 3-5 Percentage variation in fatalities and injuries in Italy from 2010 to 2019 for each age group. (Source: INSI – Italian National Statistics Institute)

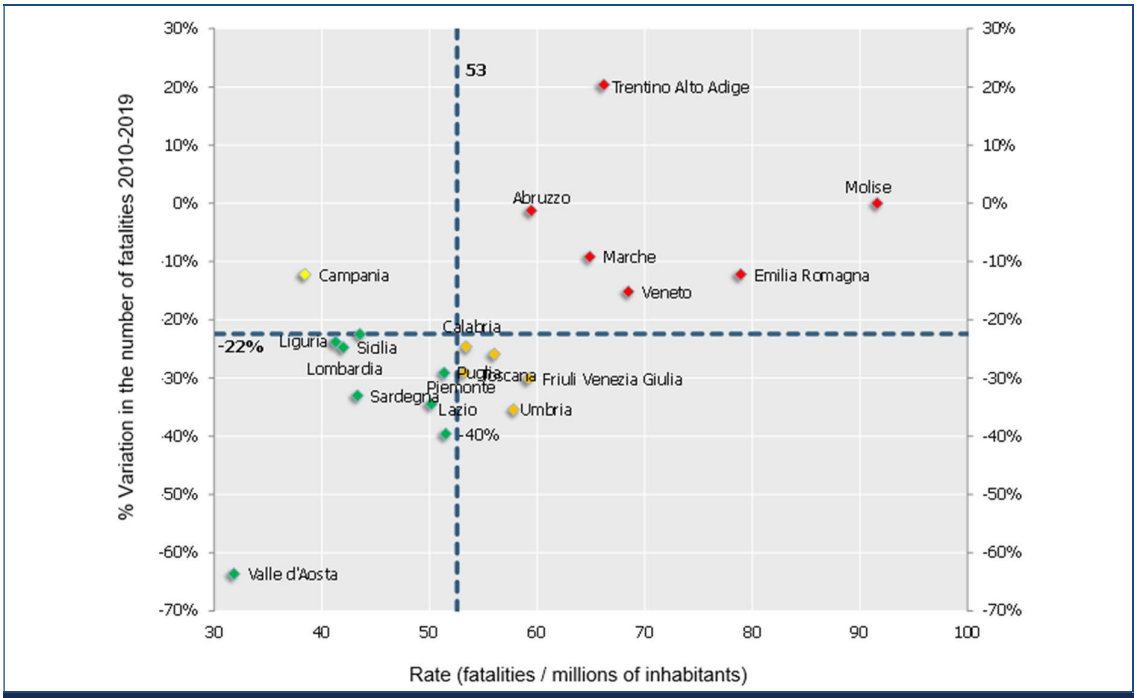
As for the number of years of driving experience after obtaining a driving license, Picture 3-6 shows that **the number of fatalities and injuries among drivers with six years of experience has significantly decreased over the last decade**. The widest variations are to be found among drivers with 10 to 20 years of driving experience (-77% injuries and -63% fatalities), followed by those with 21 to 40 years of driving experience (-74% injuries and -61% fatalities), and those with 6 to 10 years of driving experience (-70% injuries and -55% fatalities). On the other hand, **novice drivers have a steep increase in the number of fatalities (+51%) and injuries (+20%).**



Picture 3-6 Percentage variation in fatalities and injuries in Italy from 2010 to 2019 by seniority in driving. (Source: CARE/CADaS)

Accident rates are unevenly distributed across the Italian regions. Picture 3-7 analyses each region's performance as against the national average, by considering two variables: the mortality rate in 2019 (in terms of deaths per million of inhabitants) and the percentage variation in the number of fatalities from 2010 to 2019 - In other words, the current situation and the trend over the last few years.

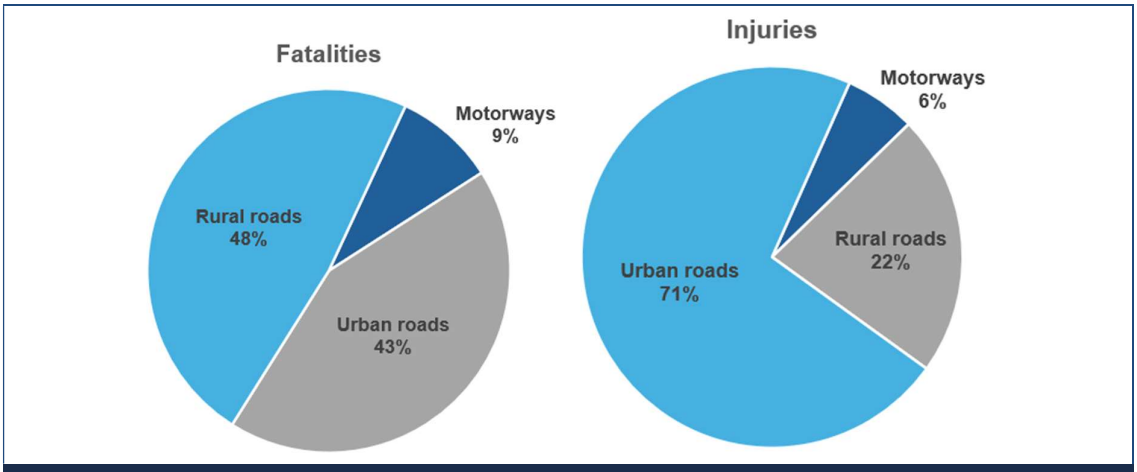
In the bottom left quadrant of the chart there are Regions with higher performance than the national average, both in terms of variation in the number of fatalities, and in terms of mortality rate as of 2019. In the upper right quadrant, instead, there are regions with a higher-than-average mortality rate and a slower improvement trend. Finally, in the upper left quadrant there are regions with a lower-than-average mortality rate, but a slow improvement trend, whereas in the lower right quadrant there are regions with a higher-than-average improvement trend, but a high mortality rate.



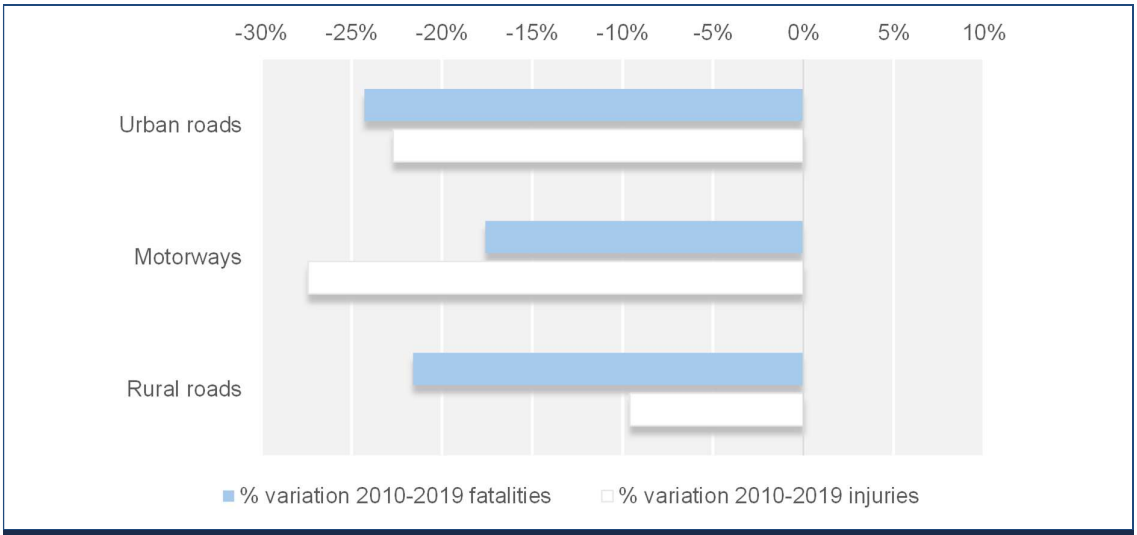
Picture 3-7 Regional distribution of mortality rate and variation in the number of fatalities. (Source: INSI – Italian National Statistics Institute)

To explain the differences between the various Regions, various factors may be considered: different levels of mobility on the regional road network (some regions have high inter-regional traffic, in addition to internal traffic); users' behaviour (Safety Performance Indicators); quality of the road network; plans and projects implemented by the administrations and organizations involved. As for the road type, on average, in the 2010-2019 period:

- **Most of the injuries were due to crashes on urban roads (71%).**
- **The majority of fatalities, instead, occurred on rural roads (48%)**, even though there is not a significant difference from urban areas (43%).
- **Around 6% of injuries and 9% of fatalities occurred on motorways**.



Picture 3-8 Average percentage of fatalities and injuries by road type in the 2010-2019 period. (Source: INSI – Italian National Statistics Institute)



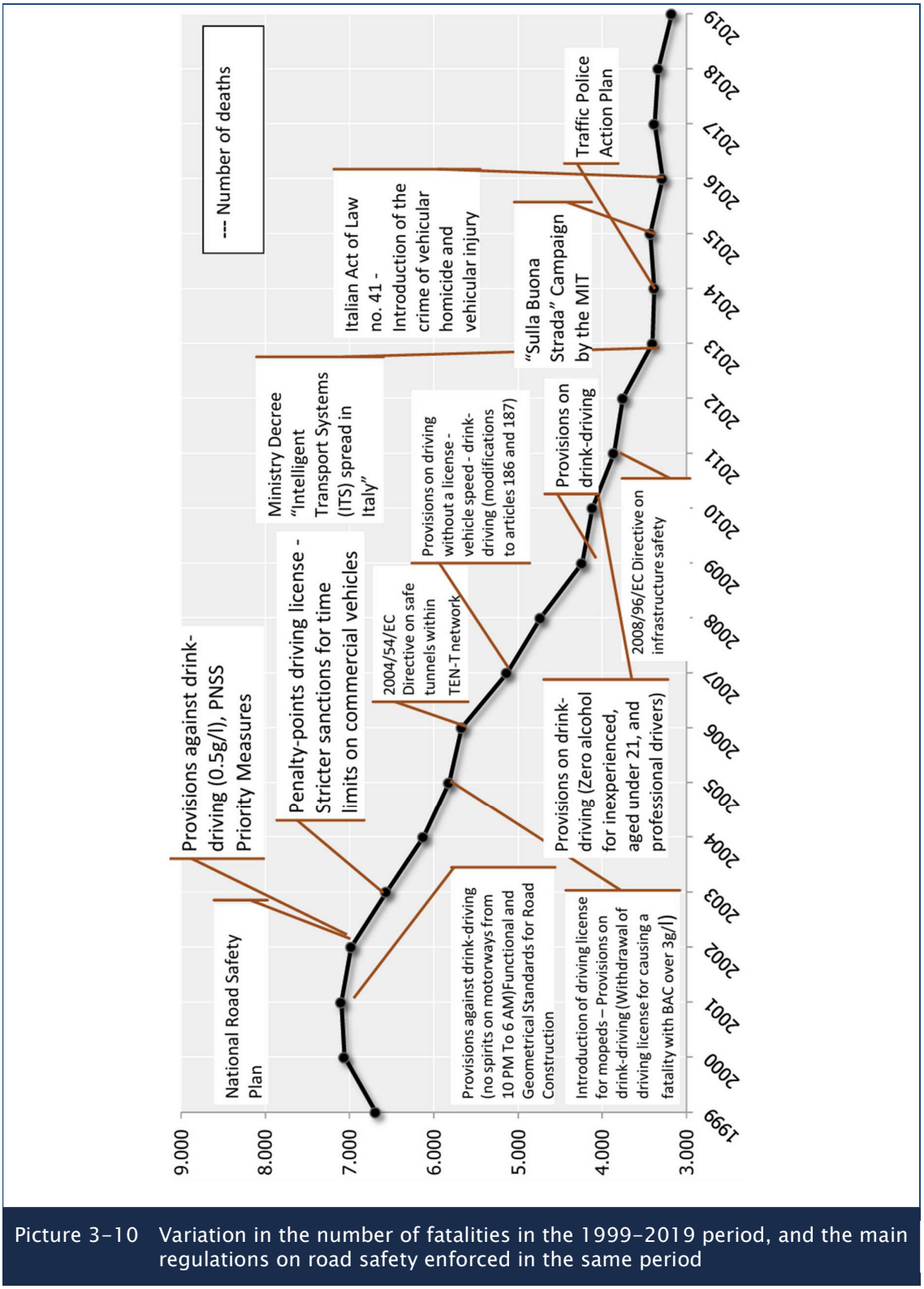
Picture 3-9 2010-2019 variation in fatalities and injuries by road type. (Source: INSI – Italian National Statistics Institute)

In comparison with the past, a **general reduction is found on all road types – urban, rural, and motorways**. The improvement in terms of number of fatalities is uniform across all road types, ranging from -17.6% on motorways to -24.3% on urban roads. Major differences are observed in terms of variation in the number of injuries, which is smaller on rural roads (-9.6%) than on urban roads (-22.7%) and motorways (-27.4%).

Picture 3-10 reports the fatality trend over the last 20 years, along with the main regulatory and strategical provisions introduced in Italy over the same period. Among them, it is worth mentioning the latest provisions approved in 2020-2021, which had a particular focus on vulnerable users and emerging micro-mobility modes of transport:

- Italian Act of Law no. 8 of February 28th, 2020, introducing provisions on road mobility of e-scooters and electric micro-mobility devices.
- Decree-Law no. 34 of May 19th, 2020, transposed into Act of Law no. 77 of July 17th, 2020, and Decree-Law no. 76 of July 16th, 2020, transposed into Act of Law no. 120 of September 11th, 2020, introducing and modifying the Road traffic laws - *Codice della Strada (e.g. Urban cycle route, bicycle lane, advanced space lines for bicycles).*
- Decree-Law no. 121 of September 10th, 2021, transposed into Act of Law no. 156 of November 9th, 3032, providing new traffic rules, namely for e-scooters, including, but not limited to: age limits; speed limits; parking; compulsory use of helmets for young riders under 18.

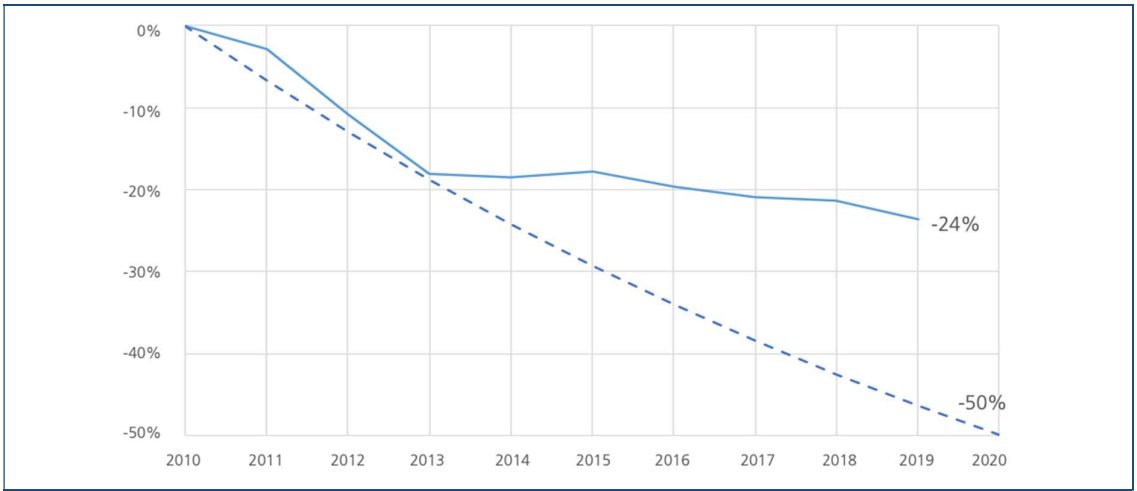
A correlation between the two elements can only be performed in qualitative terms (except for visible effects like the ones connected with the introduction of the penalty-points driving license and provisions on drink-driving, which changed the trend of the phenomenon in the early 2000s), since the real effects of each single measure should be assessed by means of specific scientific studies, like the analysis by time series or a correlation analysis. Although the latest regulatory measures still need to show their effects, it is interesting to notice that **legislative action has continuously accompanied the evolution of the phenomenon,** thus surely contributing to the results achieved.



Picture 3-10 Variation in the number of fatalities in the 1999-2019 period, and the main regulations on road safety enforced in the same period

3.2 Comparison with the European Union

In the EU, the general target of halving the number of road fatalities was neither met in 2010, nor in 2020. Despite missing the target, the significant reduction in the number of victims (by approximately 42%) and the decrease in the number of injuries and crashes (though more moderate, it equalled 23% and 25% respectively) in the 2001-2010 decade showed that the measures to deal with road crashes at national and European level had a certain degree of effectiveness. **Indeed, the mortality rate dramatically decreased** in the 2001-2010 decade, not only in Italy, where it dropped from 125 to 68 deaths per million of inhabitants (a reduction by 57 deaths per million of inhabitants), but also at European level, were there was a reduction by 51 deaths per million of inhabitants. Over the last decade, EU27 data[42] show a **24% reduction in the number of victims between 2010 and 2019**, while the strongest progress took place in the 2011-2013 period, then followed by years of stagnation (Picture 3-11).



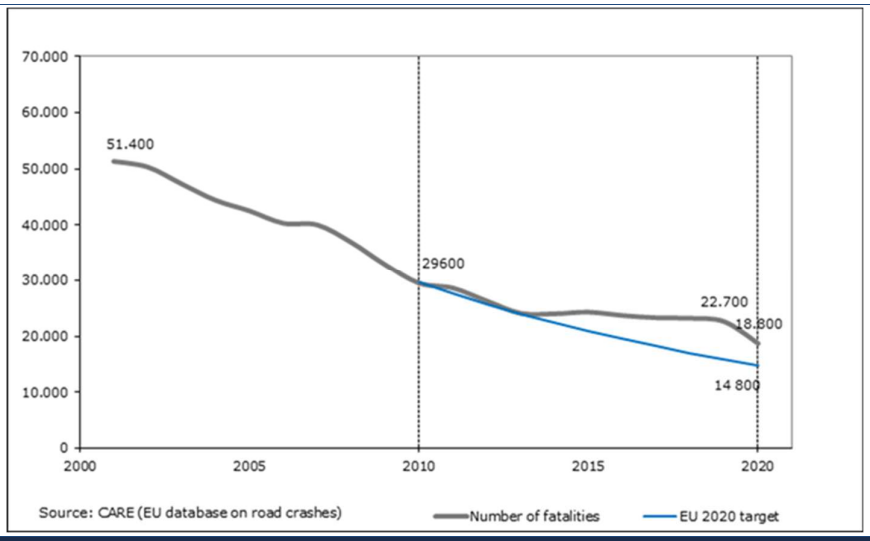
Picture 3-11 Trend in the reduction of road fatalities in the EU27 since 2010 (blue line) as compared to the 2020 target (dotted blue line).

2020 data show the strong influence of mobility restrictions owing to the COVID-19 pandemic crisis[43]. The average reduction in Europe between 2019 and 2020 equalled 17%, accounting for a 37% average reduction as against 2010

[42] *14th Road Safety Performance Index Report*, June 2020.
https://etsc.eu/14th-annual-road-safety-performance-index-pin-report/

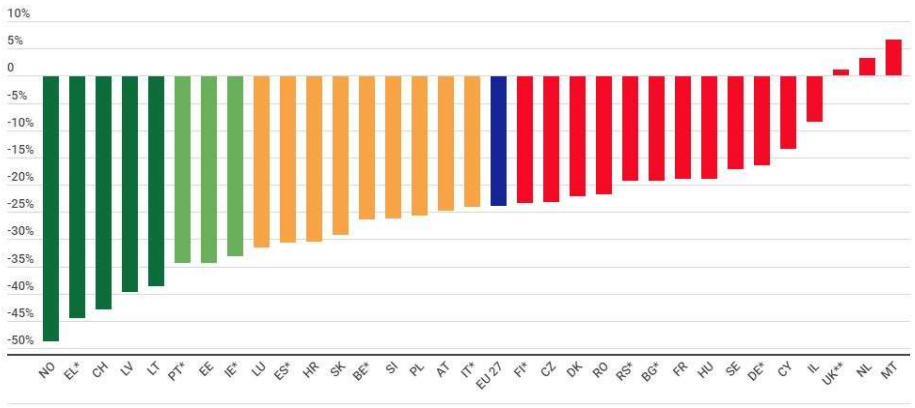
[43] *2020 road safety statistics: what is behind the figures?*
https://ec.europa.eu/transport/modes/road/news/2021-04-20-road-safety-statistics-2020_en

(Picture 3-12). Italy performed even better – there was a 25% reduction in the number of victims in comparison with the previous year, and a 42% reduction as against 2010. Such data show that the **target that had been established was not met, neither in Italy nor in the EU, despite a sharp reduction in the number of road fatalities in 2020 owing to the mobility restrictions imposed during the lockdown periods of the pandemic crisis.**



Picture 3-12 Number of seriously injured in EU27 2001 to 2020 (Sources: 2020 Road Safety Statistics: What is behind the figures?)

With reference to the reduction in the number of deaths reported in every EU27 country, Picture 3-13, referring to the 2010-2019 period, shows that all member States are below the EU-established threshold, while only Norway, Greece, Switzerland, Latvia, and Lithuania moved closer to the target, with a reduction ranging from 48% to 39%. Italy confirmed, instead, the average European rate of reduction in road fatalities, with a 22.9% decrease.



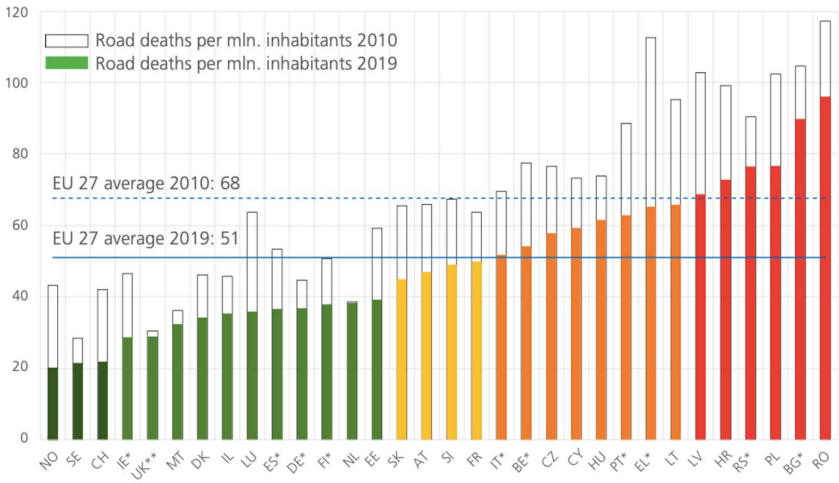
Picture 3-13 Variation in the number of road fatalities in EU member States in the 2010-2019 period (Source:14th Road Safety Performance Index Report, 2020)

Remarkably, some countries that used to outperform others in terms of road safety, such as the Netherlands and the United Kingdom, reported extremely negative performances over the last decade. Apart from specific national factors that may have influenced the phenomenon, **such trends confirm the difficulty in achieving the set objectives, even for countries with a long-established culture of road safety**, and the need for careful and continuous control measures, adequately supported by the necessary resources.

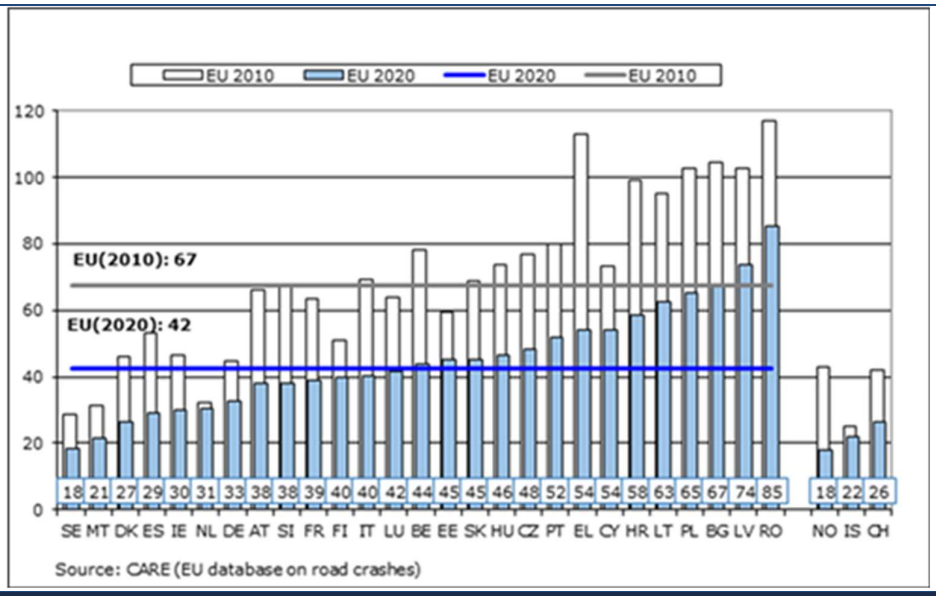
As for the number of deaths per million of inhabitants, in 2019 the figure for Italy was 53, slightly higher than the EU27 average of 51 (Picture 3-14). The reduction in the number of victims in 2020[44], caused by the above mentioned reasons, determined a rate of 40 victims per million of inhabitants in Italy (a significant reduction in comparison with the value of 68 victims in 2010), slightly lower than the EU27 average of 42, as against 67 deaths per million of inhabitants in 2010 (Picture 3-15).

[44] *2020 Road Safety Statistics: What is behind the figures?*

https://ec.europa.eu/transport/modes/road/news/2021-04-20-road-safety-statistics-2020_en



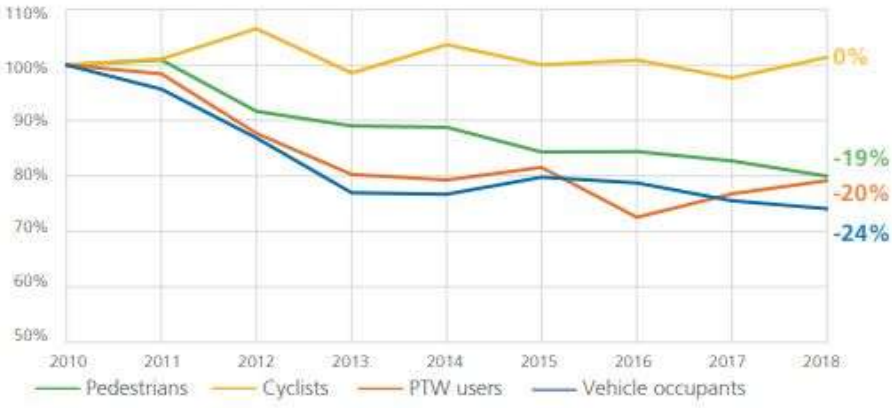
Picture 3-14 Number of deaths per million of inhabitants in EU member States between 2010 and 2019 (Source:14th Road Safety Performance Index Report, 2020)



Picture 3-15 Number of deaths per million of inhabitants in EU member States between 2010 and 2020 (Source: 2020 Road Safety Statistics: What is behind the figures?)

As for the number of victims by road user category in the EU, **pedestrians and cyclists respectively contribute to 21% and 8% of the total number of victims reported in 2018.** As per Picture 3-1, the respective percentages in Italy, as of 2019, are the same one for cyclists and a lower one for pedestrians (17%). Powered

two-wheelers account for 18% of the victims in the European Union, while the value in Italy is 25%. However, the trends reported between 210 and 2018 show a 19% reduction in the number of pedestrians killed on European roads, while there is a stable trend in the number of cyclists killed, even though the latter may be influenced by the general increase in the use of bicycles. Motorcycle and moped riders (*PTW users*) and vehicle occupants, instead, are the types of road users with the largest reduction in the number of victims, by 20% and 24% respectively as against 2010[45] (Picture 3-16).



Picture 3-16 Reduction trend in the number of victims in the EU, subdivided by type of victim, in the 2010-2018 period (Source: How safe is walking and cycling in Europe?, 2020)

The reductions in the number of victims by road user type in Italy are broadly in line with the European average. As reported in Picture 3-4, the largest reductions in the 2010-2019 period were obtained by powered-two-wheeler users (-32%), vehicle occupants (-23%), pedestrians (-14%), and cyclists (-5%)[46]. When examining road types in the 2010-2017 period, EU figures show a 14% reduction of victims on urban roads, a 16% reduction of victims on motorways, and a 24% reduction of victims on rural roads[47] (Picture 3-17). In Italy, instead, in the 2010-2019 period, the reduction of victims on urban roads (-24.3%) is larger than the European average, the reduction of victims on motorways is slightly larger (-17.6%) than the

[45] *How safe is walking and cycling in Europe?* 2020

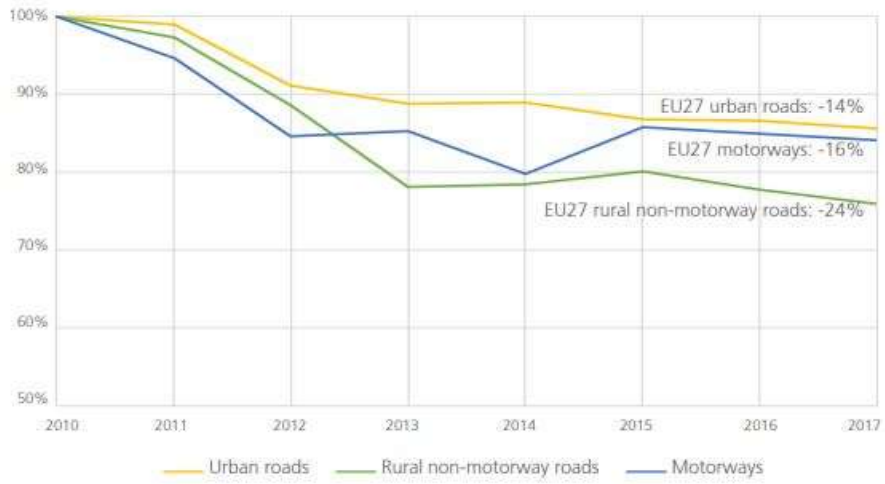
https://etsc.eu/how-safe-is-walking-and-cycling-in-europe-pin-flash-38/

[46] ACI-ISTAT *"Incidenti stradali Anno 2019"* ("Road crashes in 2019").

[47] *Safer roads, safer cities: How to improve urban road safety in the EU*, 2019

https://etsc.eu/safer-roads-safer-cities-how-to-improve-urban-road-safety-in-the-eu-pin-flash-37/

European average, whereas the reduction of victims on rural roads is smaller (-21.6%) than the European average.



Picture 3-17 Reduction trend in the number of victims in the EU, subdivided by road type, in the 2010-2017 period (Source: Safer roads, safer cities: How to improve urban road safety in the EU, 2019)

As for the number of **serious injuries**, the latest available European Transport Safety Council report (*14th Road Safety Performance Index Report*, June 2020) notes the non-comparability of the number of serious injuries between the various European countries, because of the different definitions adopted at national level and the incompleteness of historical data. Consequently, it does not report the percentage variation for Italy in the 2010-2019 period. The report highlights that the average reduction in the number of serious injuries (among the 23 countries whose data were available) was approximately 2% over the 2010-2019 period. The largest reductions were attained in Greece (-60%), Cyprus (-40%), Belgium (-35%), and Czech Republic (-25%), whereas a significant increase was found in Malta (+45%), Israel (+15%), the Netherlands, and the United Kingdom (over 10% increase).

As highlighted in Picture 3-3, the increasing trend in serious injuries that was reported in Italy was influenced by factors related to the coverage of the survey, and thus to the quality of the data collected. Despite this, the phenomenon shall be carefully monitored, especially in comparison with the decreasing trend observed at European level. The most recent ACI-INSI report on road crashes (published in July 2020) provides the number of all injuries (both serious and minor), highlighting an approximate 21% reduction between 2010 (304,720 injuries) and 2019 (241,384 injuries).

3.3 Summary of the main issues and difficulties

In the 2010-2019 decade, there was a 24% reduction in the number of victims in EU member states, quite similar to the one observed in Italy (-23%). As for the mortality rate, in Italy there were 53 deaths per million of inhabitants in 2019, a slightly higher figure than the EU27 average of 51. In the same period, the number of injuries in Italy varied by 21%. However, when analysing data related to crashes provoking serious injuries, which have been calculated in Italy since 2012 based on the available data, a 42% increase is found in the 2012-2018 period when data were available, as against the 8.2% decrease in the total number of injuries in the same period. Therefore, the different data sources available need to be further integrated to analyse the severity of injuries and define correct policies for prevention and planning.

On the basis of the analyses mentioned in previous paragraphs, the road system components (mode of transport, user, and infrastructure) allowing us to identify the most vulnerable categories are listed below.

Mode of Transport

One out of four victims (25%) are riders of powered two-wheelers, as against the European average of 18%. The analysis of trends shows an improvement in this category, with a 29% reduction in the number of injuries, and a 32% reduction in the number of fatalities. However, the powered-two-wheeler vehicle categories (motorcycles and mopeds) have different trends. As for motorcycles, there was a 57% decrease both in injuries and fatalities, whereas the reduction for mopeds was smaller (-27% fatalities and -17% injuries). Moreover, unlike car traffic flows, which had a 4.9% increase in the 2010-2019[48] decade, motorcycle and moped traffic flows decreased by 5.5%. Consequently, part of the decrease in injuries was due to a reduction of exposure to risk.

Cyclists account for 8% of road fatalities in Italy, in line with the European average. However, cyclists only had a slight reduction in the number of fatalities (-5%) in comparison with other modes of transport, and a large increase in the number of injuries (+11%). Therefore, **they are included in the Plan as a vulnerable category**, also because of current policies and trends encouraging the use of bicycles (including power-assisted pedal cycles and micro-mobility vehicles), especially after the pandemic.

Pedestrians as well need to be included among vulnerable categories. The number of road crash victims among pedestrians was 534, accounting for 17% of the total number of victims in 2019. Although the number of victims decreased by 14% in the 2010-2019 decade, the reduction was smaller than the one observed

[48] See "Table 7.4 - Total national passenger traffic" of the National Count of Infranstructures and Transport - "*Conto Nazionale delle Infrastrutture e dei Trasporti*" - years 2018-2019 of the Ministry of Infrastructures and Transport.

for other means of transport. Moreover, the number of injuries in this category did not vary, unlike what happened for other categories.

Car occupants account for almost a half of the victims (44%) and 58% of the injured in road crashes, because the car is the most widespread means of transport and it is a component impacting on the safety of other vulnerable categories. Many of the actions that may be implemented to improve their safety require systematic measures. The Plan approach is to treat this category by means of general strategies.

Users

Road crashes are among the most frequent causes of death for children up to 14 years old[49]. Even though **children** and **adolescents** involved in road crashes accounted for 1% of victims and 5% of injuries in 2019, they are recognized as **at-risk category** in the Plan.

Over 65 account for approximately 31% of fatalities (slightly higher than the European average of 29%[50]) and 13% of injuries in 2019. The Italian mortality rate for this age group (77.8 deaths per million of inhabitants) is also higher than the European rate (75.5)[51]. In addition to that, unlike other age groups, the elderly had an increased number of injuries (10%) and a slight reduction of fatalities (7%). Therefore, also this age group must be included in the Plan as **at-risk category**.

Novice drivers and those who have 2 to 5 years of experience in driving are also a category that needs a great amount of attention, because they had a large increase in the number of deaths (+51%) and injuries (+20%). The Plan will also focus on **young drivers,** the majority of whom have few years of driving experience.

Road type

Finally, as for the three road types examined, **urban roads need more attention than others**. In 2019, most injuries were due to crashes on urban roads (71%). The percentage of deaths was 43%. In comparison with the European average, in 2016 (year whose data are available), the percentage of deaths on urban roads in Italy (45%) was higher than the European average (38%)[52].

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[49] See ISTAT *"Le principali cause di morte in Italia – Anno 2012"* ("Main causes of death in Italy – Year 2012") https://www.istat.it/it/files//2014/12/Principali_cause_morte_2012.pdf

[50] *European Road Safety Observatory, Facts and Figures – Seniors*, 2020. https://ec.europa.eu/transport/road_safety/sites/default/files/facts_figures_seniors_final_20210323.pdf

[51] Idem

[52] *European Road Safety Observatory, Traffic Safety Basic Facts 2018 – Urban Areas*. https://ec.europa.eu/transport/road_safety/sites/default/files/pdf/statistics/dacota/bfs2018_urbanareas.pdf

On the other hand, the previously identified categories (namely, powered two-wheelers, cyclists, pedestrians, children, and over 65) move most of all within the city, and account for approximately 83% of deaths on urban roads. Taking actions in favour of these categories indirectly means improving the safety of urban roads. Consequently, urban areas are not going to be included as another risk category.

4 GENERAL, SPECIFIC, AND OPERATIONAL OBJECTIVES

Mobility is a fundamental element of modern society. However, it also produces negative side-effects, like road crashes. The NRSP aims at improving the safety of road mobility while respecting the decisions of each road user on where, how, and when to move. Therefore, the NRSP actions do not aim at reducing, for instance, the number of motorcycles on roads because they are more dangerous than other means of transport. Instead, their aim is to try to make mobility safer.

To deal with road safety issues effectively, thus reducing the number of crashes and victims, the objectives to be achieved in the next decade need to be clearly defined. Precisely quantifying objectives allow decision-makers to be incentivised to improve their strategies and the use of the allocated funds[53].

Consistently with the hierarchical approach proposed by the European Commission[54], the 2030 NRSP proposes three target levels, to control and monitor both general trends and those of the most vulnerable categories (Picture 4-1):

- **General Objectives** – Related to the safety level of the whole road system and consisting in the final target to be achieved in terms of reduction in the number of deaths and serious injuries.
- **Specific Objectives** – Established for the user categories with higher level of risk in terms of deaths and injuries[55] and with higher difficulties in reducing the number of victims and injured persons
- **Operational Objectives** – Related to the eight factors determining road crashes according to the European Commission[56]: Speed, failure to use the helmet or safety belts, distraction while driving, driving under the use of alcohol, vehicle safety conditions, road infrastructure safety, and post-crash care. The objectives shall be established downstream of the first detection of road safety performance indicators, as identified for each of the determining factors.

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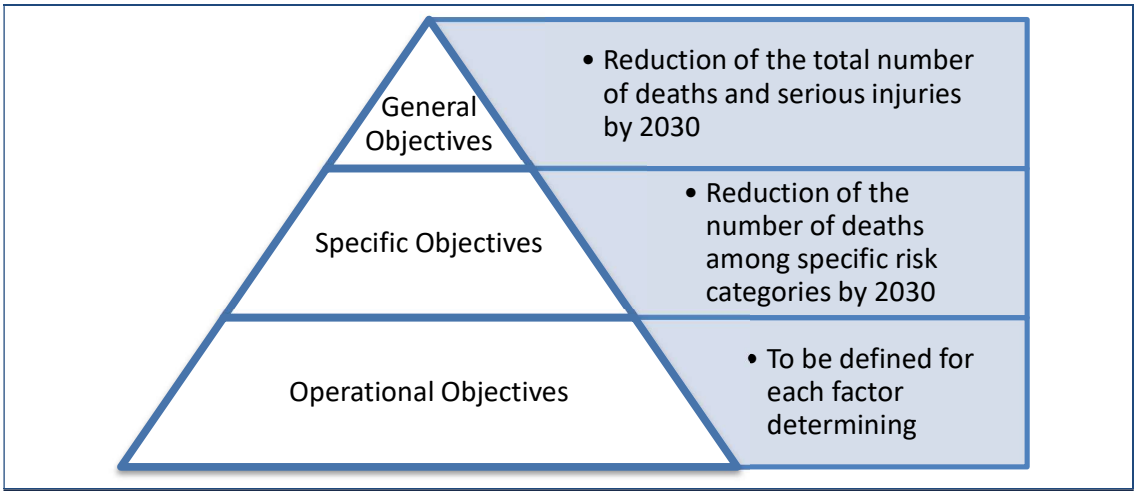
[53] See, for example, S.C. Wong et al. (2006) *Association between setting quantified road safety targets and road fatality reduction, Accident Analysis & Prevention.*

[54] *Commission Staff Working Document.* (2019) Road Safety Policy Framework 2021-2030 – Next steps towards "Vision Zero".

https://ec.europa.eu/transport/sites/transport/files/legislation/swd20190283-roadsafety-vision-zero.pdf

[55] Currently the number of serious injuries cannot be monitored for each user category. Consequently, specific reduction targets cannot be established. The Plan promotes an improvement of data collection on serious injuries, to enable the definition and monitoring of specific targets also for the seriously injured.

[56] EU road safety policy framework 2021-2030 – Next steps towards 'Vision Zero', 2019.



Picture 4-1 NRSP 2030 objectives hierarchy

To verify whether the trends of the various elements of this phenomenon are in line with the achievement of final objectives, **interim targets** are also defined in terms of a reduction in the number of crashes, fatalities, and injuries, to be achieved in the medium term rather than at the end of the whole period of implementation of the NRSP.

4.1 General Objectives

The European Commission "Sustainable and smart mobility strategy" of December 2020[57] confirms the EU long-term objective of *Vision Zero* – meaning zero victims by 2050, extending it to all modes of transport. The 'Europe on the Move – Sustainable Mobility for Europe: safe, connected, and clean' Communication of 2018 proposes the middle-term objectives of a 50% reduction in the number of road victims and serious injuries between 2020 and 2030. **Italy, following the same concept, sets the general target of halving** the number of road fatalities and serious injuries in the 2020-2030 decade, even though the anomaly of 2020 figures, owing to the effects of the pandemic, makes 2019 figures more appropriate to be set as initial reference figures, as suggested by the *European Commission High Level Group on Road Safety*. Therefore, by assuming as initial value 3,173 victims in 2019 and the provisional figure of 17,600 serious injuries, **the two quantitative targets set by the Plan are the following:**

- **Less than 1,586 road fatalities in 2030**
- **Less than 8,800 serious injuries (MAIS3+) in 2030.**

[57] *Sustainable and Smart Mobility Strategy – putting European transport on track for the future* https://ec.europa.eu/transport/sites/default/files/legislation/com20200789.pdf

As the last two decades show, such targets are quite ambitious and not easy to achieve, despite the great efforts made in terms of actions on infrastructures, introduction of technological systems for driver assistance in vehicles, stricter measures on the use of protective equipment, measures on the use of drugs, mobile phone when driving, and more. Moreover, as safety conditions get better, obtaining further significant improvements gets harder. Therefore, we need to clearly state that **the objective of halving the number of fatalities and serious injuries by 2030 can only be reached in Italy if the cultural development process on the topic of road safety that started in the early 2000s is accomplished**, namely by introducing the *Safe System* principles. With that in mind, we can also state that Italy embraces the European Commission's long-term objective of Vision Zero[58], **aiming at reaching zero road fatalities by 2050.**

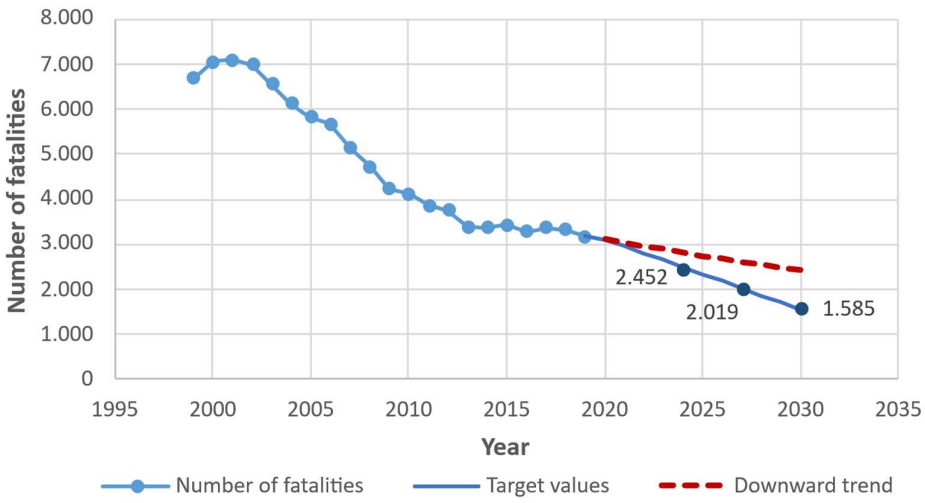
As stated above, in order to find the correct 'path' to reach the final goals, some interim targets are set for 2024 and 2027, so that the results of the strategies adopted are assessed every three years[59], and the Plan can be updated, especially in case of discrepancies between planned targets and actual results. Table 4-1 shows the NRSP 2030 general and interim targets, while Picture 4-2 shows the expected trend in the reduction of deaths, which would enable Italy to reach the target of a 50% reduction by 2030, in addition to the two interim targets which would allow to assess the trend of actual results in comparison with the set targets.

Table 4-1 General and Interim Targets

Indicator	2019	2024	2027	2030
Number of fatalities caused by road crashes	3,173	2,452	2,019	1,586
Number of serious injuries (MAIS3+) caused by road crashes	17,600	13,600	11,200	8,800

[58] "EU road safety policy framework 2021-2030 - Next steps towards 'Vision Zero', 2019" https://ec.europa.eu/transport/road_safety/sites/roadsafety/files/move-2019-01178-01-00-it-tra-00.pdf

[59] Article 32, paragraph 3, of the Italian Act of Law no. 144 of May 17th 1999.



Picture 4-2 Reduction trend and targets for the number of victims set in the Plan

The same picture also shows the crash trend forecast for a scenario without any measures for the achievement of the set targets. The forecast was obtained by applying a model based on the time series technique, namely the past trends of the variables that influenced the phenomenon the most[60]. As shown in the picture, without neither an effective action nor adequate resources allocated by the NRSP 2030, there would be a limited reduction, by approximately 22%. Thus, **the Plan sets the goal of more than doubling the pace of the reduction in crash rates**.

4.2 Specific Objectives

The NRSP 2030 Specific Objectives help reaching the general target of halving the total number of deaths and serious injuries, by focusing on identifying some **priority measures to improve road safety conditions for some high-risk user categories.** Such categories are exposed to a high risk of crashes and vulnerability, while there is a high potential for improving their safety.

The identification of high-risk categories was based on the results of specific analyses, which took into account both the change in the number of fatalities and injuries for each category over time (time series), and the comparison with data collected in similar contexts (cross-section). In addition to scientific analyses, some future-oriented considerations and social assessments must be made. As for the first consideration, reference should be made to new forms of mobility that already

[60] For that purpose, a model developed within the European DACOTA research project was applied http://www.dacota-project.eu/

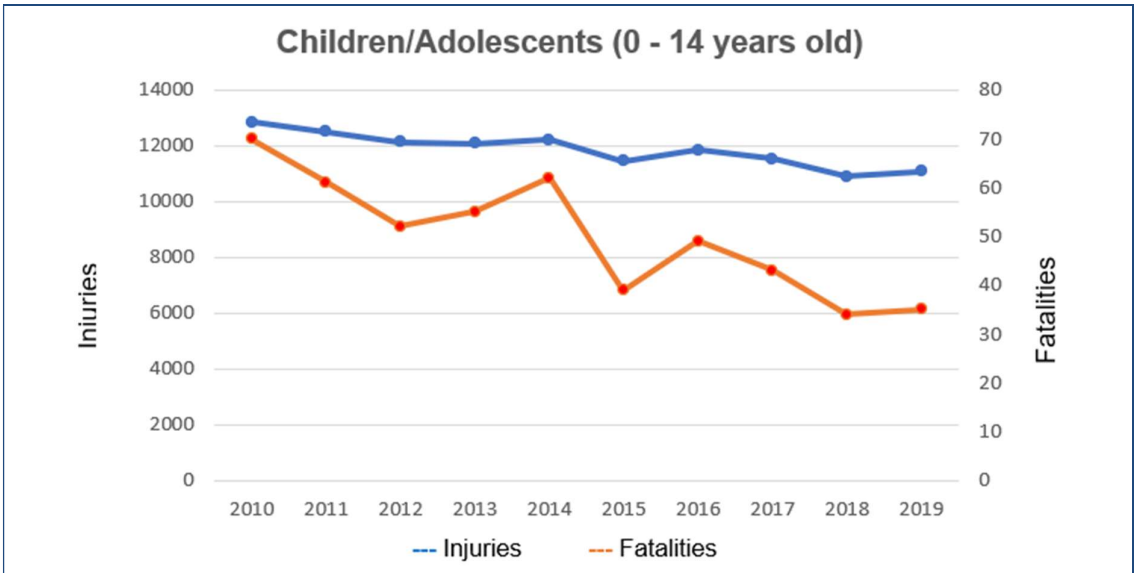
exist, but whose data have not been collected yet, making it impossible to include them in statistically reliable assessments. As for the second consideration, reference should be made to user categories who have special social value.

The most vulnerable categories according to the above-mentioned criteria are: children/adolescents, young drivers, over 65, pedestrians, cyclists, and two-wheeled motor vehicle riders.

Children/Adolescents

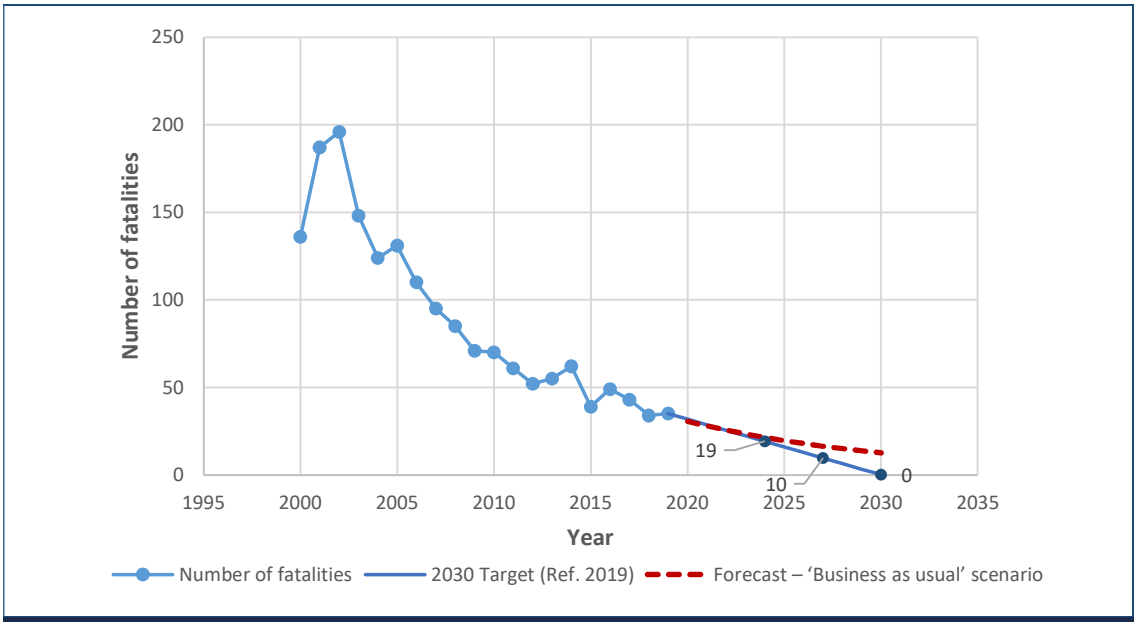
The first user category covers the youngest age group, namely children/adolescents from 0 to 14 years old. Children in the early years of their life are passive subjects who directly suffer damages from drivers' incorrect behaviour, while, as they grow up, they can move around on foot, by bicycle or moped.

INSI 2019 data show that 1.1% of road fatalities and 4.6% of injured people were minors up to 14 years old. The last decade trend (2010-2019) (Picture 4-3) highlights the reduction of fatalities by a half, and an approximate 14% decrease in the number of injuries among children aged from 0 to 14 years. In comparison to other age groups, the number of injuries affecting children/adolescents had a more modest reduction, but there is no doubt about the social significance of this user category, also in relation to the changes examined at paragraph 2.3.1.



Picture 4-3 Trend in fatalities and injuries among children under 14 in Italy from 2010 to 2019 (Source: INSI – Italian National Statistics Institute)

Consistently with the Guidelines, the Plan's specific objective for children/adolescents is the **reduction by 100% of fatalities for children/adolescents up to 14 years old in 2030**. Picture 4-4 shows the expected trend of fatalities among children/adolescents until 2030 in the absence of the measures set by the Plan (in red), as against the expected reduction trend that would allow to reach the target set (in blue).

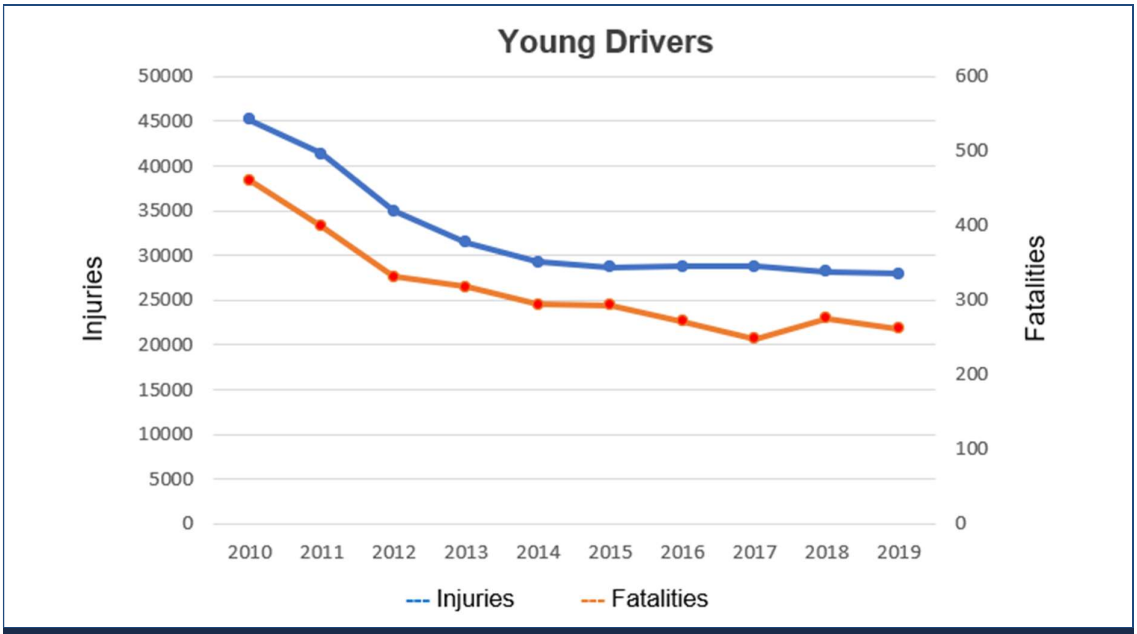


Picture 4-4 Expected reduction trend and reduction target in the number of fatalities among children and adolescents (0-14 years old) until 2030

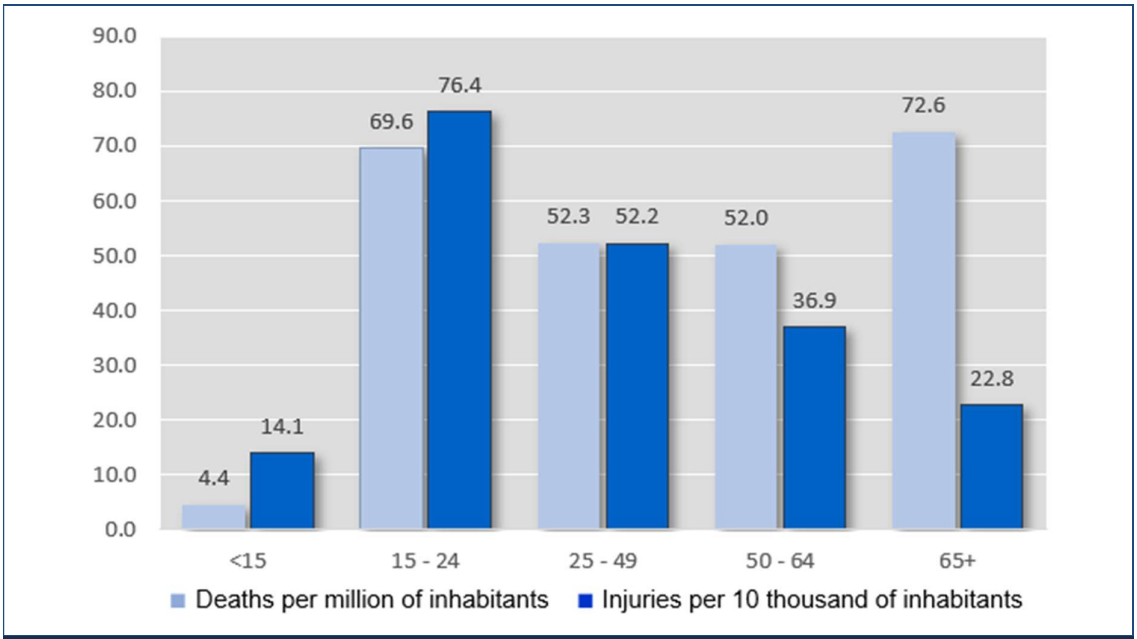
Young drivers

As adolescents grow into young adults, their higher opportunity for mobility and freedom, coupled with an underdeveloped ability to assess dangers and their consequences, in addition to the proneness to act without thinking twice and the pressure by their peers, make the first years of driving experience the most dangerous. In 2019, 406 victims were aged 15 to 24 years. 262 of them were young drivers.

The last decade trend (2010-2019) shows a 43% decrease in the number of deaths and a 38% decrease in the number of injuries (Picture 4-5). However, the young (drivers, passengers, and pedestrians) are still over-represented in statistics on crashes and fatalities, with the highest injury rate (72.6) per 10,000 inhabitants in comparison with other age groups, and the second highest mortality rate after the elderly over 65 (69.6 deaths per million of inhabitants) (Picture 4-6).

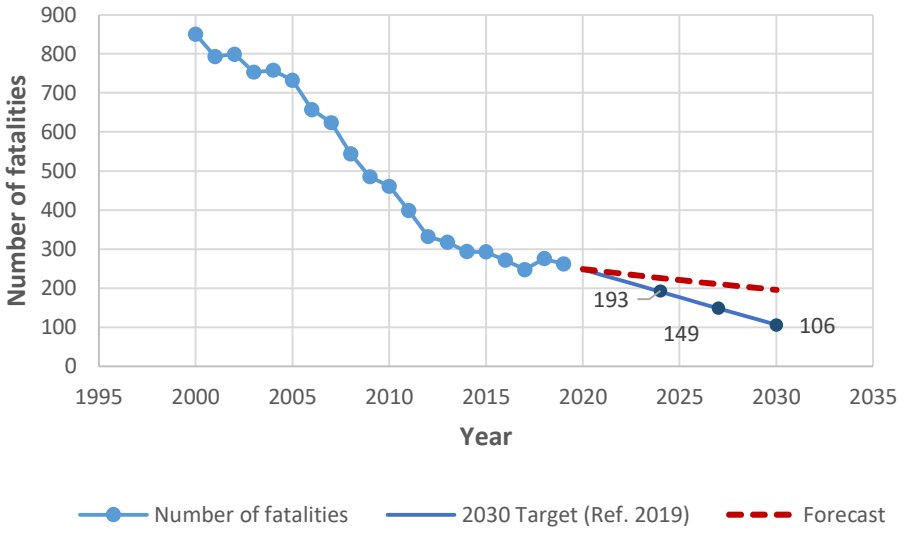


Picture 4-5 Trend in fatalities and injuries among youths aged between 15 and 24 in Italy from 2010 to 2019 (Source: INSI – Italian National Statistics Institute)



Picture 4-6 Mortality and injuries rate for each age group, 2019 (Source: INSI – Italian National Statistics Institute)

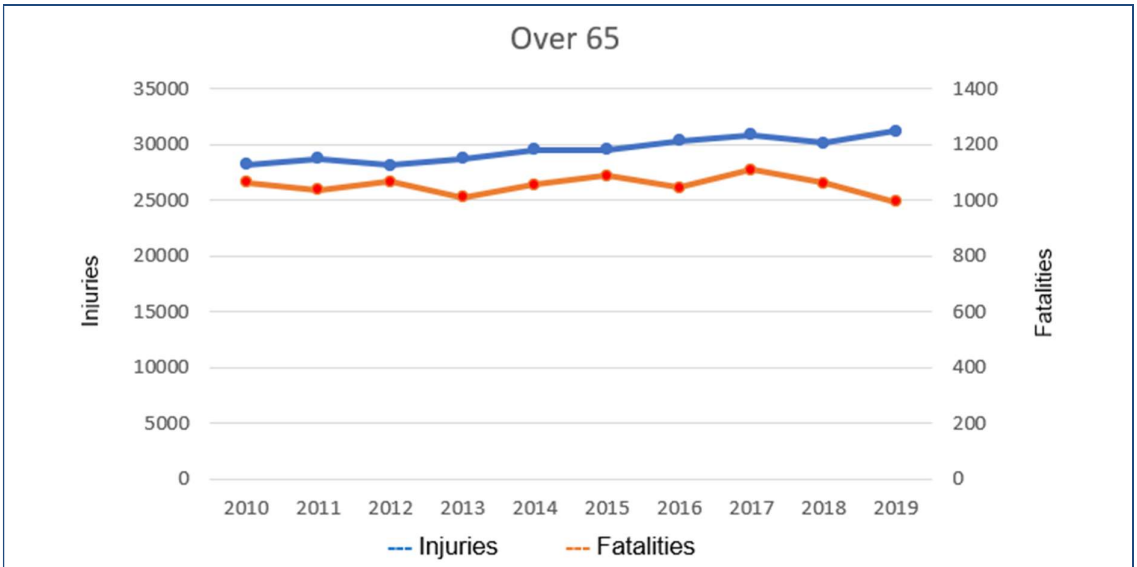
The Plan establishes the 2030 target of a 60% reduction in the number of fatalities for the category of young drivers (15 to 24 years old) (Picture 4-7).



Picture 4-7 Expected reduction trend and reduction target in the number of fatalities among young drivers (15-24 years old) until 2030

Over 65

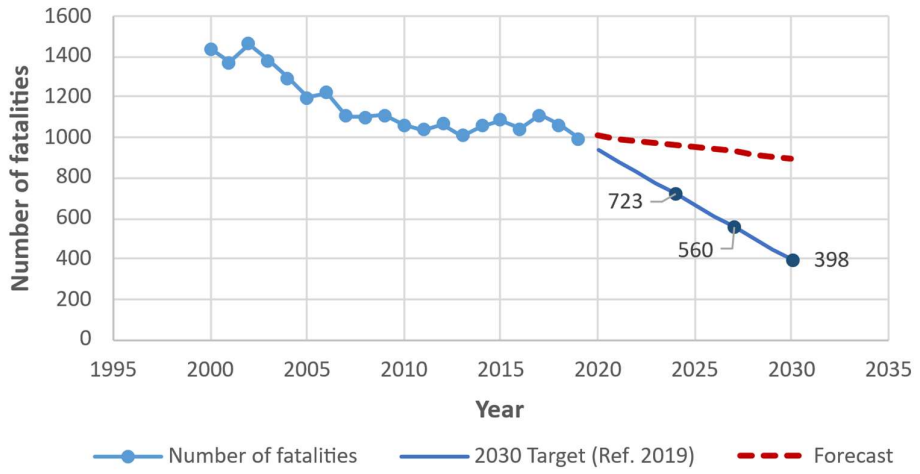
As for the over-65 user category, the past decade (2010-2019) showed an opposite trend in comparison with the youths, especially in terms of injuries (Picture 4-8). The number of victims dropped by 6.6% (994 deaths in 2019, accounting for 31.3% of the total), while the injured increased by 10.5% (31,176 injuries in 2019, accounting for 12.9% of the total). The reported multi-annual figures, however, do not follow a linear trend.



Picture 4-8 Fatalities and injuries among people aged over 65 in Italy from 2010 to 2019 (Source: INSI – Italian National Statistics Institute)

The particularly negative trend for this category also arises from population ageing. It is especially true for the rising number of people aged over 75 who are increasingly active and thus hold a driving license. This category is thus to be considered at high risk, both on the basis of quantitative analyses and because of social significance.

The Plan proposes a target of a **60% reduction in the number of fatalities**, to reverse the trend that would be expected until 2030 if the Plan did not provide any measures (Picture 4-9).



Picture 4-9 Expected reduction trend and reduction target in the number of fatalities among people aged over 65 until 2030

Pedestrians

Pedestrians, as well as cyclists, are particularly exposed to the risk of road crashes, and to injury/death in case of crash. There are multiple reasons for this, including:

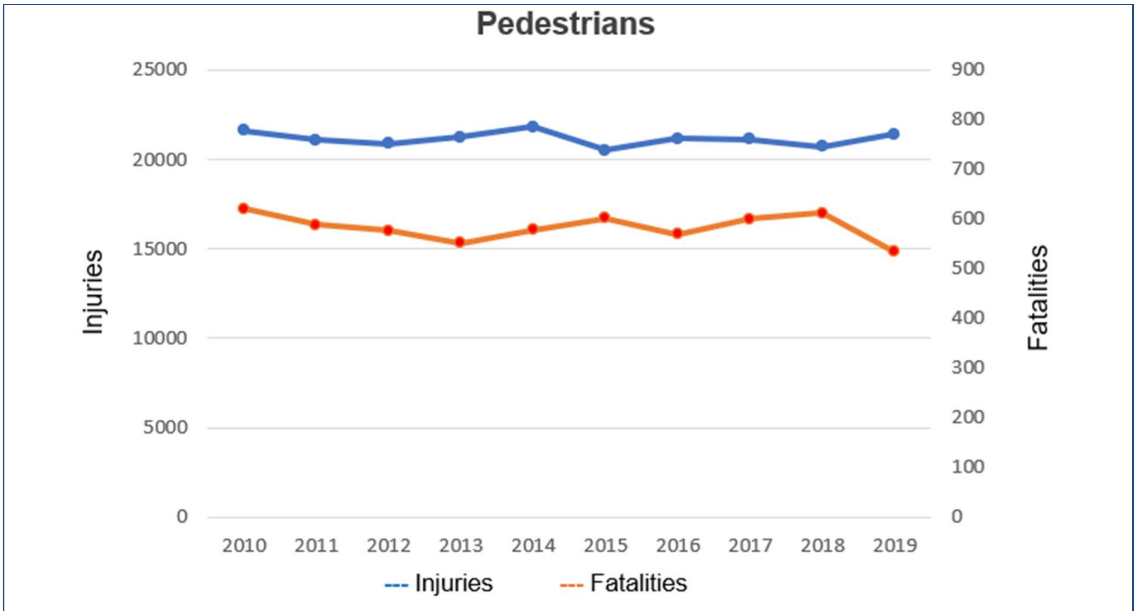
- Low speed, increasing the risk of collision with motor vehicles if there are no reserved lanes (the risk of crashes is proportional to speed difference as well as to the absolute value of speed).
- Reduced mass (in case of crash, the risk of serious consequences for the subjects involved depends on the ratio between the masses of the vehicles/pedestrians).
- The absence of a protective structure to protect car and heavy-vehicle passengers.

The available data show[61] that pedestrian mobility involves all categories, accounting for 20.8% of the total amount of urban mobility as of 2019[62]. Namely, children walk in 35.1% of cases, the young in 28.7% of cases (16.5% of them to go to school, and 12.2% to go to work), and the elderly in 19.6% of cases. INSI data over the past decade (2010-2019) show a total amount of 5,833 injuries among pedestrians, while the trends in Picture 4-10 show that the number of deaths

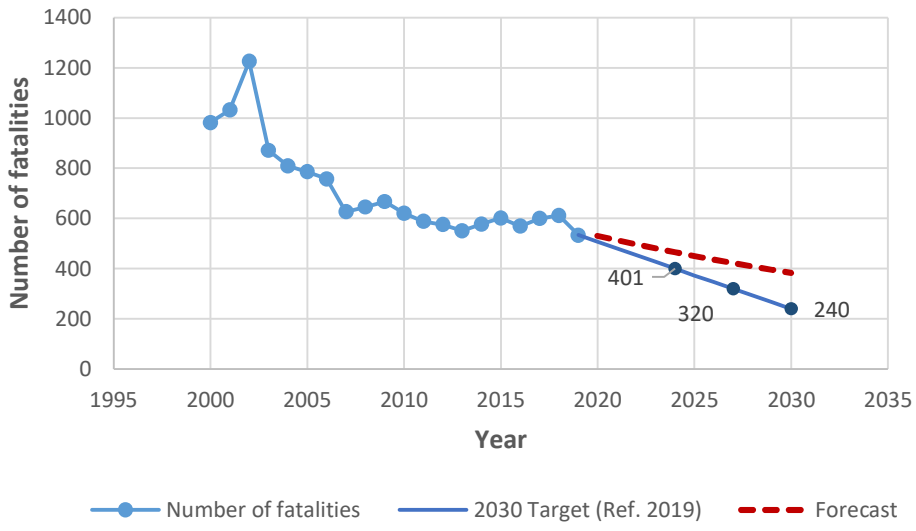
[61] ISTAT data workup – Usual modes of transport to go to school and work – Figures for 100 people with the same characteristics, 2019.

[62] ISFORT, "17° Rapporto sulla mobilità degli italiani" (17th Report on Italian Mobility) 2020.

dropped by 14% over the last ten years, whereas the number of injuries only dropped by 0.8%.



Picture 4-10 Trend in fatalities and injuries among pedestrians from 2010 to 2019 (Source: INSI – Italian National Statistics Institute)

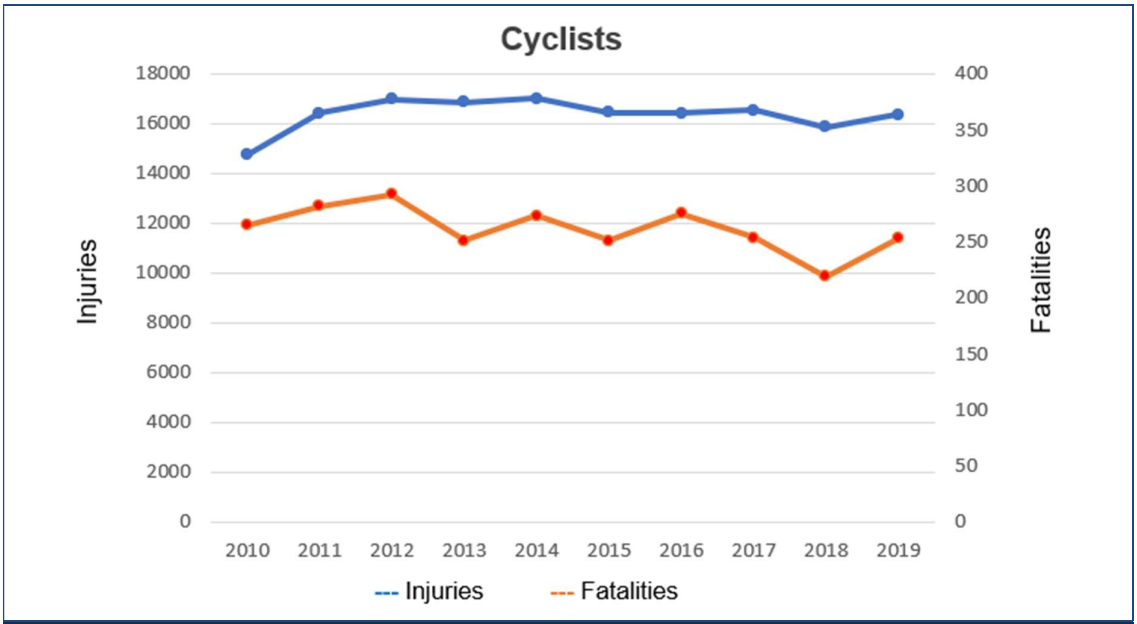


Picture 4-11 Expected reduction trend and reduction target in the number of fatalities among pedestrians until 2030

For this category, the Plan has the ambition to accelerate the reduction trend, aiming at a **55% reduction of the number of fatalities among pedestrians** by 2030 (Picture 4-11).

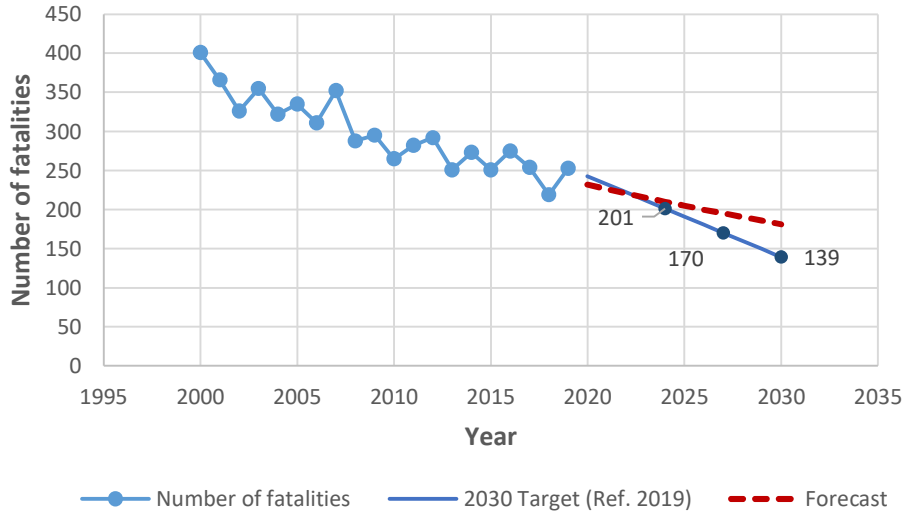
Cyclists

As of 2019, cycling accounted for 3.3% of mobility (both on urban and rural roads). Namely, children cycle in 1.3% of cases, the young in 7.6% of cases (3.6% of them to go to school, and 3.9% to go to work), and the elderly in 3.3% of cases. As for fatalities and injuries, past trends (Picture 4-12) show a slight reduction in the number of victims (although some years were characterized by an increase), and a significant increase of injuries. Over a decade (2010-2019), the number of fatalities among cyclists dropped by 4.2% (254 victims in 2019), while the number of injuries rose by 12.1% (16,737 in 2019). Data are thus quite unsatisfactory, and only over the last three years (2017-2019) a significant decrease of fatalities is noticeable (by over 20%).



Picture 4-12 : Trend in fatalities among cyclists from 2010 to 2019 (Source: INSI – Italian National Statistics Institute)

The specific objective of the Plan for this user category is **a 45% reduction of fatalities by 2030.** Such target may seem little ambitious in comparison with the others, but in fact it is particularly significant if the past trend is taken into account for future goals, and also because a rise in the use of bicycles is expected to happen in the next few years, inevitably influencing the crash rate (Picture 4-13).

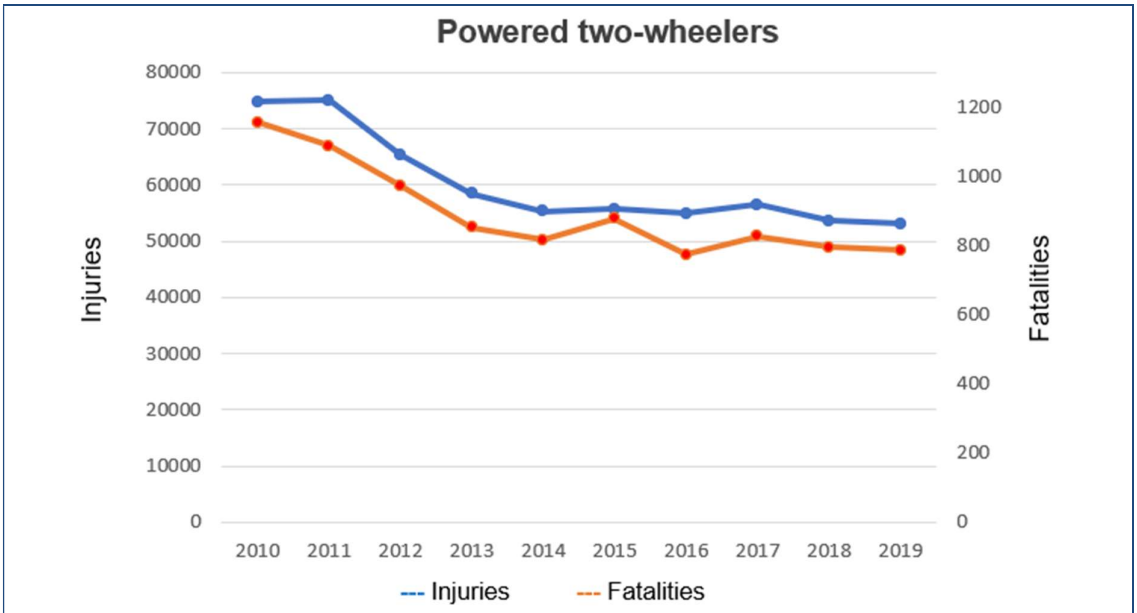


Picture 4-13 Expected reduction trend and reduction target in the number of fatalities among cyclists until 2030

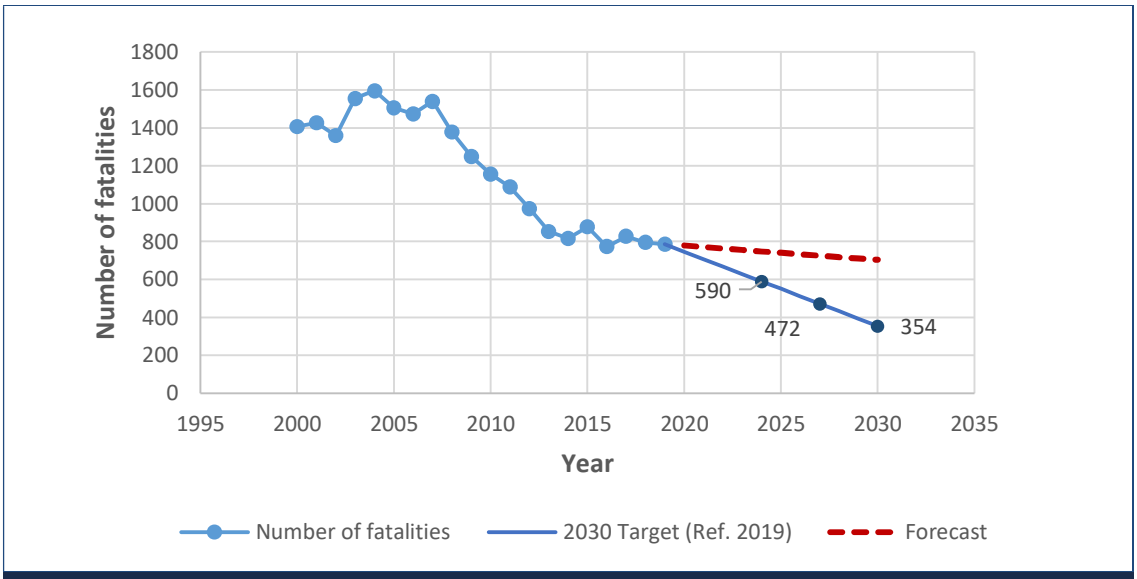
Motorcycle and moped riders

In 2019, powered two-wheelers accounted for 2.6% of mobility. Motorcycles and mopeds account for 17% of the total number of vehicles on roads and 4% of travels (in terms of passenger-km on public and private means of transport[63]), but this category accounts for 22% of injuries and 25% of road fatalities. The figures are much higher than the European average of 18%. For this user category, there were 817 victims in 2019, accounting for a 32% decrease as against 2010 (Picture 4-14).

[63] See Ministry of Infrastructures and Transport (2020), *"Conto Nazionale delle Infrastrutture e dei Trasporti"* ("National count of infrastructures and transport)



Picture 4-14 Variation in fatalities and injuries among moped and motorcycle riders from 2010 to 2019 (Source: INSI – Italian National Statistics Institute)



Picture 4-15 Expected reduction trend and reduction target in the number of fatalities among moped and motorcycle riders until 2030

The Plan sets the target of a **55% reduction in the number of victims by 2030**. In a scenario with no actions taken in connection to the Plan, the trend of the number of fatalities among two-wheeled motor vehicle riders would repeat the stagnation observed over the last five years (Picture 4-9).

Summary

Table 4-2 summarises specific objectives for each risk category. The reduction in mortality for the above-mentioned categories is crucial for achieving the NRSP general objective. Indeed, they are high-risk categories that need specific strategies to reach the targets set. Without such specific strategies, the results would not be enough to achieve the general 50% reduction target.

Table 4-2 Specific reduction objectives for each category

Category	No. of victims 2019	No. of expected victims 2024	No. of expected victims 2027	No. of expected victims 2030	Percentage reduction expected
Children	35	19	10	0	100%
Young drivers	265	193	149	106	60%
Elderly	994	723	560	398	60%
Pedestrians	534	401	320	240	55%
Cyclists	253	201	170	139	45%
Powered two-wheelers	786	590	472	354	55%

If the targets set for each category are reached, a 40% approximate reduction in the total number of victims will be achieved by the established deadline (2030). This is in line with the 50% decrease in the total number of victims expected according to the Plan, because both the specific strategies for each category and general strategies would contribute to the protection of all other users, thus allowing the achievement of the general goal.

4.3 Operational Objectives

Operational Objectives shall be identified with reference to some determining factors that are highly connected to crash risks. They can be measured by means of appropriate indicators. The eight key 'factors' were identified by the European Commission[64]:

[64] "EU road safety policy framework 2021-2030 - Next steps towards 'Vision Zero', 2019.

- Speed
- Seat belts
- Protective equipment (helmet)
- Alcohol consumption
- Distraction
- Vehicle safety
- Infrastructures
- Post-crash care.

Each factor is associated with a *Safety Performance Indicator* (SPI), also known as *Key Performance Indicator* (KPI) as per the European designation. Monitoring such indicators will enable us to assess the short-term effects of the actions taken on the eight above-mentioned factors. Table 4-3 defines the indicators to measure each risk factor.

To verify the effectiveness of the proposed actions, when preparing the first 2030 NRSP implementation programme in the course of 2022, the Ministry of Infrastructures and Sustainable Mobility (MISM) will associate the above-mentioned factors with specific quantitative targets. Such association is not possible at the moment, because of the lack of adequate reference figures.

Table 4-3 KPIs list and definition

KPI indicator	Definition
1. Speed	Percentage of vehicles travelling within the speed limit
2. Safety belts	Percentage of vehicle occupants using the safety belt or child restraint system correctly
3. Protective equipment	Percentage of riders of powered two wheelers and bicycles wearing a protective helmet
4. Alcohol	Percentage of drivers driving within the legal limit for blood alcohol content
5. Distraction	Percentage of drivers NOT using a handheld mobile device
6. Vehicle safety*	Percentage of cars whose plate was registered less than 3 years ago
7. Infrastructures**	Percentage of distance run on roads with a safety rating above an agreed threshold
8. Post-crash care	Time elapsed in minutes and seconds between the emergency call following a collision resulting in personal injury, and the arrival at the scene of the emergency services

** Additional indicator proposed by Italy as an alternative to the one suggested by the European Commission on the basis of the Euro NCAP safety assessment. For this latter one a pilot study may be conducted by ACI.*

*** There are also complementary definitions for this KPI.*

5 SPECIFIC STRATEGIC LINES OF ACTION

Strategic lines of action are organized at two levels: general strategic lines of action to act on the whole system, and specific strategic lines of action for the most vulnerable categories. **General strategic lines of action address all system components**, focusing not only on user categories, but also on other elements, like infrastructure types, vehicles, organizational structure, emergency response, post-emergency healthcare and rehabilitation facilities. The choice of general strategic lines of action is based both on a preliminary analysis of the specific problems causing crashes in Italy, and on the European Commission guidelines.

Specific strategic lines of action are focused on the most vulnerable user categories: children/adolescents, young drivers, over 65, pedestrians, cyclists, and two-wheeled motor vehicle riders. For each user category, the measures may be directed to all components of the road safety system either individually or synergistically, in accordance with the Safe System integrated approach. For instance, if cyclists are taken as an example, a series of measures shall be considered by taking into account vehicle characteristics in terms of cyclists' safety, bicycle driving training, and finally the cyclists' behaviour in terms of ability to recognise dangers.

5.1 General strategic lines of action

General strategic lines of action were grouped by the five pillars of road safety provided by the previous Global Plan for the Decade of Action for Road Safety 2011-2020 (1. Road safety management; 2. Road infrastructures; 3. Safer vehicles; 4. Safer road users; 5. Post-crash care), by taking into account the initiatives planned by the European Commission in the document titled EU Road Safety Policy Framework 2021-2030 - Next steps towards 'Vision Zero'.

5.1.1 Pillar #1 - Road safety management

The strategic lines of action included in this pillar are related to three main elements: digitalization and data collection, interministerial coordination, and research.

Digitalization and data collection

The correct management of road safety is based on the availability, quality and promptness of a series of information that are necessary for the analysis and control of the phenomenon. For that purpose, some actions need to be taken to streamline current procedures and introduce new ones. In particular, eight actions are needed:

P1.1 Introducing technological tools at a large scale to computerize and digitalize all useful data related to crashes and their consequences, by guaranteeing the presence of fundamental information such as geolocation. This will enable a new organizational process, with the opportunity to optimize time and contents, and to avoid any transcription errors that would result in the loss of important information. This action comprises all hardware and software systems for crash data collection that all authorities in charge of detecting crashes shall be equipped with.

P1.2 Defining direct and updated links to other national and international databases. There must be a close connection between road crash data and the relevant healthcare data (e.g. hospital discharge databases) and economic data (e.g. insurance and car dealership databases). The connection between databases shall allow us to get more information about injuries (not only the most severe), and to reveal any under-reporting cases, namely unrecorded or unreported crashes, whose tracking is still necessary to understand the dynamics of some crashes.

P1.3. Defining and calculating *Key Performance Indicators* – KPIs, allowing a multi-focused reading of safety conditions. Such indicators, as set forth by the European Commission, shall be focused in an integrated way on:

- Vehicle safety, e.g. in terms of speed and protection systems.
- Driver's behaviour, in terms of distraction, drink-driving, etc.
- Safety of infrastructures, including in terms of traffic flows, kilometres travelled, and accessibility level.
- Efficiency of emergency and post-crash care systems.

P1.4. Completing and optimizing the Regional Monitoring Centres network, and defining their functions (communication, data collection and analysis) in a clearer and more consistent way.

P1.5. Creating a National Observatory for Road Safety at the Ministry of Infrastructures and Sustainable Mobility (MISM), an important tool to support the correct definition of national policies on road safety. The National Observatory shall avail itself of an Internet portal and will receive information from all the organizations collecting crash data, and firstly from each Regional Centre. The Observatory will also support the process of spreading and exchanging best practices nationwide, aiming at ensuring the consistency between the management processes of the different Regions.

Interministerial coordination

To deal with the multidisciplinary aspects characterizing the sector of road safety, and to develop synergies between the authorities in charge of it, the Plan provides actions to encourage coordination and collaboration, both by involving the central administration and the representatives of local administrations, and by involving the social partners and the economic and production system.

P1.6. To increase the synergy between the various actions performed by all the institutional bodies in charge of road safety, a "Committee for guiding and coordinating road safety activities" needs to be established. Even though the Committee is required as per Art. 46 of the Italian Act of Law no. 120 of July 29th, 2010, it has never been established. Such Committee would be the top management organization for road safety nationwide, and, at the same time, it would be the main reference authority at European and International level. The Committee, indeed, would be comprised of representatives of all Public Administrations in charge of managing the various aspects of the road safety phenomenon. In the spirit of a systematic approach and in view of an ongoing collaboration, the Committee, chaired by the Minister, is composed by the following Ministries: Economy and Finance; Health; the Interior; Education, University and Research; Economic Development; and by three representatives of Regions, Autonomous Provinces of Trento and Bolzano, and Local Administrations, appointed by the Unified Conference. This permanent composition may be associated to an extended composition including the technical collaboration of Organizations, Entities, Associations, Observatories, and Private Entities, for specific activities requiring further competence. The Committee may avail itself of information support by the Italian National Observatory for Road Safety and of methodological/scientific support by the Research Centre on Road Safety that needs to be created within the CISMI - Centre for Innovation and Sustainability in the field of Mobility and Infrastructures, as set forth by Art. 5 of the Decree-Law 76/2021.

Within the interministerial coordination, **special attention shall be paid to training**, conceived as a development path for prevention of the human factor. Training shall not only be targeted to road users but also to managers and operators who contribute to road safety at national and local level. As the Committee comprises all the necessary professionals and competences to ensure single management of the training, customised training courses may be activated, including in relation to the development of digital skills that make information sharing more accessible and appealing in terms of affordability. We shall take into account the need to formalize specific courses as professional retraining of examiners and instructors, redesign drivers' mandatory training by differentiating it by age group (over 65, young drivers), and qualified training for specific professional expertise. Particular attention shall be paid to developing traffic education in schools of all grades, as a necessary cultural subject within Civic education. Finally, targeted and specific strategies shall be put in place in terms of community service – also by means of convention agreements with the Ministries concerned – as per Articles 186 and 187 of Italian road traffic laws (Codice della Strada), as integrated by Art. 33 of the mentioned Act of Law no. 120 of 2010. Community service consists in performing unpaid work in favour of the community, and priority shall be given to service in the field of road safety ad traffic education, at national level and in Regions, Provinces, Municipalities, or at social assistance

entities or organization, at voluntary associations, or at centres specialized in the fight against addictions.

P1.7. The integration and coordination process between the various competences and responsibilities involved shall be reinforced by means of a close collaboration with ANSFISA (Italian Agency for the Safety of Railway, Road, And Motorway Infrastructures), whose current tasks are limited to the safety of railways and road infrastructures, so that the safety of road infrastructures and the safety of mobility can synergically advance towards an overall improvement of the whole system.

P1.8. Involving the social partners and the economic and production system. For that purpose, considerable support for comparing and analysing data will be given by the Italian National Council for road safety and sustainable mobility established at the CNEL (National Council for Economics and Labour), which may integrate the work of the various local councils for road safety that have been established in past years. If needed, the Plan promotes coordination and consulting initiatives at local level for the purpose of preparing and monitoring an action programme for road safety, which may receive funds from the implementation programmes of the Plan.

Research

Research plays an essential role in road safety improvement, as demonstrated by the large contribution to improving road safety in Europe given by the projects developed within the European Commission Framework and Horizon 2020 Programmes. Research on road safety in Italy is mainly limited to some universities and research centres, while there is no single reference institution, unlike in various European countries. In addition to that, there is no specific research strategy on road safety at national level to ensure that research meets the country's needs, with reference to the macro-areas related to vehicles, roads, and human factor, or to institutional topics.

P1.9. Creation of a division specifically dedicated to research on road safety, within the Centre for Innovation and Sustainability in the field of Mobility and Infrastructures (CISMI). The Division will have the function of analysing road safety problems at national level, and guiding the legislative action and the management of the phenomenon. At the same time, it will act as an interface and connection with international institutions, thus reinforcing the Italian role in the European and global context. Namely, it shall have the task of:

- Analysing the main road safety problems, consistently with the NRSP.
- Identifying and developing research programmes in the short and long term, both in terms of basic research and applied research.
- Assessing the effects of the activities performed and promoting the sharing of results with the relevant subjects (public and local administrations, users and citizens, companies and industries, etc.).

- Supporting decision-makers in choosing the best policies, in terms of both effectiveness and efficiency.
- Supporting the training process of road safety technicians, with special reference to the staff operating at Regional Monitoring Centres.

The Division is going to be created by taking the most successful European research centres as reference, such as the SWOV in the Netherlands, the VIAS in Belgium, the TOI in Norway, and the CERTH-HIT in Greece. It may acquire self-financing capability by supporting public and private national organizations, and by taking part in international financing programmes, especially those provided by the European Commission.

5.1.2 Pillar #2: Road infrastructures

The priority of this strategy is improving the safety of existing and planned road infrastructures, in accordance with the principles of the *Safe System* (See paragraph 2.2). Well-designed roads should be self-explaining, by minimizing the need for limits and speed monitoring systems. When the above is not possible, especially on existing roads, speed limits must be regulated on the basis of the principles of credibility and consistency. In urban areas, in particular, downstream of a revision of the hierarchy of roads, the Plan proposes **a clear identification of the areas with a 50 kmph speed limit and of those with a 30 kmph speed limit.**

A number of studies were conducted to provide useful tools for correct speed management (the EU 'Executive Seminar on Speed and Speed Management' took place in October 2020[65]) Certainly, the systems for cooperation between vehicles and infrastructures are the new frontier, i.e. Cooperative Intelligent Transport Systems (C-ITS), which will allow adaptive speed management, but will also require a more effective system for collecting and managing data related to the infrastructure, static and dynamic data, and an advanced system for monitoring and controlling the state of the network. The actions included in this strategic line of action are related to five aspects.

P2.1. Applying road safety management criteria and procedures to the whole road network as per Directive 2008/96/EC, as modified in 2019. The 2008 Directive on road safety played an essential role in raising awareness on the need to consider road safety as a system that needs to be managed in an integrated and coordinated way. The 2019 modification introduced innovative elements at system level for the management of road safety, which must no longer be seen as 'exclusively' related to large infrastructures, but rather covering the whole road network (including urban areas). Vulnerable users, who used to be an ancillary element in the framework of road safety management, have now become a primary element. **Road safety assessments on projects must also be extended to works not included in the**

[65] https://ec.europa.eu/transport/road_safety/sites/default/files/pdf/2020-10-08-speed_seminar_conclusions.pdf

Trans-European transport network, as this is currently the most critical issue at national level.

In accordance with the Safe System approach, inspections on existing infrastructures are one of the most important tools of 'proactive safety' for the road network, to identify potential safety issues before serious crashes occur. In 2019, the Ministry of Infrastructures and Transport completed safety inspections on the whole road network concerned by the Directive 2008/96/EC. Now the results and experience acquired need to be systematized to define practical guidelines and tools to be widely applied to the whole road network.

P2.2. Updating road design and operation criteria by taking into account the human factor and human behaviour. Regulations on the geometrical and functional design of roads, and, above all, of intersections, are based on principles that rarely take into account the human factor (e.g. limitations) and human behaviours (e.g. Risk taking). When updating the industry regulations, which date back to more than 15 years ago, we must consider the new principles based on the Human Factor concept, to induce users to adopt a driving behaviour which is compatible with the context, without having to resort to control systems. At the same time, regulations must take into account the new micro-mobility users, especially in urban areas, and the changes in vehicle technology and sensor technology.

P2.3. Adoption/activation of systems for the managing bodies to schedule the maintenance of road infrastructures (including road signs and road markings). It is one of the essential topics that arose after the first implementation of the Directive 2008/96/EC and it is related to the use of the results deriving from checks and inspections in connection with the process of road safety management by managing authorities. *Safety Management System* shall become an integral part of the overall infrastructure management system, in which all 'traditional' databases are integrated (traffic, crashes, geometry), including the results of all the monitoring, inspection and control activity. Advanced monitoring tool systems (RFID systems, drones, probe vehicles, road guardrail collision crash detection systems, etc.) shall become an integral part of the road safety management system.

Finally, the Plan highlights the importance of a penalty and incentive system for motorway concession and operating companies, to guarantee better road maintenance.

P2.4. Monitoring and financing experimentation, pilot studies and measures to make road infrastructures functional for higher levels of vehicle automation (Decree of the Ministry of Infrastructures and Sustainable Mobility no. 70/2018). Over the last few years, various projects based on the use of advanced technologies have been developed and now need to move to the implementation stage in order to produce effective tools for improving road safety. Some examples of ongoing experimentation related to the introduction of cooperative and automated driving technologies in heavy vehicles and cars are the C-Roads Italy and C-Roads Italy2 projects. The first one studies the introduction of cooperative systems based on

V2X technologies, for applications such as heavy-vehicles 'platooning', Highway Chauffeur (light vehicles), and the testing of automated and connected vehicles on urban roads and last-mile transportation, on D, E, and F road types in the cities of Turin and Parma, as well as on A and B road types. The second one studies and tests a series of Day1 services, such as the priority request of green traffic lights for some vehicles including ambulances, police cars, etc., mainly in real urban traffic conditions in the cities of Turin, Verona, and Trento, and Day1,5 services providing information on traffic conditions and best routes.

New experimentation will be financed by the NRSP and the Italian National Plan for Recovery and Resilience (NPRR), aiming at helping Italy take the lead in introducing new automation technology to improve road safety.

P2.5. Road maintenance and use of new technologies to improve the safety of infrastructures. Consistently with the NPRR provisions and the recent Italian 2022-2024 Budget Law, actions and resources shall be directed to the improvement and maintenance of the road networks, especially for Regional and Province roads, in addition to measures for ensuring safety and technological monitoring. Namely, the NPRR already includes measures for ensuring safety and for technological monitoring of the A24 and A25 motorways, in addition to 0.45 billion for the technological monitoring of bridges, viaducts, and tunnels on roads and motorways. Moreover, 1.1 billion euros were transferred to Provinces in 2021 for maintenance operations, and the 2022-2024 Budget Law allocated 10.8 billion for the improvement and maintenance of roads and motorways, namely: 4.5 billion to ANAS – the Italian National Roads Authority (48% for maintenance); 1.4 for operations on bridges and viaducts on Province roads for compliance with the guidelines for risk classification and management, safety assessment, and monitoring of existing bridges (Ministerial Decree no. 578 of December 17th, 2020); 3.3 billion for improving Regional, Province, and Metropolitan City roads; 1.4 billion for A24-A25 motorways.

5.1.3 Pillar #3: Safer vehicles

In accordance with the European Commission provisions, the NRSP sets, among others, the objectives for improving vehicle safety and promoting the fitting of safety equipment and the application of new technologies to vehicles for enhanced road safety. A cost-effectiveness assessment [66] on vehicle policies shows the effectiveness of the mandatory fitting of three safety measures as against a baseline scenario in which safety measures are only implemented on a voluntary basis by the member States. The effectiveness was assessed in terms of cost-

[66] Report SI2.733025 – 2018

https://op.europa.eu/it/publication-detail/-/publication/ed4aff17-49c5-11e8-be1d-01aa75ed71a1

effectiveness and of number of preventable fatalities. Namely, the measures are defined below:

- P01 – Already known and widely available safety solutions, though not mandatory in the EU.
- P02 – The same as P01, but also including safety solutions focusing on the protection of vulnerable road users and on monitoring the driver's attention.
- P03 – The same as P02, with feasible safety solutions or with solutions already existing on the market, but having a low rate of adaptability and spread on the market, which maximizes the reduction of the total number of fatalities and can promote the innovation of safety solutions.

The expected reduction in the number of victims in 15 years' time (i.e., 2021-2037) is reported in Table 5-1 and Picture 5-1, subdivided by vehicle type. Data show a higher effectiveness of P02 and P03 scenarios as against P01, in terms of preventable fatalities.

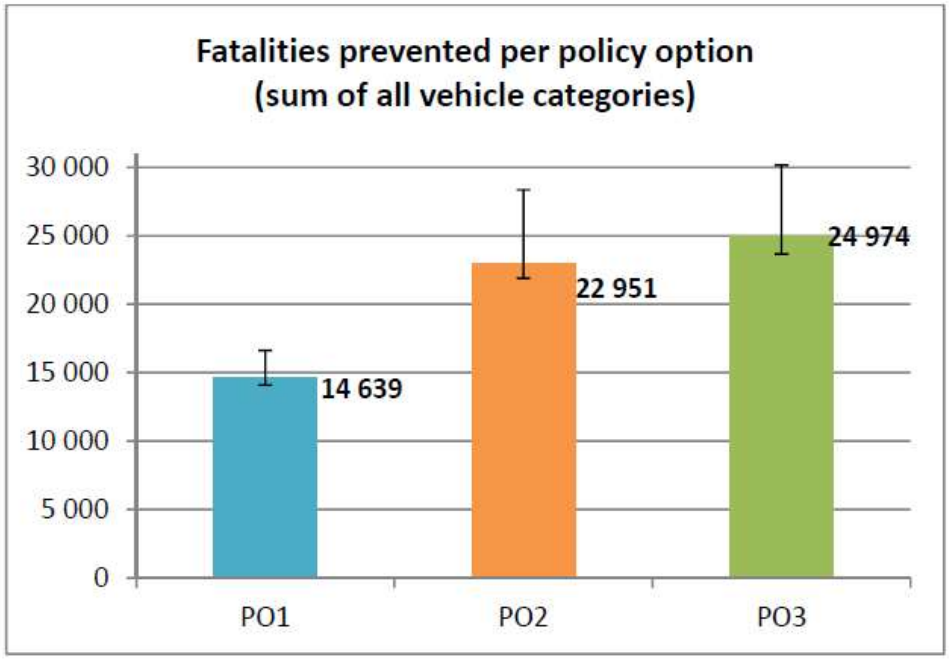
Table 5-1 Total number of deaths that can be prevented between 2021 and 2037 by mandating the implementation of safety measures on specific vehicle categories, as against the baseline scenario. Source: Report EU, SI2.733025 – 2018

	P01	P02	P03
Cars (M1 category)	13,785	20,081	21,337
Buses (M2 and M3)	2	207	227
Commercial vehicles (N1)	852	1,005	1,283
Trucks (N2 and N3)	0	1,658	1,947
Total	**14,639**	**22,951**	**24,974**

Another recent study[67] on, *Advanced Driver Assistance Systems* (ADAS) assessed the cost-effectiveness of the implementation of such systems on existing vehicles too, in comparison with the above presented alternative strategies, for the 2026-2041 period.

[67] *Study on the feasibility, costs and benefits of retrofitting advanced driver assistance to improve road*

https://op.europa.eu/en/publication-detail/-/publication/88be5621-7ebf-11ea-aea8-01aa75ed71a1



Picture 5-1 Total number of victims that can be prevented between 2021 and 2037 by mandating the implementation of safety measures on specific vehicle categories, as against the baseline scenario. Source: Report EU, SI2.733025 – 2018

Both studies quote as a fundamental element the Regulation (EU) 2019/2144 of the European Parliament and of the Council of November 27th, 2019, also known as *General Safety Regulation*, GSR). The GSR Regulation concerns Driver Assistance systems and components designed and built for all motor vehicles (cars, light commercial vehicles, heavy-goods vehicles). For the first time, in addition to the safety of vehicle occupants, it also covers the safety of vulnerable road users such as pedestrians and cyclists, to reduce significantly the number of road victims. More specifically, minimum requirements are going to enter into force in the second half of 2022. From then onwards, all motor vehicles shall be equipped with specific safety devices. Therefore, the European Union policy consists in setting a schedule for gradual mandatory requirements, firstly for newly type-approved vehicles, and then also for newly registered vehicles, as reported in Table 5-2.

Table 5-2 Safety systems installed in vehicles, vehicle category involved, and year of mandatory fitting of the safety system

Technology	Vehicle category involved	Year of mandatory fitting
Intelligent Speed Assistance (ISA)	All	2022
Interface for the installation of an alcohol ignition interlock device (like *alcolock*)	All	2022
Driver attention warning and drowsiness detection system	All	2022
Advanced Driver Distraction Warning	All	2024
Emergency Stop Signal (ESS)	All	2022
Reversing Detection	All	2022
Event Data Recorder (EDR)	Cars, light commercial vehicles	2022
	Heavy-goods vehicles	2024
Tyre Pressure Monitoring Systems (TPMS)	All	2022
Advanced Emergency Braking System (AEBS) • Obstacle and moving vehicle detection • Pedestrians and cyclist detection	Cars, light commercial vehicles	2022 2024
Emergency Lane Keeping	Cars, light commercial vehicles	2022
Vulnerable user detection system: • *Blind Spot Warning* (BSW) • *Moving Off Inhibit System* (MOIS)	Heavy-goods vehicles	2022 2022

A further contribution to improve vehicle safety was given by Euro NCAP[68], a European programme that designed a star-based vehicle safety evaluation. The purpose of the programme is to provide users and companies with assistance in choosing the vehicle that better responds to their specific needs. Euro NCAP performs sample tests of potential collision scenarios that may cause the injury or death of vehicle occupants or other road users (i.e. Tests for frontal collision, side collision, and collision with pedestrians). The star score indicates vehicle performance in Euro NCAP tests, and it also depends on the safety equipment

[68] https://www.euroncap.com/it

offered by manufacturers on each market. The safety indicator provided by the NCAP rating is recommended by the EU as a suitable KPI for the assessment of member States' performance in terms of 'safer vehicles'[69]. Within this context, the actions proposed by the Plan include:

P3.1. Awareness-raising campaigns for the purchase of vehicles that are fitted with more safety equipment.

P3.2. Tax and insurance incentives programmes for the spread of vehicles with more safety equipment than the basic models.

P3.3. Legislative actions and control on vehicles to encourage the transposition and the effective implementation of the Regulation 2019/2144, imposing new advanced safety systems on newly registered motor vehicles since 2022. New compulsory safety systems include Intelligent Speed Assistance, interface for installing an alcohol ignition interlock device, and Automatic Emergency Braking. Special attention will be paid to the comparative study of *alcolock* systems for alcohol ignition interlock.

5.1.4 Pillar #4: Safer users

Users clearly play a major role in the road safety improvement process. The knowledge and understanding of risk factors, and the adoption of highly safe behaviours must be fostered with various strategies, from awareness-raising to education, up to the repression of risky behaviour.

Awareness-raising campaigns may give significant results, promoting a change in education and culture, starting from one of the most vulnerable road user categories – the young.

P4.1. The starting point, thus, must be the school. In fact, Italy follows the European negative trend, as the country does not provide sufficient traffic education in all school grades (only Czech Republic, Ireland, and Germany do), nor it schedules exams to verify the achievement of the educational targets set (only one third of European states do it in primary schools and only for out of twenty-nine states do it in secondary schools)[70]. This takes on particular importance when considering that road crashes are the first cause of death among the young (15 to 24 years old)[71].

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[69] *EU Road Safety Policy framework 2021-2030 – Next steps towards "Vision Zero"* https://op.europa.eu/en/publication-detail/-/publication/d7ee4b58-4bc5-11ea-8aa5-01aa75ed71a1

[70] *The status of traffic safety and mobility education in Europe*, ETSC, 2019.

[71] ISTAT data workup, 2019.

What we learn, what we are exposed to and how we behave at a young age may stay with us all life long. Once acquired, wrong habits and wrong behaviours on the road are hard to correct. Consequently, the need to plan permanent awareness-raising campaigns among the youth is evident. Such campaigns must be reinforced by the introduction of traffic education in school, and the achievement of learning objectives must be adequately verified with the direct involvement of local police forces or specifically trained teachers (both those inside the school and those external to it).

P4.2. Everyone must be introduced to and accompanied with lifelong education. In this spirit, information and training are extremely important not only to improve knowledge and driving skills, but also to better understand one's limits, wrong behaviours, and the risks connected with road mobility. Such permanent awareness-raising activities, considered in a broader sense, shall be supported by a wide spread of information among all user categories, thanks to the various media platforms (TV channels, newspapers, social networks, multimedia and cinematic content to propose virtuous models), in addition to the update on any modifications/integrations to road safety regulations, which may be introduced because of the spread of new technology, in cooperation with police forces. It is crucial for the information to be disseminated by means of a highly technical-scientific approach, even though the language used must be appropriate to the users' age and background, in order not to share only crash figures (crashes, fatalities, injuries, etc.), but also to explain how deeply driving performance may be affected by wrong driving behaviour in connection with alcohol, distraction caused by handheld devices (smartphones, etc.), drug abuse, speed driving, failure to use safety equipment, etc. In this sector, six actions are provided.

P4.3. With that in mind, increasing police checks is of paramount importance. The operations strategy needs to be adjusted to reinforce sanction deterrence in case of misbehaviour. If police checks cannot be increased, the objective may be reached both by increasing the number of infringements that can be detected by automated remote monitoring devices, and by planning targeted and coordinated checks between police forces for specific types of behaviour (such as the use of safety belts and child restraint seats).

P4.4 The action of police forces coordinated by the Ministry of the Interior shall be supported by introducing new regulations or modifying the existing ones, by giving priority to the prevention of fatal crashes and serious injuries. Prevention can also be pursued by means of more effective sanctions and more streamlined procedures for police checks.

P4.5 Monitoring and assessing driving performances and verifying physical and mental aptitude for driving, are other critical elements to be assessed in connection with various factors (such as cognitive load, drowsiness, age, and reaction time). Prevention strategies to be applied:

- Road driving courses on a voluntary basis, including an assessment of driving style, reaction time, and sight. At the end of the course, participants can receive a report with advice on how to improve their driving style an make it safer.
- Driving courses for self-assessment of the ongoing changes due to ageing, which influence behaviour, habits, and ability to drive. Such courses should include practice lessons on tracks, in a safe environment where participants can experience what risks they may face if these aspects are ignored.
- Assessment of road and track driving by means of technological systems for performance analysis (e.g. eye tracker) by the Italian Traffic Control Authority or by other bodies in charge of those functions.
- Training and updating activities upon driving license renewal, to verify whether users have acquired knowledge of the new rules and modifications to the road traffic laws (mandatory safety belts, behaviour on roundabouts, presence of cycle lanes, etc.), with special attention to users aged over 65.
- Periodical checks by a specialised psychologist, to identify dangerous behavioural traits and analyse the perception of risk, impulses and reactions in specific contexts.

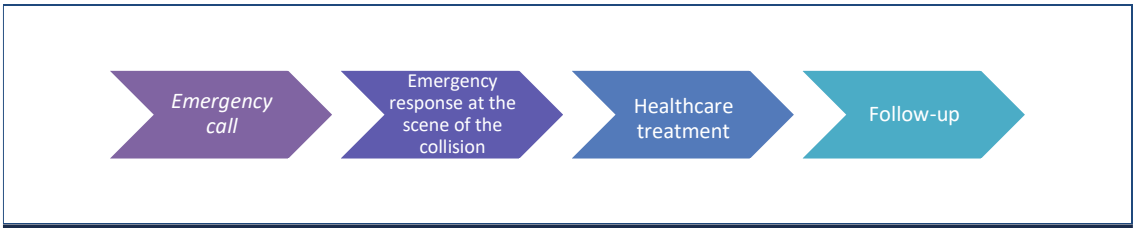
P4.6 Such elements must be integrated with actions to promote a road safety culture in companies and other types of organizations. Appropriately trained Mobility Managers (with targeted training provided and managed by the Regions), are the most appropriate subjects to promote road safety in Public Administrations and private companies. The Mobility Manager shall be in charge of planning and delivering road safety programmes, as well as assessing and quantifying the risk for users travelling to work every day. All that, in compliance with international standards (for example, ISO 39001:2012 – Road traffic safety management systems), by adopting extensive *risk assessment* procedures.

5.1.5 Pillar #5: Post-crash care

Providing efficient and effective post-crash care is fundamental to mitigate the severity of the consequences of road crashes[72]. Post-crash care organization is complex and requires the optimization of resources and the best coordination of emergency response activities. The *golden hour* is the first hour after a crash. Everything that is done in that time is crucial for the survival of a person and to limit the severity of injuries.

[72] *EU Road Safety Policy framework 2021-2030 – Next steps towards "Vision Zero"* https://op.europa.eu/en/publication-detail/-/publication/d7ee4b58-4bc5-11ea-8aa5-01aa75ed71a1

There are five main *post-crash phases*[73], and action strategies for the overall system improvement must be defined for each phase:



Picture 5-2 Post-crash flow

1) **Receiving the emergency call**. In Europe, the average time for answering emergency calls is around 10 seconds, while in Italy only 86% of the calls get answered within that time[74]. The correct functioning of the single European Emergency Number – 112[75] is essential to avoid delays and provide prompt assistance. In particular, after a trial period[76], the Enabling Law no. 124 of August 7th, 2015, established the 112 single European emergency number nationwide, with regional operation centres[77].

   The time elapsed before the arrival of the emergency services may be further reduced by the use of automatic crash notification systems fitted on the vehicle, like the eCall[78] system. Since March 31st, 2018, all newly type-approved cars are equipped with that system by default. According to the European Commission, the system can reduce emergency response time by 50% on rural roads and by 60% on urban roads, thus saving many more lives each year[79].

[73] *An overview of post-collision response and emergency care in the EU.* Revive Project. European Transport Safety Council (2019).

[74] European Commission (2017*), Implementation of the European emergency number 112 – Results of the tenth data-gathering round*, page 6, http://goo.gl/ghwWdW

[75] Art. 26 of Directive 2002/22/EC of the European Parliament and of the Council, of March 7th, 2002, on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive).

[76] The Lombardy Region, in collaboration with the Regional Emergency-Urgency Agency (AREU), started trials in some provinces in June 2010 for the implementation of Directive 2002/22/EC on enabling the Single European Emergency Number.

[77] https://112.gov.it/servizio/

[78] National Action Plan for Intelligent Transport Systems (ITS), implementing the European Parliament Directive 2010/40/EU.

[79] M. Nemeckova & L. Atchison (2019), *An overview of post-collision response and emergency care in the EU*. ETSC Report.

2) **Sending a response vehicle.** In order to send the most appropriate emergency services to the scene of the collision, Computer Aided Dispatch (CAD) is recommended to support the operator's work. The system, indeed, on the basis of pre-programmed scenarios, helps the operator to collect information and send the necessary emergency services.
3) **Travelling to the place of the crash**. When travelling to the place of the crash, it is fundamental for the emergency services to get to the crash location as quickly as possible, without creating dangerous situations for other road users. Moreover, to facilitate the transit of emergency services, especially in case of traffic jams, in addition to building emergency lanes where required, it is also possible to resort to emergency corridors, meaning temporary lanes that shall be kept free in case of transit of the emergency services. Such elements facilitate quicker access and increase the possibility of survival by 40% for people involved in a crash[80].
4) **Arriving and providing assistance at the place of the crash**. The percentage of fatal crashes is lower where there is high availability of emergency service vehicles, especially ambulances. Furthermore, the ambulances need to be adequately equipped. Specific requirements for first-aid vehicles are detailed in the recently updated Consolidated Law for the mobility of the Italian Red Cross vehicles [81].

   Once they arrive at the scene of the collision, operators need to have all the necessary tools and training to provide first aid. Training is important for both medical and non-medical staff – As suggested by international experiences, lifelong learning must be provided in compliance with the *Advanced Trauma Life Support* (ATLS) and *International Trauma Life Support* (ITLS) protocols to coordinate the emergency response team and assess the emergency situation.

   Moreover, the Directive EC 2000/56 requires member States to adopt measures to ensure that those who hold a driving license know what to do in case of crash and how to assess the conditions of people involved, so that they can act as necessary by knowing basic first aid and emergency response principles, such as the evacuation of passengers.

   Finally, to recognize any potential risks at the scene of the collision, the first-aid team needs to have handy all the tools to operate safely and effectively, namely the rescue sheets. Recently, Euro NCAP, in partnership with the International Association of Fire & Rescue Services (CTIF), created a new app (*Euro Rescue*) enabling emergency service teams to collect and update vehicle rescue sheets.

[80] REVIVE Project. Case study 4. European Transport Safety Council (2019).

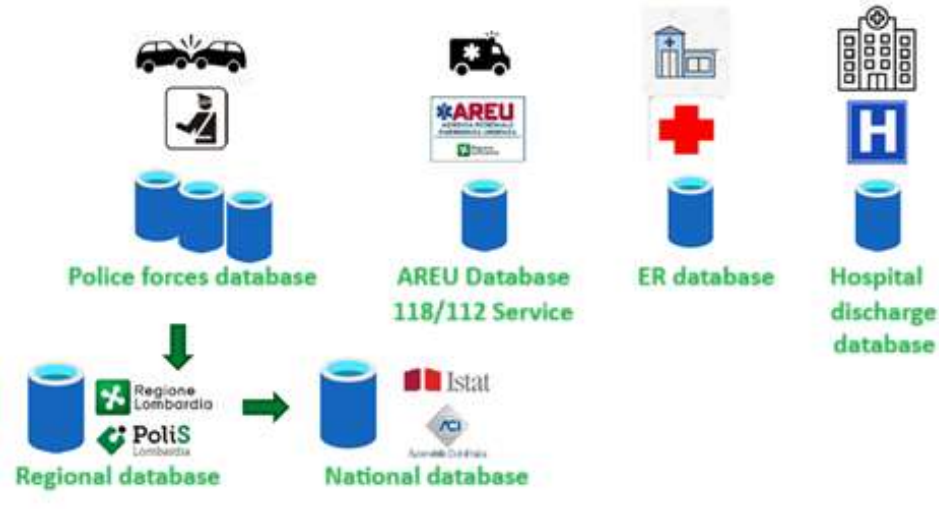
[81] Consolidated Act, as updated by Decision CDN 65/2020. Available at the following link: https://www.cri.it/motorizzazione

5) **Transfer to a healthcare facility.** The organization of a nation-wide network of hospitals and trauma centres is part of a strategy for quick response in case of crash and fast and safe transfer to a healthcare facility. Another objective to be pursued is the extension and higher specialization of rehabilitation facilities at national level.

To make the healthcare system more prepared and effective, integrated crash databases should be built to monitor the trends of people arriving at a hospital because of road crashes, and the services usually provided according to specific crash cases, user type involved, collision type, etc., also for prevention purposes. The ongoing experimentation proved the potential of such tools in reducing the effects of a crash[82].

It should be remembered that survivors and families affected by road crashes have to deal with a variety of consequences, including physical injury and consequent disability, psychological trauma which may affect the ability to return to work and to family life, in addition to economic and legal consequences. An integrated approach to support survivors and their families may mitigate the short- and long-term effects of experiencing a road crash and may help the people affected to get their independence back, at home and at work. Namely, after the healthcare treatment, follow-up services should be provided for supporting the injured (and their families) from both a medical and psychological point of view, for the biological damage they suffered and the consequent detriment to their quality of life.

[82] "Valutazione economica dell'incidentalità stradale. Analisi dei costi sanitari per il biennio 2018-2019" https://www.polis.lombardia.it/wps/portal/site/polis/pubblicazioni/studi-e-Documenti



Picture 5-3 Model for database integration: police forces, Regional Agency for Emergency-Urgency (AREU), ER, and hospital discharge databases. Source: '*Valutazione economica dell'incidentalità stradale. Analisi dei costi sanitari per il biennio 2018-2019*'

P5.1. *eCall system* nationwide implementation, in accordance with the provisions of the Italian national action Plan for intelligent transport systems, supported by actions to cover all vehicles on Italian roads.

P5.2. Reinforcing the cooperation between rescue and emergency services taking part in the various action phases for trauma survival, also by means of legislative support.

P5.3. Medical and non-medical staff training, and improving the emergency service equipment.

P5.4. Identifying areas in the country where it takes a long time for the emergency services to arrive at the scene of the collision, and starting programmes to reduce response times to and from such areas.

P5.5 Institutionalizing a service to provide better trauma and post-trauma care, starting from the already existing national best practices. The service shall provide psychological and psycho-social support to people involved in road crashes and their families, in addition to information about the existing rehabilitation facilities at national level.

P5.6. Connection and coordination with Interest Associations on road safety, for legal, psychological, social and healthcare/rehabilitation support.

5.2 Specific strategic lines of action for the most vulnerable categories

The definition of strategic lines of action for the most vulnerable categories is based on the analysis of the main risk factors for the identified user categories. The analysis took into account the results of international research on the risks for those user categories, namely the results of the SAFETYCUBE European project[83]. The Decision Support System (DSS) developed by SAFETYCUBE supports decision-making through a systemic approach, in line with the Safe System principles. More specifically, DSS provides information on risk factors and road safety measures for infrastructures, road users' behaviour, vehicles, and crash prevention.

Potential specific risk factors and strategic lines of action have been identified for each of the high-risk categories, in relation to the various components of the road system (user, infrastructure, vehicle). The analysis took into account INSI data on road crashes, police data on road traffic laws infringements, and the results of the ESRA[84] international survey of road users' declared attitudes and behaviours, conducted in 2018[85].

Each strategic line of action is associated to one or multiple specific actions. Risks and actions are matched to specific crash types and/or crash phases (pre-crash, crash, and post-crash). Finally, each action is associated to a time frame for its implementation (on the basis of the three stages of the Plan, as defined in 6.1.1), and to the entity in charge of it.

Table 5-3 reports the link between risk categories, specific strategic lines of action, and risk factors. In addition to this, the most relevant risk factors have been identified for each risk category. Having found the link between risk category / relevant risk factor allows to define targeted strategic lines of action, to effectively take action on the most critical aspects of the road system. Strategic lines of action for the most vulnerable categories are reported below.

[83] https://www.safetycube-project.eu/

[84] *E-Survey of Road Users' Attitudes* https://www.esranet.eu/en/

[85] For consistency with this survey, the other analyses on road crashes also refer to 2018.

Table 5-3 Vulnerable categories, strategic lines of action, and risk factors

Category	Strategy code	Motor and cognitive development	Protective equipment	Traffic characteristics	Low visibility or lighting conditions	Lack of driving experience	Infringement of road traffic regulations	Distraction and inattention	Driving under the influence of drugs	Factors connected with the road infrastructure	Proneness to injury	Vehicle design features	Impaired mental and physical state	Risk taking	Behavioural factors	Adverse weather conditions	Use of protective equipment	Safety conditions of road construction sites
Children/Adolescents	SLoA 1	✓																
	SLoA 2		✓															
	SLoA 3		✓															
	SLoA 4			✓														
	SLoA 5				✓													
	SLoA 6			✓														
Young drivers	SLoA 7					✓												
	SLoA 8					✓												
	SLoA 9						✓	✓										
	SLoA 10						✓		✓									
Over 65	SLoA 11									✓								

Category	Strategy code	Motor and cognitive development	Protective equipment	Traffic characteristics	Low visibility or lighting conditions	Lack of driving experience	Infringement of road traffic regulations	Distraction and inattention	Driving under the influence of drugs	Factors connected with the road infrastructure	Proneness to injury	Vehicle design features	Impaired mental and physical state	Risk taking	Behavioural factors	Adverse weather conditions	Use of protective equipment	Safety conditions of road construction sites
	SLoA 12										✓							
	SLoA 13									✓								
	SLoA 14											✓						
	SLoA 15											✓						
	SLoA 16							✓					✓					
	SLoA 17			✓														
	SLoA 18												✓					
	SLoA 19												✓					
Powered two-wheelers	SLoA 20																	
	SLoA 21						✓				✓							
	SLoA 22			✓														
	SLoA 23											✓						
	SLoA 24											✓						
	SLoA 25		✓				✓	✓						✓				

Category	Strategy code	Motor and cognitive development	Protective equipment	Traffic characteristics	Low visibility or lighting conditions	Lack of driving experience	Infringement of road traffic regulations	Distraction and inattention	Driving under the influence of drugs	Factors connected with the road infrastructure	Proneness to injury	Vehicle design features	Impaired mental and physical state	Risk taking	Behavioural factors	Adverse weather conditions	Use of protective equipment	Safety conditions of road construction sites
	SLoA 26		✓				✓	✓										
	SLoA 27		✓	✓						✓					✓	✓		
	SLoA 28									✓								
Cyclists	SLoA 29			✓						✓								
	SLoA 30			✓														
	SLoA 31										✓							
	SLoA 32									✓								
	SLoA 33										✓	✓						
	SLoA 34														✓		✓	
	SLoA 35																✓	
	SLoA 36						✓	✓							✓			
	SLoA 37						✓	✓										
Pedestrians	SLoA 38			✓						✓								
	SLoA 39									✓						✓		

Category	Strategy code	Motor and cognitive development	Protective equipment	Traffic characteristics	Low visibility or lighting conditions	Lack of driving experience	Infringement of road traffic regulations	Distraction and inattention	Driving under the influence of drugs	Factors connected with the road infrastructure	Proneness to injury	Vehicle design features	Impaired mental and physical state	Risk taking	Behavioural factors	Adverse weather conditions	Use of protective equipment	Safety conditions of road construction sites
	SLoA 40										✓							
	SLoA 41											✓						
	SLoA 42						✓	✓										
	SLoA 43																	✓
	SLoA 44																	✓

5.2.1 Specific strategic lines of action for children/adolescents

Main risk factors:

- Motor and cognitive development. Children are less capable than adults of perceiving and dealing with a traffic situation when cycling, walking, etc., because their physical and cognitive abilities are still developing[86].
- Traffic characteristics. Factors linked to traffic affect all vulnerable categories and are mainly due to the traffic flow, its composition, the presence of traffic jams, and the absence of management and control on the number of private access gates to roads.
- Poor visibility or lighting conditions. Poor visibility or lighting conditions affect the limited visibility of vulnerable users, especially at night, and the poor ability of other road users to perceive the presence of pedestrians and children. The phenomenon especially occurs on rural roads in case of road crashes involving pedestrians or bicycles[87].
- Protective equipment. In the case of children, protective equipment mainly refers to child restraint systems and the helmet for those who go cycling. As per the latest Ulisse report, the prevalence of use observed for child car seats is very low, equalling 43% in the 2015-2016 period. Remarkably, approximately 9% of children who got killed or injured were cycling when they got involved in the crash.
- Vehicle design features. Cyclists, pedestrians, and motorcyclists' reduced mass is a primary factor of vulnerability, and the vehicle shape significantly influences the consequences of a crash in case of being run over. This aspect is particularly relevant for children.

Table 5-4 Specific strategic lines of action for children/adolescents

Strategic line of action (SLoA)	Risk factor	Actions	Plan stage	Who is in charge?
SLoA 1: Promoting a road safety culture by means of specific training and education for children, aiming at both prevention and management	Motor and cognitive development	Providing education and training within the framework of the 2030 NRSP implementation programmes, by also involving local police forces	1, 2, 3	Municipalities, Metropolitan Cities, Provinces

[86] *European Road Safety Observatory. Children 2018*
https://ec.europa.eu/transport/road_safety/sites/default/files/pdf/ersosynthesis2018-children.pdf

[87] See ACI/ ISTAT *"Incidenti stradali – Anno 2019"* ("Road crashes in 2019").

Strategic line of action (SLoA)	Risk factor	Actions	Plan stage	Who is in charge?
SLoA 2: Encouraging the parents/legal guardians' responsibility in taking care of their children to avoid crashes and injuries, by promoting the participation in education and training programmes	Protective equipment	Commissioning a pilot study with training programmes on the correct use of child car seats for dealers of child car seats and primary school teachers	1	MISM
SLoA 3: Encouraging the use of child retention and protection systems (like the helmet when cycling), by taking action on regulations and their implementation	Protective equipment	Initiating a public consultation with stakeholders on imposing the mandatory use of helmets for children when cycling	1	MISM
SLoA 4: Supporting the establishment of regulations in favour of children's safety, by carrying out studies on the impact on their safety	Traffic characteristics	Ordering a research study to identify possible modifications to the current regulations, aiming at improving children's safety (e.g. by introducing traffic education in schools), and assessing the impact of those modifications on children's safety.	1	MISM
SLoA 5: Increasing the visibility of children on their walk/bicycle ride to and from school	Low visibility or lighting conditions	Carrying out inspections and adopting safety measures near schools and on home-to-school routes. The implementation	1, 2, 3	Municipalities, Metropolitan Cities, Provinces

Strategic line of action (SLoA)	Risk factor	Actions	Plan stage	Who is in charge?
		programme should take into account the School and Area Mobility Manager's guidelines		
SLoA 6: Reducing the risk of crashes and injuries of children when walking and cycling, especially in their route to and from school, by means of speed management measures and enforcement	Traffic characteristics	Carrying out speed management and enforcement actions near schools and on home-to-school routes, by taking into account the Mobility Manager directions when drawing up Implementation programmes	1, 2, 3	Municipalities, Metropolitan Cities, Provinces

5.2.2 Strategic lines of action for young drivers

Main risk factors:

- Lack of driving experience. While basic driving skills are easy to acquire, anticipating potentially dangerous traffic situations requires years of practice. 57% of the young drivers deceased in 2019, and 49% of the injured ones, had obtained their driving license less than two years before the crash.
- Distraction and inattention. According to the 2018 ESRA survey[88], the percentage of drivers declaring to have used a mobile phone while driving in the previous 30 days was higher among younger drivers and lower among the elderly. In Italy[89], 59% of interviewees declared having spoken on their mobile phone by using earphones or speakers, and almost 27% declared holding the phone in their hands at least once in the previous month. In 2016, according to the Ulisse Observatory data, around 5% of drivers used their mobile phone when driving, without any earphones[90]. As for rural roads, distraction when driving or indecisive steering was reported in 17.9% of collisions resulting in personal injury.

[88] Pires, C., Areal, A., & Trigoso, J. (2019), *Distraction (mobile phone use)*. ESRA2 Thematic report Nr. 3. ESRA project (E-Survey of Road users' Attitudes).

[89] Vias institute (2019). *Country fact sheet Italy*.

[90]Giustini M, E. Longo, C. Cedri (2016) "Sistema Ulisse – Stato di avanzamento dei lavori al 30 novembre 2016".

- Infringement of road traffic regulations. The *Novice Drivers 2018 report*[91] identified three typical infringements made by drivers in this age group: speed driving, drink-driving, and driving under the influence of drugs. These kinds of infringements are quite widespread in Italy. Suffice it to say that the ESRA2 survey results show that approximately 55% of drivers in our country exceeded speed limits on rural roads and 40% of them on urban roads in the 30 days preceding the interview. Almost 14% of drivers declared having driven after exceeding the legal limit on blood alcohol content, and 4% of them after taking drugs. As a consequence, in 2019, 3.4% of crashes detected by the Carabinieri and Traffic Police were related to drug consumption and 8.7% to drink-driving[92].

Table 5-5 Specific strategic lines of action for young drivers

Strategic line of action (SLOA)	Risk factors	Actions	Plan stage	Who is in charge?
SLoA 7: Supporting the introduction of new safety regulations	Lack of driving experience	Commissioning a study to explore the social and economic consequences of introducing a graduated driver licensing system (GDL)	1	Ministry of Infrastructures and Sustainable Mobility (MISM)
SLoA 8: Incentivising the culture of road safety with training and education in schools	Lack of driving experience	Including education and training in the Implementation programmes	1, 2, 3	Municipalities, Metropolitan Cities, Provinces, Universities, Ministry of the Interior, Ministry of Education, MISM, Television channels
SLoA 9: Encouraging responsibility among young drivers for them to take the necessary	Infringement of road traffic regulations; Distraction and inattention	Commissioning education and awareness-raising campaigns targeted	1	MISM

[91] *European Commission, Novice Drivers, European Commission, Directorate General for Transport*, February 2018
https://ec.europa.eu/transport/road_safety/sites/default/files/pdf/ersosynthesis2018-novicedrivers.pdf

[92] "Relazione al Parlamento Alcol 2020"
https://www.salute.gov.it/imgs/C_17_pagineAree_2349_3_file.pdf

Strategic line of action (SLOA)	Risk factors	Actions	Plan stage	Who is in charge?
precautions to avoid crashes and injuries, by means of awareness-raising campaigns		to young drivers and their parents		
SLoA 10: Preventing dangerous behaviour, like low use of protection systems, speeding, and alcohol and drug abuse when driving, and intervening on regulations and their implementation	Infringement of road traffic regulations. Driving under the influence of drugs	Commissioning the testing of new tools to detect the presence of narcotic substances in the driver's body, in collaboration with the Police forces	1	MISM, Ministry of the Interior

5.2.3 Strategic lines of action for users aged over 65

Main risk factors:

- Impaired mental and physical state, including impaired sight (field of vision, visual acuity, contrast perception), impaired hearing, and cognitive impairment (for instance, due to dementia, depression, Alzheimer, etc.).
- Distraction and inattention, including factors like the use of smartphones when driving or at pedestrian crossings, conversation with passengers, listening to music, or cognitive overload.
- Traffic characteristics. Factors linked to traffic affect all vulnerable categories and are mainly due to the traffic flow, its composition, the presence of traffic jams, and the absence of control over the number of access gates to roads.
- Factors connected with the road infrastructure. The most relevant factors for this category include latent infrastructure conditions that may induce operational errors when driving, poor legibility of markings, poor visibility of intersections, and sidewalk or cycle lanes conditions.

- Use and features of protective equipment. The last report on monitoring the use of protective equipment[93] shows an alarming spread of risky behaviour in the 2015-2016 period, especially in some areas of the country. Only 63% of front seat occupants use safety belts, while the prevalence of use among back seat occupants drops to 11%. Due to their higher vulnerability, this factor is especially critical for drivers aged over 65.
- Vehicle design features. The user's reduced mass and higher fragility is a primary factor of vulnerability, and the vehicle shape significantly influences the consequences of a crash in case of being run over.
- Proneness to injury. The probability of suffering from serious injury increases along with the age and the impact speed.

Table 5-6 Specific strategic lines of action for drivers aged over 65

Strategic line of action (SLoA)	Risk factors	Actions	Plan stage	Who is in charge?
SLoA 11: Reducing crashes between vulnerable users and vehicles and between vehicles at intersections in urban areas, by taking actions for at-grade junctions and traffic light systems	Factors connected with the road infrastructure. Traffic characteristics	Inspecting and ensuring the safety of pedestrian paths, within the Implementation programmes	1, 2, 3	Municipalities, Metropolitan Cities, Provinces
SLoA 12: Reducing the speed to mitigate the speed difference between pedestrians and motor vehicles, by means of speed management and control measures	Proneness to injury	Carrying out speed management (30kmph-zones, etc.) and enforcement measures within the framework of the Implementation programmes, in the areas where pedestrian traffic is not	1, 2, 3	Municipalities, Metropolitan Cities, Provinces

[93] Giustini M, E. Longo, C. Cedri (2016), "Sistema Ulisse – Stato di avanzamento dei lavori al 30 novembre 2016".

Strategic line of action (SLoA)	Risk factors	Actions	Plan stage	Who is in charge?
		protected enough, by taking into account the Area Mobility Manager directions		
SLoA 13: Designing self-explaining roads that prevent drivers from carrying out dangerous manoeuvres, like travelling in the wrong direction, and that enable to forgive an error by mitigating its consequences, and implementing measures to improve visibility and lighting conditions, road signs and road markings, information and alert to drivers, platforms and margins at the side of the road	Factors connected with the road infrastructure	Inspecting and ensuring the safety of roads within the Implementation programmes, on the basis of the self-explaining and forgiving roads principles	1, 2, 3	Municipalities, Metropolitan Cities, Provinces
SLoA 14: Promoting the use of vehicles equipped with a higher level of protection, with advanced lane-change assistance systems, and introducing provisions to increase their distribution	Vehicle design features	Introducing subsidies for purchasing vehicles equipped with driver assistance systems	1	MISM

Strategic line of action (SLoA)	Risk factors	Actions	Plan stage	Who is in charge?
SLoA 15: Promoting the use of vehicles offering higher protection for pedestrians, e.g. equipped with active safety systems, and introducing provisions to increase their distribution	Vehicle design features	Introducing subsidies for buying vehicles with better safety equipment for the protection of vulnerable users	1	MISM
SLoA 16: Re-train people aged over 65 to give them updates on the use of active safety technology	Distraction and inattention. Impaired mental and physical state	Commissioning a pilot study encompassing training on how to use active safety technologies correctly	1	MISM
SLoA 17: Encouraging responsibility among drivers aged over 65, for them to take the necessary precautions to avoid crashes and injuries, by means of education and re-training programmes	Traffic characteristics	Providing alternative forms of transport that must be safe, easy to use, and comfortable for (elderly) road users that are no longer able to drive; Education and training programmes	1, 2, 3	Municipalities, Metropolitan Cities, Provinces, Civil Society
SLoA 18: Conducting awareness-raising campaigns among the over 65 on the impairments due to age and the importance of using protective equipment on board	Impaired mental and physical state	Commissioning education and awareness-raising campaigns to increase the awareness of impairments due to age, diseases and prescribed drugs, and their potential effects	1	MISM

Strategic line of action (SLoA)	Risk factors	Actions	Plan stage	Who is in charge?
		on road users' safety		
SLoA 19: Preventing unfit individuals from driving, by improving the physical and mental fitness assessment and rehabilitation process	Impaired mental and physical state	Conducting a pilot study to assess the feasibility of the creation of specialised centres with multi-disciplinary professionals (driving instructors, psychologists, doctors, etc.) to conduct medical examinations and driving tests and provide tailored training	1	MISM, Ministry of Health, Driving School Associations

5.2.4 Strategic lines of action for powered two-wheelers

Main risk factors:

- Risk taking, especially with reference to manoeuvres like overtaking, not keeping the safety distance, and taking speed in a way that is inappropriate to the road environment, which is considered as a system comprising infrastructure, traffic, and environment conditions.
- Distraction and inattention, including factors like the use of smartphones when driving, conversation with passengers, listening to music, or cognitive overload. According to the European 2018 ESRA survey[94], approximately 17% of two-wheeled motor vehicle riders declared having read or checked text messages, e-mails or social media at least once while riding in the previous month.

[94] Vias institute (2019). *Country fact sheet Italy*.

- Infringement of road traffic regulations, like passing through a red light, failure to abide by a stop or give-way sign, and the incorrect use of emergency lanes on motorways or reserved lanes.
- Adverse weather conditions. In 2018, 17% of crashes resulting in injuries happened on wet or damp soil, thus highlighting the need to pay higher attention to road design and maintenance during rainy conditions, especially for pedestrians, cyclists, and two-wheeled motor vehicle riders.
- Traffic characteristics. Factors linked to traffic affect all vulnerable categories and are mainly due to the traffic flow, its composition, the presence of traffic jams, and the absence of control over the number of access gates to roads.
- Factors connected with the road infrastructure. Approximately 44% of crashes with powered two-wheelers were caused by intersections, in comparison to 40% of the total number of crashes. Relevant factors for this category include: road pavement conditions; latent infrastructure conditions that may induce errors when driving; poor legibility of markings and poor visibility of intersections; failures in at-grade junctions; failures in multi-level junctions; central reservation and crash-barriers; inadequate organization and conditions of platforms, road margins, and roadsides.
- Protective equipment. The prevalence of use of the helmet was estimated to be 98% in the 2015-2016 period. However, the uneven distribution of this risk factor at national level and on different road types should be taken into account. There are cases where the prevalence of use is lower than average.
- Vehicle design features. Cyclists, pedestrians, and motorcyclists' reduced mass is a primary factor of vulnerability, and the vehicle shape significantly influences the consequences of a crash in case of being run over.
- Proneness to injury. The main factors are impact speed, age, and crash type. The probability of suffering from serious injury increases along with the age and the impact speed.

Table 5-7 Strategic lines of action for Powered two-wheelers

Strategic line of action	Risk factors	Actions	Plan stage	Who is in charge?
SLoA 20: Supporting the introduction of new safety regulations for two-wheeled motor vehicle users, by means of impact assessments on safety	-	Ordering a research study to identify possible modifications to the current regulations, aiming at improving the safety of two-wheeled motor vehicle users, and assessing the impact of those modifications on their safety	1	Ministry of Infrastructures and Sustainable Mobility (MISM)
SLoA 21: Reducing the high speeds that provoke the most serious effects in case of crash, by means of speed management and enforcement measures	Infringement of road traffic regulations, Proneness to injury	Carrying out speed management and enforcement measures on rural roads, within the framework of the Implementation programmes	1, 2, 3	Municipalities, Metropolitan Cities, Provinces
SLoA 22: Raising awareness among the other road users on the characteristics and dynamics of powered two-wheelers	Traffic characteristics	Launching an experimental programme in partnership with driving schools to raise awareness among prospective drivers	1	MISM, Driving School Associations

Strategic line of action	Risk factors	Actions	Plan stage	Who is in charge?
SLoA 23: Fostering the choice of vehicles that are safer for vulnerable users, by means of measures to promote the spread of vehicles that are better equipped to protect two-wheeled motor vehicle riders in case of collision with them	Vehicle design features	Launching a programme to promote vehicle models that are better equipped to protect two-wheeled motor vehicle riders in case of collision with them, in partnership with ANCMA, ANFIA, and UNRAE	2	MISM
SLoA 24: Promote the choice of safer motorcycles, by means of measures encouraging the spread safety systems and rider assistance systems, to minimize dangerous situations	Vehicle design features	Launching a programme to promote safer motorcycle models, in partnership with ANCMA	1	MISM
SLoA 25: Preventing dangerous behaviour, like low use of protection systems, speeding, and alcohol and drug abuse when driving, by providing training programmes	Risk taking, Protective equipment, Infringement of road traffic regulations, Distraction and inattention	Promoting Advanced Safe Driving Courses for novice drivers and offenders. Initiating a consultation on driving instructors' certification and training focusing on road safety aspects	1, 2, 3	MISM, Safe Driving Centres
SLoA 26: Preventing dangerous behaviour, like low use of protection systems, speeding, and alcohol and drug abuse when driving, and intervening on regulations and their implementation	Infringement of road traffic regulations, Distraction and inattention, Protective equipment	Cooperating with police forces to define a common strategy to prevent and control motorcyclists' risky behaviour	1	MISM, Ministry of the Interior

Strategic line of action	Risk factors	Actions	Plan stage	Who is in charge?
SLoA 27: Encouraging responsibility among vehicle drivers and two-wheeled motor vehicle riders, for them to take the necessary precautions to avoid crashes and injuries, by means of awareness-raising campaigns	Behavioural factors. Protective equipment. Adverse weather conditions. Traffic characteristics. Factors connected with the road infrastructure	Cooperating with FMI (Italian Motorcycling Federation) and ANCMA (the Italian association of manufacturers of two- and three-wheeler vehicles and quadricycles), to define the content and features of a recurring awareness-raising campaign. Commissioning an awareness-raising campaign on the safety of powered two-wheelers Introducing subsidies for motorcyclists to purchase passive protection devices	1	MISM
SLoA 28: Raising awareness among road owners / managers on the effects of the lack of infrastructure maintenance, the importance of scheduled maintenance, and the installation of specific crash attenuator barriers to protect motorcyclists	Factors connected with the road infrastructure	Commissioning a study on the effects of the lack of scheduled infrastructure maintenance, including the definition of best practices and their promotion. Incentivising and monitoring the implementation of the Ministerial Decree of April 1st, 2019	2	MISM

5.2.5 Strategic lines of action for cyclists

Main risk factors:

- Distraction and inattention, including factors like the use of smartphones when riding, listening to music, or cognitive overload. According to the European 2018 ESRA survey[95], approximately 17% of cyclists declared having read or checked text messages, e-mails or social media at least once while riding in the previous month.
- Infringement of road traffic regulations, like passing through a red light, failure to abide by a stop or give-way sign. For cyclists, being overtaken by another vehicle is a particularly risky manoeuvre, especially when there is no cycle lane and the speed limit is high.
- Adverse weather conditions. In 2018, 17% of crashes resulting in injuries happened on wet or damp soil, thus highlighting the need to pay higher attention to road design and maintenance during rainy conditions, especially for pedestrians, cyclists, and two-wheeled motor vehicle riders.
- Traffic characteristics. Factors linked to traffic affect all vulnerable categories and are mainly due to the traffic flow, its composition, the presence of traffic jams, and the absence of control over the number of access gates to roads.
- Factors connected with the road infrastructure. Cyclists, powered two-wheelers, children, and over 60 seem to be particularly prone to risks at intersections. As for cyclists, almost 23% of crashes took place at intersections regulated by stop or give-way signs, in comparison with the 15% value referring to all crashes resulting in injuries. Relevant factors for this category include: road pavement conditions; latent infrastructure conditions that may induce errors when riding; poor legibility of markings and poor visibility of intersections; failures in at-grade junctions; inadequate organization and conditions of platforms, road margins, and roadsides; sidewalk and cycle lane conditions.
- Use and features of protective equipment. According to the European 2018 ESRA survey[96], approximately 64% of cyclists in Italy declared not having worn a safety helmet at least once in the month preceding the interview.
- Vehicle design features. A vehicle design for the protection of the others involved in case of crash is essential for vulnerable road users. The user's reduced mass is a primary factor of vulnerability, and the vehicle shape significantly influences the consequences of a crash in case of being run over.

[95] Vias institute (2019), *Country fact sheet Italy*.

[96] Vias institute (2019), *Country fact sheet Italy*.

- Proneness to injury. The main factors are impact speed, age, and crash type. The probability of suffering from serious injury increases along with the cyclist's age and the impact speed.

Table 5-8 Specific strategic lines of action for cyclists

Strategic line of action	Risk factors	Actions	Plan stage	Who is in charge?
SLoA 29: Regulating traffic flows where there are high speed differences, by introducing cycle paths and cycle lanes	Traffic characteristics, Factors connected with the road infrastructure	Building cycle lanes and cycle paths, within the framework of the Implementation programmes, to develop and extend the provisions contained in the NPRR[97] and other sectoral plans (PSNMS[98], PGMC [99], SUMP[100])	1, 2, 3	Municipalities, Metropolitan Cities, Provinces
SLoA 30: Making intersections safer for cyclists by taking measures for safer at-grade junctions	Traffic characteristics, Factors connected with the road infrastructure	Ensuring the safety of road intersections for cyclists, downstream of safety inspections within the Implementation programmes	1, 2, 3	Municipalities, Metropolitan Cities, Provinces
SLoA 31: Reducing the difference in speed by introducing speed management and enforcement measures	Proneness to injury	Including speed management (30kmph areas, etc.) and enforcement measures in Implementation programmes, by	1, 2, 3	Municipalities, Metropolitan Cities, Provinces

[97] The 4.1 Investment: To encourage cycling, the PNRR requires the construction of approximately 570 km of cycle paths in urban areas and metropolitan cities, and approximately 1,250 km of tourist cycling routes

[98] National Strategic Plan for Sustainable Mobility.

[99] General Plan for Cycling

[100] Urban Plans for Sustainable Mobility.

Strategic line of action	Risk factors	Actions	Plan stage	Who is in charge?
		following the directions of the Area Mobility Manager, in the places where cyclists are not protected		
SLoA 32: Increasing cyclists' visibility and protection, by taking measures for improving visibility and lighting	Factors connected with the road infrastructure	Carrying out inspections and adopting safety measures for cycle lanes, as part of the implementation programmes, by taking into account the Area Mobility Manager directions	1, 2, 3	Municipalities, Metropolitan Cities, Provinces
SLoA 33: Raising awareness among car and heavy-vehicle drivers on purchasing vehicles equipped with safety devices to protect vulnerable users, and on paying more attention to cyclists	Proneness to injury, Vehicle design features	Launching a programme to promote vehicle models that are better equipped to protect cyclists in case of collision with them, in partnership with cycling associations (e.g. FIAB – Italian Association for the Environment and Cycling)	1	MISM
SLoA 34: Supporting the introduction of new regulations for cyclists' safety (for example, for higher visibility and for the mandatory use of protection systems), by means of impact	Behavioural factors, like the use of protective equipment	Ordering a research study to identify possible modifications to the current regulations, aiming at improving cyclists' safety, and assessing the impact of those	1	MISM

Strategic line of action	Risk factors	Actions	Plan stage	Who is in charge?
assessments on safety		modifications on their safety		
SLoA 35: Encouraging the use of protective equipment for cyclists, by taking measures to promote its spread	Use of protective equipment	Introducing subsidies for cyclists to purchase protection devices	1	MISM
SLoA 36: Encouraging responsibility among drivers and cyclists, for them to take the necessary precautions to avoid crashes and injuries, by means of awareness-raising campaigns	Behavioural factors, Infringement of road traffic regulations, Distraction and inattention	Commissioning an awareness-raising campaign for cyclists' safety	1	MISM
SLoA 37: Preventing drivers and cyclists' dangerous behaviours	Infringement of road traffic regulations, Distraction and inattention	Cooperating with police forces to define a common strategy to prevent and control drivers and cyclists' risky behaviour	1	MISM, Ministry of the Interior

5.2.6 Strategic lines of action for pedestrians

Main risk factors

- Distraction and inattention, including factors like the use of smartphones at pedestrian crossings, conversation, listening to music, or cognitive overload. According to the European 2018 ESRA survey[101], approximately 56% of pedestrians declared having read or checked text messages, e-mails or social media at least once while walking on the street in the previous month.

[101] Vias institute (2019), *Country fact sheet Italy*.

- Infringement of road traffic regulations. According to the European 2018 ESRA survey, almost 75% of pedestrians declared not having used a pedestrian crossing to cross the street, although there was one nearby, at least once in the month preceding the interview, while almost 40% declared having crossed the street when the pedestrian traffic light was red.
- Adverse weather conditions. In 2018, more than 12% of crashes involving pedestrians occurred in rainy weather, in comparison to a 10% value referring to the total number of crashes resulting in injuries.
- Traffic characteristics. Factors linked to traffic affect all vulnerable categories and are mainly due to the traffic flow, its composition, the presence of traffic jams, and the absence of control over the number of access gates to roads.
- Factors connected with the road infrastructure. Poor visibility or lighting conditions affect the limited visibility of vulnerable users, especially at night, and the poor ability of other road users to perceive the presence of pedestrians and children. The most relevant factors for this category are the following: poor legibility of road markings and intersections; failures in at-grade junctions; poor visibility and lighting conditions; the absence of traffic islands; inadequate organization and conditions of platforms, road margins, and roadsides; conditions of sidewalks and cycle lanes; and safety conditions of road construction sites.
- Vehicle design features. The user's reduced mass is a primary factor of vulnerability, and the vehicle shape significantly influences the consequences of a crash in case of being run over.
- Proneness to injury. The probability of suffering from serious injury increases along with the pedestrian's age and the impact speed.

Table 5-9 Specific strategic lines of action for pedestrians

Strategic line of action	Risk factors	Actions	Plan stage	Who is in charge?
SLoA 38: Improving the infrastructures to remove any risk factors that may result in crashes or injuries in urban areas	Factors connected with the road infrastructure, Traffic characteristics	Carrying out inspections and adopting safety measures for pedestrian paths, as part of the implementation programmes, by taking into account the Area Mobility Manager directions	1, 2, 3	Municipalities, Metropolitan Cities, Provinces

Strategic line of action	Risk factors	Actions	Plan stage	Who is in charge?
SLoA 39: Increasing the visibility of pedestrians who walk on the side of the road or when crossing, by improving road signs and markings, visibility and lighting conditions	Factors connected with the road infrastructure, Adverse weather conditions	Inspecting and ensuring the safety of pedestrian paths, within the Implementation programmes Conducting testing on highly perceptible and visible road signs for pedestrian crossings near schools / hospitals / shopping malls	1, 2, 3	Municipalities, Metropolitan Cities, Provinces, MISM
SLoA 40: Reducing the difference in speed between pedestrians and other road users by introducing speed management and enforcement measures	Proneness to injury	Including speed management (30kmph zones, etc.) and enforcement measures in Implementation programmes, by following the directions of the Area Mobility Manager, in the places where pedestrians are not protected enough	1, 2, 3	Municipalities, Metropolitan Cities, Provinces
SLoA 41: Fostering the choice of vehicles that are safer for vulnerable users, e.g. equipped with active devices to protect pedestrians or Automatic Emergency Braking, by means of appropriate measures to promote their spread	Vehicle design features	Introducing subsidies for purchasing vehicles that are safer for vulnerable users	1	MISM

Strategic line of action	Risk factors	Actions	Plan stage	Who is in charge?
SLoA 42: Raising consciousness and awareness on pedestrian vulnerability among other road users, by means of awareness-raising campaigns. Raising awareness among pedestrians for them to take precautions to avoid crashes and injuries	Distraction and inattention, Infringement of road traffic regulations	Commissioning an awareness-raising campaign for pedestrians' safety	1	MISM
SLoA 43: Improving the safety of road construction sites	Safety conditions of road construction sites	Ordering a study on road work sites safety, identifying best practices and reviewing the existing specific regulations (e.g. construction site signs)	2	MISM, Ministry of the Interior
SLoA 44: Improving the safety of road construction sites	Safety conditions of road construction sites	Specific awareness-raising campaigns for drivers to be informed on the behaviour to be adopted near road work sites	1, 2, 3	Owners and concession companies operating roads and motorways; Ministry of the Interior, MISM

5.2.7 Strategic guidelines for kick scooters

The use of kick scooters is expected to develop in the next few years, but an equivalent methodological analysis to the one conducted for other risk categories cannot be performed yet, due to the absence of studies and specific consolidated data. Nonetheless, some early guidelines are provided for some actions to be taken to prevent risk factors connected to the use of this means of transport, whose risk factors are essentially similar to the ones concerning cyclists. The initial actions to be taken aim at conducting specific crash rate analyses, reviewing the regulations on kick scooters, and launching specific awareness-raising campaigns on the correct behaviour to adopt when riding this means of transport. Later, on the basis

of the results of experiences, studies, and research at European level, further actions to prevent risks may be considered.

5.2.8 Summary

Table 5-10 contains the summary of all the specific strategic lines of action and the actions related to them, including their potential effectiveness. 'Effectiveness' hereby means the ability of the action to reduce the number and/or severity of road crashes, according to the available scientific evidence. For simplification purposes, three levels of effectiveness are indicated with the following symbols:

+	Actions that are able to reduce crashes by up to 10%.
++	Actions that are able to reduce crashes by 11%-25%.
+++	Actions that are able to reduce crashes by over 25%.
II	Actions having an indirect impact on road safety.

Table 5-10 Specific strategic lines of action (SLoA) Summary

Category	Code	Strategic line of action	Risk factor	Actions	Plan stage	Who is in charge?	Effectiveness
Children/ Adolescents	SLoA 1	Promoting a road safety culture by means of specific training and education for children, aiming at both prevention and control	Motor and cognitive development	Providing education and training within the framework of the 2030 NRSP implementation programmes, by also involving local police forces	1, 2, 3	Municipalities, Metropolitan Cities, Provinces	++
Children/ Adolescents	SLoA 2	Encouraging the parents/legal guardians' responsibility in taking care of their children to avoid crashes and injuries, by promoting the participation in education and training programmes	Protective equipment	Commissioning a pilot study with training programmes on the correct use of child car seats for dealers of child car seats and primary school teachers	1	MISM	+
Children/ Adolescents	SLoA 3	Encouraging the use of child retention and protection systems (like the helmet when cycling), by taking action on regulations and their implementation	Protective equipment	Initiating a consultation with stakeholders on imposing the mandatory use of helmets for children when cycling	1	MISM	II
Children/ Adolescents	SLoA 4	Supporting the establishment of regulations in favour of children safety, by carrying out studies on the impact on their safety	Traffic characteristics	Ordering a research study to identify possible modifications to the current regulations, aiming at improving children's safety (e.g. by introducing traffic education in schools), and	1	MISM	II

Category	Code	Strategic line of action	Risk factor	Actions	Plan stage	Who is in charge?	Effectiveness
				assessing the impact of those modifications on children's safety			
Children/ Adolescents	SLoA 5	Increasing the visibility of children on their walk/bicycle ride to and from school	Low visibility or lighting conditions	Carrying out inspections and adopting safety measures near schools and on home-to-school routes. The implementation programme should take into account the School and Area Mobility Manager's guidelines	1, 2, 3	Municipalities, Metropolitan Cities, Provinces	++
Children/ Adolescents	SLoA 6	Reducing the risk of crashes and injuries for children when walking and cycling, especially in their route to and from school, by means of speed management measures and enforcement	Traffic characteristics	Carrying out speed management and enforcement measures near schools and on home-to-school routes, within the framework of the Implementation programmes	1, 2, 3	Municipalities, Metropolitan Cities, Provinces	+++
Young drivers	SLoA 7	Supporting the introduction of new safety regulations	Lack of driving experience	Commissioning a study to explore the social and economic consequences of introducing a graduated driver licensing system (GDL)	1	MISM	II

Category	Code	Strategic line of action	Risk factor	Actions	Plan stage	Who is in charge?	Effectiveness
Young drivers	SLoA 8	Incentivising the culture of road safety with training and education in schools	Lack of driving experience	Including education and training in the Implementation programmes	1, 2, 3	Municipalities, Metropolitan Cities, Provinces, Universities, Ministry of the Interior, Ministry of Education, MISM, Television channels	+
Young drivers	SLoA 9	Encouraging responsibility among young drivers, for them to take the necessary precautions to avoid crashes and injuries, by means of awareness-raising campaigns	Infringement of road traffic regulations, Distraction and inattention	Commissioning education and awareness-raising campaigns targeted to young drivers and their parents	1	MISM	+
Young drivers	SLoA 10	Preventing dangerous behaviour, like low use of protection systems, speeding, and alcohol and drug abuse when driving, and intervening on regulations and their implementation	Infringement of road traffic regulations, Driving under the influence of drugs	Commissioning the testing of new tools to detect the presence of narcotic substances in the driver's body, in collaboration with the Police forces	1	MISM, Ministry of the Interior	++

Category	Code	Strategic line of action	Risk factor	Actions	Plan stage	Who is in charge?	Effectiveness
Over 65	SLoA 11	Reducing crashes between vulnerable users and vehicles and between vehicles at intersections in urban areas, and taking actions for at-grade junctions and traffic light systems	Factors connected with the road infrastructure, Traffic characteristics	Inspecting and ensuring the safety of pedestrian paths, within the Implementation programmes	1, 2, 3	Municipalities, Metropolitan Cities, Provinces	++
Over 65	SLoA 12	Reducing the speed to mitigate the speed difference between pedestrians and motor vehicles, by means of speed management and control measures	Proneness to injury	Carrying out speed management (30kmph-zones, etc.) and enforcement measures within the framework of the Implementation programmes, in the areas where pedestrian traffic is not protected enough, by taking into account the Area Mobility Manager directions	1, 2, 3	Municipalities, Metropolitan Cities, Provinces	+++
Over 65	SLoA 13	Designing self-explaining roads that prevent drivers from carrying out dangerous manoeuvres, like travelling in the wrong direction, and that enable to forgive an error by mitigating its consequences, and implementing measures to improve visibility and	Factors connected with the road infrastructure	Inspecting and ensuring the safety of roads within the Implementation programmes, on the basis of the self-explaining and forgiving roads principles	1, 2, 3	Municipalities, Metropolitan Cities, Provinces	+++

Category	Code	Strategic line of action	Risk factor	Actions	Plan stage	Who is in charge?	Effectiveness
		lighting conditions, road signs and road markings, information and alert to drivers, platforms and margins at the side of the road					
Over 65	SLoA 14	Promoting the use of vehicles equipped with a higher level of protection, with advanced lane-change assistance systems, and introducing provisions to increase their distribution	Vehicle design features	Introducing subsidies for purchasing vehicles equipped with driver assistance systems	1	MISM	++
Over 65	SLoA 15	Promoting the use of vehicles offering higher protection for pedestrians, e.g. equipped with active safety systems, and introducing provisions to increase their distribution	Vehicle design features	Introducing subsidies for buying vehicles with better safety equipment for the protection of vulnerable users	1	MISM	+
Over 65	SLoA 16	Re-train people aged over 65 to give them updates on the use of active safety technology	Distraction and inattention, Mental and physical impairment	Commissioning a pilot study encompassing training for car dealers on how to use active safety technologies correctly	1	MISM	+

Category	Code	Strategic line of action	Risk factor	Actions	Plan stage	Who is in charge?	Effectiveness
Over 65	SLoA 17	Encouraging responsibility among drivers aged over 65, for them to take the necessary precautions to avoid crashes and injuries, by means of education and re-training programmes	Traffic characteristics	Providing alternative forms of transport that must be safe, easy to use, and comfortable for (elderly) road users that are no longer able to drive; Education and training programmes	1, 2, 3	Municipalities, Metropolitan Cities, Provinces, Civil Society	II
Over 65	SLoA 18	Conducting awareness-raising campaigns among the over 65 on the impairments due to age and the importance of using protective equipment on board	Mental and physical impairment	Commissioning education and awareness-raising campaigns to increase the awareness of impairments due to age, diseases and prescribed drugs, and their potential effects on road users' safety	1	MISM	+
Over 65	SLoA 19	Preventing unfit individuals from driving, by improving the physical and mental fitness assessment and rehabilitation process	Mental and physical impairment	Conducting a pilot study to assess the feasibility of the creation of specialised centres with multi-disciplinary professionals (driving instructors, psychologists, doctors, etc.) to conduct medical examinations and driving tests and provide tailored training	1	MISM, Ministry of Health	+

Category	Code	Strategic line of action	Risk factor	Actions	Plan stage	Who is in charge?	Effectiveness
Powered two-wheelers	SLoA 20	Supporting the introduction of new safety regulations for two-wheeled motor vehicle users, by means of impact assessments on safety	-	Ordering a research study to identify possible modifications to the current regulations, aiming at improving the safety of two-wheeled motor vehicle users, and assessing the impact of those modifications on their safety	1	MISM	II
Powered two-wheelers	SLoA 21	Reducing the high speeds that provoke the most serious effects in case of crash, by means of speed management and enforcement measures	Infringement of road traffic regulations, Proneness to injury	Carrying out speed management and enforcement measures on rural roads, within the framework of the Implementation programmes	1, 2, 3	Municipalities, Metropolitan Cities, Provinces	++
Powered two-wheelers	SLoA 22	Raising awareness among the other road users on the characteristics and dynamics of powered two-wheelers	Traffic characteristics	Launching an experimental programme in partnership with driving schools to raise awareness among prospective drivers	1	MISM, Driving school associations	+
Powered two-wheelers	SLoA 23	Fostering the choice of vehicles that are safer for vulnerable users, by means of measures to promote the spread of vehicles that are better equipped to protect two-wheeled motor vehicle	Vehicle design features	Launching a programme to promote vehicle models that are better equipped to protect two-wheeled motor vehicle riders in case of collision with them, in partnership with ANCMA, ANFIA, and UNRAE	2	MISM	+

Category	Code	Strategic line of action	Risk factor	Actions	Plan stage	Who is in charge?	Effectiveness
		riders in case of collision with them					
Powered two-wheelers	SLoA 24	Promote the choice of safer motorcycles, by means of measures encouraging the spread safety systems and rider assistance systems, to minimize dangerous situations	Vehicle design features	Launching a programme to promote safer motorcycle models, in partnership with ANCMA	1	MISM	+
Powered two-wheelers	SLoA 25	Preventing dangerous behaviour, like low use of protection systems, speeding, and alcohol and drug abuse when driving, by providing training programmes	Risk taking. Protective equipment, Infringement of road traffic regulations, Distraction and inattention	Promoting Advanced Safe Driving Courses for novice drivers and offenders. Initiating a consultation on driving instructors' certification and training focusing on road safety aspects	1, 2, 3	MISM, Safe Driving Centres	+
Powered two-wheelers	SLoA 26	Preventing dangerous behaviour, like low use of protection systems, speeding, and alcohol and drug abuse when driving, and intervening on	Infringement of road traffic regulations, Distraction and inattention, Protective equipment	Cooperating with police forces to define a common strategy to prevent and control motorcyclists' risky behaviour	1	MISM, Ministry of the Interior	II

Category	Code	Strategic line of action	Risk factor	Actions	Plan stage	Who is in charge?	Effectiveness
		regulations and their implementation					
Powered two-wheelers	SLoA 27	Encouraging responsibility among vehicle drivers and two-wheeled motor vehicle riders, for them to take the necessary precautions to avoid crashes and injuries, by means of awareness-raising campaigns	Behavioural factors, Protective equipment, Adverse weather conditions, Traffic characteristics, Factors connected with the road infrastructure	Cooperating with FMI (Italian Motorcycling Federation) and ANCMA (the Italian association of manufacturers of two- and three-wheeler vehicles and quadricycles), to define the content and features of a recurring awareness-raising campaign. Commissioning an awareness-raising campaign on the safety of powered two-wheelers. Introducing subsidies for motorcyclists to purchase passive protection devices	1	MISM	+
Powered two-wheelers	SLoA 28	Raising awareness among road owners or managers on the effects of the lack of infrastructure maintenance, the importance of scheduled maintenance, and the installation of specific crash attenuator barriers to protect motorcyclists	Factors connected with the road infrastructure	Commissioning a study on the effects of the lack of scheduled infrastructure maintenance, including the definition of best practices and their promotion. Incentivising and monitoring the implementation of the Ministerial Decree of April 1st, 2019	2	MISM	II

Category	Code	Strategic line of action	Risk factor	Actions	Plan stage	Who is in charge?	Effectiveness
Cyclists	SLoA 29	Regulating traffic flows where there are high speed differences, by introducing cycle paths and cycle lanes	Traffic characteristics, Factors connected with the road infrastructure	Building cycle lanes and cycle paths, within the framework of the Implementation programmes, to develop and extend the provisions contained in the NPRR and other sectoral plans (PSNMS, PGMC , SUMP)	1, 2, 3	Municipalities, Metropolitan Cities, Provinces	++
Cyclists	SLoA 30	Making intersections safer for cyclists by taking measures for safer at-grade junctions	Traffic characteristics Factors connected with the road infrastructure	Ensuring the safety of road intersections for cyclists, downstream of safety inspections within the Implementation programmes	1, 2, 3	Municipalities, Metropolitan Cities, Provinces	++
Cyclists	SLoA 31	Reducing the difference in speed by introducing speed management and enforcement measures	Proneness to injury	Including speed management (30kmph) etc.) and enforcement measures in Implementation programmes, by following the directions of the Area Mobility Manager, in the places where cyclists are not protected	1, 2, 3	Municipalities, Metropolitan Cities, Provinces	+++
Cyclists	SLoA 32	Increasing cyclists' visibility and protection, by taking measures for improving visibility and lighting	Factors connected with the road infrastructure	Carrying out inspections and adopting safety measures for cycle lanes, as part of the implementation programmes, by taking into account the Area Mobility Manager directions	1, 2, 3	Municipalities, Metropolitan Cities, Provinces	++

Category	Code	Strategic line of action	Risk factor	Actions	Plan stage	Who is in charge?	Effectiveness
Cyclists	SLoA 33	Raising awareness among car and heavy-vehicle drivers on purchasing vehicles equipped with safety devices to protect vulnerable users, and on paying more attention to cyclists	Proneness to injury; Vehicle design features	Launching a programme to promote vehicle models that are better equipped to protect cyclists in case of collision with them, in partnership with cycling associations (e.g. FIAB - Italian Association for the Environment and Cycling)	1	MISM	+
Cyclists	SLoA 34	Supporting the introduction of new regulations for cyclists' safety (for example, for higher visibility and for the mandatory use of protection systems), by means of impact assessments on safety	Behavioural factors, like the use of protective equipment	Ordering a research study to identify possible modifications to the current regulations, aiming at improving cyclists' safety, and assessing the impact of those modifications on their safety	1	MISM	II
Cyclists	SLoA 35	Encouraging the use of protective equipment for cyclists, by taking measures to promote its spread	Use of protective equipment	Introducing subsidies for cyclists to purchase protection devices	1	MISM	++
Cyclists	SLoA 36	Encouraging responsibility among drivers and cyclists, for them to take the necessary precautions to avoid crashes and injuries, by means of awareness-raising campaigns	Behavioural factors, Infringement of road traffic regulations, Distraction and inattention	Commissioning an awareness-raising campaign for cyclists' safety	1	MISM	+

Category	Code	Strategic line of action	Risk factor	Actions	Plan stage	Who is in charge?	Effectiveness
Cyclists	SLoA 37	Preventing drivers and cyclists' dangerous behaviours	Infringement of road traffic regulations, Distraction and inattention	Cooperating with police forces to define a common strategy to prevent and control drivers and cyclists' risky behaviour	1	MISM, Ministry of the Interior	II
Pedestrians	SLoA 38	Improving the infrastructures to remove any risk factors that may result in crashes or injuries in urban areas	Factors connected with the road infrastructure, Traffic characteristics	Including speed management (30kmph areas, etc.) and enforcement measures in Implementation programmes, by following the directions of the Area Mobility Manager, in the places where pedestrians are not protected enough	1, 2, 3	Municipalities, Metropolitan Cities, Provinces	++
Pedestrians	SLoA 39	Increasing the visibility of pedestrians who walk on the side of the road or when crossing, by improving road signs, visibility and lighting conditions	Factors connected with the road infrastructure, Adverse weather conditions	Inspecting and ensuring the safety of pedestrian paths, within the Implementation programmes. Conducting testing on highly perceptible and visible road signs for pedestrian crossings near schools / hospitals / shopping malls	1, 2, 3	Municipalities, Metropolitan Cities, Provinces, MISM	++
Pedestrians	SLoA 40	Reducing the difference in speed between pedestrians and other road users by introducing speed	Proneness to injury	Including speed management and enforcement measures in the Implementation programmes, by following the directions of the Area Mobility	1, 2, 3	Municipalities, Metropolitan Cities, Provinces	+++

Category	Code	Strategic line of action	Risk factor	Actions	Plan stage	Who is in charge?	Effectiveness
		management and enforcement measures		Manager, in the areas where pedestrians are not protected enough			
Pedestrians	SLoA 41	Fostering the choice of vehicles that are safer for vulnerable users, e.g. equipped with active devices to protect pedestrians or Automatic Emergency Braking, by means of appropriate measures to promote their spread	Vehicle design features	Introducing subsidies for purchasing vehicles that are safer for vulnerable users	1	MISM	+
Pedestrians	SLoA 42	Encouraging responsibility among pedestrians, for them to take the necessary precautions to avoid crashes and injuries, and raising awareness among other users on pedestrians' vulnerability, by means of appropriate awareness-raising campaigns	Distraction and inattention, Infringement of road traffic regulations	Commissioning an awareness-raising campaign for pedestrians' safety	1	MISM	+
Pedestrians	SLoA 43	Improving the safety of road construction sites	Safety conditions of road construction sites	Ordering a study on road work sites safety, identifying best practices and review the existing	2	MISM, Ministry of the Interior	II

Category	Code	Strategic line of action	Risk factor	Actions	Plan stage	Who is in charge?	Effectiveness
				specific regulations (e.g. construction site signs)			
Pedestrians	SLoA 44	Improving the safety of road construction sites	Safety conditions of road construction sites	Specific awareness-raising campaigns for drivers to be informed on the behaviour to be adopted near road work sites	1, 2, 3	Owners and concession companies operating roads and motorways; Ministry of the Interior, MISM	++

6 IMPLEMENTATION, MONITORING, AND ASSESSMENT

The implementation process of the strategies indicated in the 2030 NRSP shall be based on specific provisions clearly defining the types of actions that are eligible for funding, the funding schemes and their beneficiaries, in addition to streamlined processes allowing local authorities to manage the projects more efficiently.

6.1 Plan implementation

6.1.1 Stages of the 2030 NRSP

The Plan implementation will be developed in three stages: a first 4-year stage dedicated to the launch of the Plan and systemic actions; a second 3-year stage for consolidation; and a third stage of maximised implementation. At the end of each stage, an interim assessment shall be conducted on the Plan (the first one is scheduled in 2024), to guarantee that deadlines are met when planning and implementing the actions. In accordance with the scheme, **five Implementation programmes are scheduled for 2022, 2024, 2026, 2028, and 2030**. The first stage comprises the 2022 and 2024 Implementation programmes, the second stage includes the 2026 and 2028 Implementation programmes, and the third stage consists in the 2030 Implementation programme.

At the beginning of the first stage, priority will be given to the actions that are necessary for effectively launching the Plan. Namely, the following actions are going to be taken:

1) Drawing up the Plan's first Implementation programme.
2) Reinforcing road safety governance (in accordance with the *ad hoc* strategies for Pillar 1 – Road safety management).
3) Defining the Plan monitoring system by establishing procedures and tools to support its implementation and management (IT platform for data collection).
4) Launching communication and enforcement campaigns.
5) Establishing and launching Regional Monitoring Centres, where they are not running yet.
6) Training the Regions and Local authorities' staff on the Plan management and implementation methods.
7) Defining methods for identifying the actions to be taken in the various areas of the country.

The Ministry intends to take the above-mentioned actions during the first two years of the first stage, and later move on to the implementation of road safety measures.

Namely, the Plan is scheduling the following actions for the first six months of 2022:

- Preparing the Plan's first Implementation programme.
- Defining the Plan monitoring system.
- Establishing and having the first meeting of the 'Committee for guiding and coordinating road safety activities'.
- Establishing a National Observatory for Road Safety, to promote the Plan's actions.
- Defining and starting the data collection for the calculation of Road Safety Key Performance Indicators (KPIs).
- Awareness-raising initiatives to involve the community at regional and local level, to provide adequate early information on strategies and rules for the Plan implementation.
- Establishing and launching a working group coordinated by the Ministry of Infrastructures and Sustainable Mobility (MISM), for the definition of direct and updated links to other national and international databases.
- Designing the National Research Centre on Road Safety within the Centre for Innovation and Sustainability in the field of Mobility and Infrastructures (CISMI)

6.1.2 Entities in charge

The following principles will be applied to guarantee the effective and efficient management and implementation of the Plan: clearly defining competences, formalizing and streamlining implementation procedures, giving priority to monitoring, and assessing the financed measures (as for the latter, see the relevant chapters). The entities in charge of the Plan management and implementation are mainly the following: Ministry of Infrastructures and Sustainable Mobility (MISM) – General Direction for Road Safety and Road Haulage; Regions, Autonomous Province, and Beneficiary Entities; Regional Monitoring Centres; other bodies and entities. The responsibilities and competences of each entity are summarised in Table 6-1.

Table 6-1 Responsibilities and competences of the entities involved in the management and implementation of the 2030 NRSP

Entity	Responsibilities	Competences
Ministry of Infrastructures and Sustainable Mobility – Direction for Road Safety and Road Haulage	Planning and coordination Monitoring and assessment	General strategic planning. Legislative activity. Defining the provisions and guidelines for implementation (in terms of

Entity	Responsibilities	Competences
		management, procedures, and accounting). Central coordination of the Plan monitoring and assessment. Management and update of the Italian National Observatory for Road Safety.
Regions and Autonomous Provinces	Implementation Monitoring	Implementation of financed measures. Assessment and selection of project proposals in the various areas of the country. Coordination of the implementation of projects within the framework of Regional planning.
Beneficiary entities	Implementation Monitoring	Implementation of the financed measures. Monitoring of process indicators (procedure, financial, and physical indicators) of each financed measure.
Regional Monitoring Centres	Monitoring Assessment	Monitoring crash data Assessing the effectiveness and the impact of NRSP-financed measures at regional level. Decision support for the Region.
Italian National Statistics Institute (INSI)	Monitoring Assessment	Statistical returns related to road crashes.
Ministry of the Interior	Planning Implementation Monitoring	Strategic contributions for the Plan draw-up and Implementation programmes. Road safety enforcement. Accident data collection and sharing.
Ministry of Health	Planning Monitoring Assessment	Strategic contributions for the Plan draw-up and Implementation programmes. Collection and sharing of health data related to road crashes (serious injuries). Analysis of the social cost of road crashes.
Ministry of Education	Planning Monitoring	Strategic contributions for the Plan draw-up and Implementation programmes. Training and education in schools.

Entity	Responsibilities	Competences
Local police forces	Implementation Monitoring	Accident data collection and sharing. Road safety *enforcement*. Training and education in schools.

The below responsibility matrix shows the Specific Strategic Lines (SSL) of action assigned to each entity.

Table 6-2 Specific strategic lines of action and responsibilities

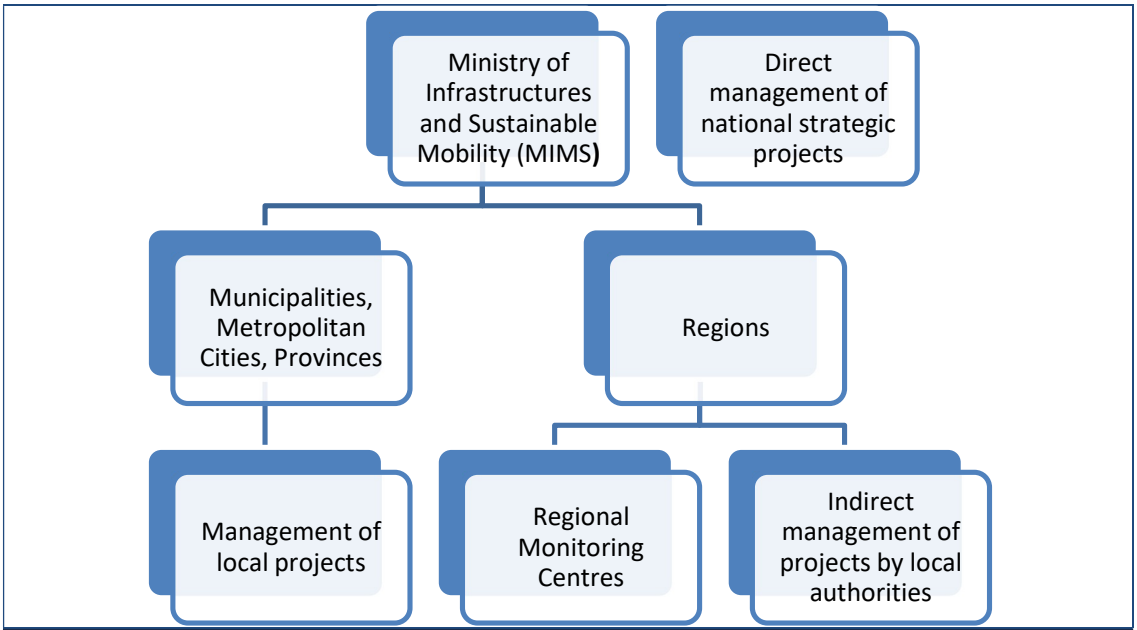
Risk category	Strategy code	Municipalities and Metropolitan Cities	Provinces	MISM	Universities	TV channels	Ministry of the Interior	Civil society	Ministry of Health	Advanced Safe Driving Centres	Driving Schools Associations	Road owners and concession companies
Children/ Adolescents	SLoA 1	✓	✓									
	SLoA 2			✓								
	SLoA 3			✓								
	SLoA 4			✓								
	SLoA 5	✓	✓									
	SLoA 6	✓	✓									
Young drivers	SLoA 7			✓								
	SLoA 8	✓	✓	✓	✓	✓						
	SLoA 9			✓								
	SLoA 10			✓			✓					
Over 65	SLoA 11	✓	✓									
	SLoA 12	✓	✓									
	SLoA 13	✓	✓									
	SLoA 14			✓								

Risk category	Strategy code	Municipalities and Metropolitan Cities	Provinces	MISM	Universities	TV channels	Ministry of the Interior	Civil society	Ministry of Health	Advanced Safe Driving Centres	Driving Schools Associations	Road owners and concession companies
	SLoA 15			✓								
	SLoA 16			✓								
	SLoA 17	✓	✓					✓				
	SLoA 18			✓								
	SLoA 19			✓					✓			
Powered two-wheelers	SLoA 20			✓								
	SLoA 21	✓	✓									
	SLoA 22			✓							✓	
	SLoA 23			✓								
	SLoA 24			✓								
	SLoA 25			✓						✓		
	SLoA 26			✓			✓					
	SLoA 27			✓								
	SLoA 28			✓								
Cyclists	SLoA 29	✓	✓									
	SLoA 30	✓										
	SLoA 31	✓	✓									
	SLoA 32	✓	✓									
	SLoA 3o3			✓								
	SLoA 34			✓								
	SLoA 35			✓								
	SLoA 36			✓								
	SLoA 37			✓			✓					

Risk category	Strategy code	Municipalities and Metropolitan Cities	Provinces	MISM	Universities	TV channels	Ministry of the Interior	Civil society	Ministry of Health	Advanced Safe Driving Centres	Driving Schools Associations	Road owners and concession companies
Pedestrians	SLoA 38	✓	✓									
	SLoA 39	✓	✓	✓								
	SLoA 40	✓	✓									
	SLoA 41			✓								
	SLoA 42			✓								
	SLoA 43			✓			✓					
	SLoA 44			✓			✓					✓

6.1.3 Implementation programmes

The Plan is going to be implemented by means of five Implementation programmes. In accordance with the General provisions and guidelines for the 2030 NRSP implementation, each programme may have different ways of financing and action management (Picture 6-1), including measures directly managed by the Ministry of Infrastructures and Sustainable Mobility (MISM); measures managed by local authorities (Municipalities, Metropolitan Cities, Provinces) that are directly financed by the MISM; measures managed by the Regions, partly targeted to the Regional Monitoring Centres, and partly to local authorities' projects.



Picture 6-1 Project management and fund allocation scheme

Strategic measures at national level shall be directly managed by the MISM (e.g. information and communication campaigns, institutions giving support to direct and indirect victims of road crashes, National Observatory for Road Safety, National Research Centre on Road Safety), while there will be three types of measures managed by local authorities and directly financed by the MISM:

- Actions connected to the strategic measures directly managed by the MISM, for the local transposition of national strategies.
- Innovative actions including a strong research and experimentation component. Such actions will require the proactive participation of research institutes and total coverage of the costs.
- Actions on road infrastructure in urban areas.

The measures managed by the Regions shall be related to the completion of the Regional Monitoring Centres network and the harmonization and connection of the existing ones. The above-mentioned actions may be included in one or more programmes. Finally, the measures managed by local authorities and financed by the MISM through the Regions shall mainly include actions on infrastructure, improvement of road safety management (e.g. digitalization of data collection and analysis, draw-up of local road safety plans, monitoring of results), training (students, technicians, vulnerable users). The above-mentioned actions shall be financed through procedures managed by the Regions in accordance with the provisions contained in the Plan.

As for regional and local measures, the complete launch of all Regional Monitoring Centres is of paramount importance for the choice and implementation of such actions, because in that way all Regions and Autonomous Provinces will be equipped with the required technical tools to understand and analyse the road safety phenomenon correctly, and identify the proposed measures that need to be prioritized.

The measures selection process shall follow the below criteria:

1) The MISM shall be in charge of identifying strategic areas, categories of measures to be financed, setting deadlines, and macro-criteria for measures to be selected.
2) Regional Monitoring Centres or the Regions (where the Centres are not running yet) shall perform a detailed and thorough analysis on the state of road safety at regional level, to identify needs, critical problems, and priorities to be taken into account when selecting the measures.
3) In accordance with the results of the above-mentioned analysis, the Regions shall be in charge of drawing up a list of priority measures to be submitted for national co-funding. The list of regional measures shall be accompanied by the relevant information, such as: Analysis and identification of needs; Information sheets describing the measures proposed and detailing targets, actions, results, time schedule, and financial plan.
4) On the basis of such list, a specific convention agreement shall be signed between the Ministry and each Region / Autonomous Province. The declared deadlines and expenses budget shall be binding for the Regions and the entities in charge of the implementation, so that conditionality, withdrawal, and reward schemes may be applied.

The disbursement of the NRSP 2030 resources shall take place by means of the MISM direct contribution to the Regions. The resources to be allocated to each Region for implementing each Programme shall be determined at central level by means of a fixed amount allocated to each Region, and an additional amount of funds to be allocated in proportion to the social cost of crashes in that area.

As for the **co-funding mechanism**, the previous implementation programmes required the beneficiary entities to finance a significant proportion of the programme, around 50% on average. In various cases, this resulted in a difficulty in finding the necessary resources, thus significantly delaying the implementation of measures, or, in some cases, leading the entities to renounce the implementation of the measures. To facilitate the carrying out of the measures, the 2030 NRSP is **reducing the proportion of co-funding that the beneficiary entities need to disburse, which may range from 20% to 40% of the total cost**. The accounting of costs shall be performed in accordance with the procedures and tools described in paragraph 6.2.2.

6.1.4 Estimate of resources

A preliminary estimate of costs and resources required for the 2030 NRSP implementation and achievement of targets is reported below. The estimate is based on the comparison with the costs and results of previous implementation programmes, even though it is very hard to establish a clear correlation between the actions taken in compliance with the previous Plan and the results achieved in terms of reduction of crashes, injuries, and fatalities. Other external factors may have influenced the results: for instance, the improvement of vehicle safety features and some actions taken regardless of the Plan, such as the installation of the average speed monitoring system on motorways. Nonetheless, such external factors may be reasonably assumed to be still present during the decade of implementation of the 2030 Plan, thus producing the same influence.

The calculation took into account that the 2010 NRSP five Implementation programmes, which in fact were implemented in 15 years, required 480 million euros allocated by the State, for a total investment of approximately 950 million euros (including the co-funding by local authorities). This enabled the achievement of a 52% reduction in the number of fatalities in the 2001-2015 period, whereas the reduction in the number of injuries was more modest (-34%).

When considering the renewed goal of a 50% reduction in the number of road fatalities by 2030 and the new goal of halving the number of serious injuries, the **minimum estimated funds requirement for the next decade is approximately 1.4 billion euros**. The estimate also takes into account the inflation rate for the period. Finally, if the average proportion of State co-funding is 70%, **the State contribution is estimated as 980 million euros, while the remaining 420 million euros shall be paid by local authorities.**

This is actually a conservative estimate. In fact, the 52% reduction of the number of fatalities in the 15-year period also depended on external factors, regardless of the 2010 NRSP. Suffice it to observe the spread of safer vehicles or the influence of some events on mobility, such as the 2009 economic crisis or the more recent COVID-19 pandemic. The longer the period, the greater the positive contribution of external factors. To achieve the same results in a shorter period (10 years), more resources than the minimum estimate are presumably necessary.

6.2 Monitoring plan

The implementation and the effects of the 2030 NRSP are going to be subject to a specific monitoring process on an annual basis to pursue the following objectives:

- Monitoring the procedural, physical, and financial progress of the measures taken.
- Monitoring the safety performances of the various components of the road system.
- Monitoring the Plan progress as against its general and specific targets.

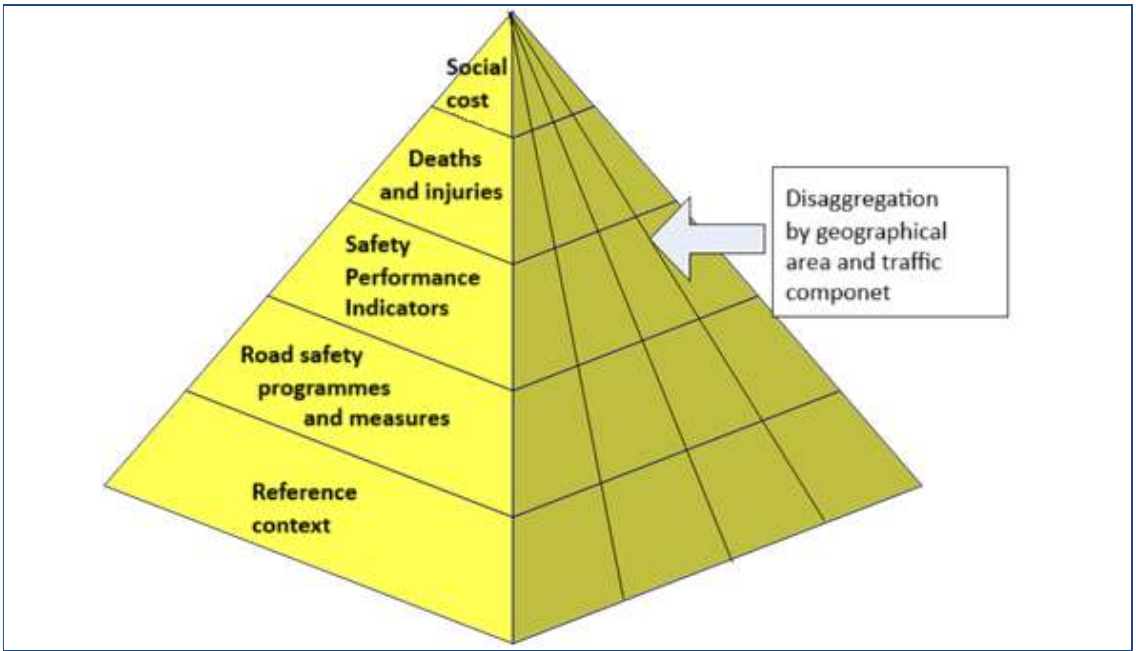
The 2030 NRSP monitoring plan comprises the following elements:

- A predefined Monitoring Indicators system.
- A network of entities in charge of data collection, imputation, and processing for the Indicators calculation.
- Appropriate monitoring tools, like a specific system for the imputation and collection of monitoring data, and detailed procedures.

6.2.1 Indicators system and entities in charge

The reference model for the Plan monitoring process will be based on the results of the European SUNflower[102] research project, defining a pyramidal hierarchy of road safety objectives, including both the final results (the number of fatalities and injuries and their social cost) and the interim results, in terms of users' behaviour and infrastructure and vehicle features (Safety Performance Indicators), the road safety measures implementation programmes, and the country's structural and cultural context, as shown in Picture 6-2. The idea is that the top tier is the result of the lower tiers, therefore the phenomenon can only be understood if all the elements contained in the pyramid are measured.

[102] *SUNflower: a comparative study of the development of road safety in Sweden, the United Kingdom, and the Netherlands* https://ec.europa.eu/transport/road_safety/sites/roadsafety/files/pdf/projects_sources/sunflower_report.pdf



Picture 6-2 SUNflower model pyramidal structure

With reference to that model, the Plan monitoring system is going to be based on the definition and collection of four types of indicators:

- **Risk exposure indicators**, to measure the demand of road mobility for each mode of transport.
- **Process indicators**, to verify the measures implementation progress.
- **Risk indicators** (Safety Performance Indicators or KPIs), describing the safety level of each part of the road network.
- **Impact indicators**, directly measuring progress as against the targets set for the risk categories and road types.

Some strategic level indicators will be directly collected by the Ministry of Infrastructures and Sustainable Mobility (MISM). Others shall be collected and shared by the beneficiary entities. The following Tables define the indicators to be monitored for each type and the relative entities in charge.

Risk exposure indicators will be used to detect the mobility levels for different modes of transport and different road types (urban roads, rural roads, motorways). Risk exposure indicators are reported in Table 6-3.

Table 6-3 Risk exposure indicators		
Indicator	Description	Entity in charge
Vehicle-kilometres driven by cars	Total vehicle-kilometres driven by cars	MISM
Vehicle-kilometres run by powered two-wheelers	Total vehicle-kilometres run by powered two-wheelers	MISM
Vehicle-kilometres run by cyclists	Total vehicle-kilometres run by cyclists	MISM
Vehicle-kilometres walked by pedestrians	Total vehicle-kilometres walked by pedestrians	MISM
Vehicle-kilometres driven by heavy vehicles	Total vehicle-kilometres driven by heavy vehicles	MISM
Vehicle-kilometres run on urban roads	Total vehicle-kilometres run on urban roads	MISM
Vehicle-kilometres run on rural roads	Total vehicle-kilometres run on rural roads	MISM
Vehicle-kilometres run on motorways	Total vehicle-kilometres run on motorways	MISM

Process indicators will be used to analyse the state of completion of each measure on an annual basis, by assessing whether the implementation of the measures has met the deadline, the budget, and the quantity established. Process indicators are reported in Table 6-4.

Table 6-4 Process indicators included in the Plan (for each measure taken)		
Indicator	Description	Entity in charge
Category of measure	Based on the list of possible measure categories	MISM
Procedural progress	1. Temporarily suspended measure 2. Permanently discontinued measure 3. Ongoing measure 4. Completed measure	MISM
Physical completion/ Result	Partial duration/Total duration	MISM
Process timeframe	Expected duration/Actual duration	MISM
Financial progress	Partial cost/Total cost	MISM

KPIs enable to understand whether a measure results in an improvement of road safety conditions. The KPIs considered, which will be analysed on an annual basis, are reported in Table 6-5, and refer to the list proposed by the European

Commission (DG MOVE) within the strategic programme for the 2020-2030 decade for all member States.

Table 6-5 KPIs and entities in charge of monitoring them

Indicator	Description	Entity in charge
Speed	Percentage of vehicles travelling within the speed limit	MISM, Motorway concession companies, ANAS, Regions, Provinces, Municipalities
Safety belts	Percentage of vehicle occupants using the safety belt or child restraint system correctly	MISM
Protective equipment	Percentage of riders of powered two wheelers and bicycles wearing a protective helmet	MISM
Alcohol	Percentage of drivers driving within the legal limit for blood alcohol content (BAC)	Ministry of the Interior, Provinces, Municipalities (Police, Carabinieri, Province Police, and Local Police)
Distraction	Percentage of drivers NOT using a handheld mobile device	MISM
Vehicle safety	Percentage of new passenger cars with a Euro NCAP safety rating equal or above a predefined threshold*	MISM
Infrastructures	Percentage of distance run on roads with a safety rating above an agreed threshold*	MISM
Post-crash care	Time elapsed in minutes and seconds between the emergency call following a collision resulting in personal injury, and the arrival at the scene of the emergency services	Ministry of Health, INSI, 112 Emergency Service

Impact indicators are an interim assessment of the measures provided by the Plan, as against the targets set for risk categories and road types. Table 6-6 reports the list of impact indicators to be analysed on an annual basis.

Table 6-6 Impact indicators included in the Plan

Indicator	Description	Entity in charge
No. of crashes	Total number of crashes per year	INSI, ACI
No. of fatalities	Total number of fatalities per year	INSI, ACI
No. of injuries	Total number of injuries per year	INSI, ACI
No. of serious injuries	Total number of serious injuries (MAIS 3) per year	Ministry of Health

Indicator	Description	Entity in charge
No. of fatalities for each mode of transport	Number of fatalities per year for the following modes of transport: - Buses - Cars - Commercial vehicles - Powered two-wheelers - Bicycles - Pedestrians - Kick scooters	INSI, ACI
No. of serious injuries for each mode of transport	Number of injuries per year for the following modes of transport: - Buses - Cars - Commercial vehicles - Powered two-wheelers - Bicycle - Pedestrian - Kick scooters	Ministry of Health
No. of injuries for each mode of transport	Number of injuries per year for the following modes of transport: - Buses - Cars - Commercial vehicle - Powered two-wheelers - Bicycle - Pedestrian - Kick scooters	INSI, ACI
No. of fatalities for each age group	Number of fatalities per year for the following age groups: - <15 - 15- 17 - 18- 24 - 25- 64 - 65+	INSI, ACI
No. of injuries for each age group	Number of injuries per year for the following age groups: - <15 - 15- 17 - 18- 24 - 25- 64 - 65+	INSI, ACI
No. of serious injuries for each age group	Number of injuries per year for the following age groups: - <15 - 15- 17 - 18- 24 - 25- 64 - 65+	Ministry of Health
No. of fatalities for each road category	Number of fatalities per year for the following road categories:	INSI, ACI

Indicator	Description	Entity in charge
	- Urban roads - Rural roads - Motorways	
No. of injuries for each road category	Number of injuries per year for the following road categories: - Urban roads - Rural roads - Motorways	INSI, ACI
No. of deaths per million of inhabitants	Total number of deaths per million of inhabitants	INSI, ACI
No. of injuries per million of inhabitants	Total number of injuries per million of inhabitants	INSI, ACI
Social cost	Annual social cost of road crashes and victims according to the methodology annexed to the Executive Decree no. 189/2012 of the Ministry of Infrastructures and Transport.	Ministry of Infrastructures and Sustainable Mobility (MISM)

6.2.2 Monitoring tools and procedures

To support beneficiary entities throughout the Plan monitoring process, procedures and tools shall be defined for data uploading, to guarantee a more effective and efficient management of the data detected ad the entities in charge of the process. The Ministry shall make a dedicated information system available for beneficiary entities to access with their credential and upload monitoring data. The access to the system will take place within the Italian National Observatory for Road Safety.

The system will be structured on the basis of the following features:

1) *Web based platform* to allow access to the Ministry, Regions, Autonomous Provinces, Beneficiary entities, and other entities that will be identified during the Plan implementation stage (Regional Monitoring Centres, police forces, local police, external auditors, etc.).
2) Simplified and user-friendly sheets to detect monitoring indicators, from the minimum level of disaggregation (each measure components) to the maximum level of aggregation (the Plan as a whole).
3) Data processing and reporting features (monitoring dashboard).

At the design, trial, and launch stages of the above-mentioned information system, the Ministry will prepare and fill in monitoring data reporting sheets (in digital format).

Furthermore, the monitoring process shall focus on the following points:

- Data certification by each entity uploading the data to the monitoring system.

- Collection/update of monitoring data on a quarterly basis. The data collected will form the database for the annual reports on Plan implementation and the Annual Report to the Parliament.
- Deferred detection of some indicators, pending an adequate set up of detection and monitoring systems by the various entities in charge.
- Disbursement of resources by the Ministry, in compliance with the administrative and accounting procedures as per the implementation tools, subject to the correct monitoring of the measures taken. The Plan implementation programmes will establish the necessary reward and penalty mechanisms to encourage beneficiary entities to conduct monitoring activities by combining the provision of monitoring data with the participation in the subsequent implementation programmes.

6.3 2030 NRSP Assessment and Update

The monitoring activity will be instrumental in the assessment on the Plan effectiveness, efficiency, and impact. The Plan assessment process consists in specific activities to be carried out: two interim assessments corresponding to the 2030 NRSP interim targets, and an ex post assessment.

6.4 Interim assessments

The Plan interim assessments are going to be conducted at the time of verification of the interim target achievement, in 2024 and 2027. The first interim assessment is going to be conducted at the end of 2024, to assess the strategic projects carried out in the previous period and the first two Implementation programmes. The second interim assessment is going to be conducted at the end of 2027, to assess the strategic projects carried out in the previous period and the third and fourth Implementation programmes.

The assessments are recommended to be carried out at regional level too.

Interim assessments have the following purposes:

- Assessing the progress in the implementation of the Safe System in Italy.
- Verifying that the context analysis and the Plan strategy are up to date.
- Assessing the consistency and relevance of the strategies, actions, and measures taken, also in accordance with the selection criteria applied.
- Assessing the effectiveness and efficiency of the Plan implementation and the relative measures, and making a preliminary estimate of their impact.
- Providing guidelines for the next Implementation programmes.
- Assessing the functioning and appropriateness of the Plan management and implementation system and the relative regional measures.
- Assessing the quality and operation of the monitoring system.

The interim assessment shall be completed within three months from the start of the Plan interim revision. Therefore, the regional interim assessments shall be completed sufficiently far in advance of the conclusion of the overall Plan assessment.

6.5 Ex post assessment

The ex post assessment shall be made after 2030, and it shall include the analyses listed below.

- *Strategic level:*
  a. Consistency of the action strategy, as a logical connection between the measures planned and actually financed and the quality objectives set at the planning stage.
  b. Relevance of the Plan and its measures, in terms of adequacy and sustainability of the results achieved in relation to the modifications required by the initial delay in the reference context, and to the concentration of investments.
  c. Usefulness of the Plan and its measures, meaning its ability to detect and consistently meet the needs of its reference context.

- *Operational level:*
  d. Efficiency of the implementation measures, as the comparison between the results achieved and the resources employed, by also identifying the factors influencing it.
  e. Effectiveness of the measures taken, as the comparison between the quantitative results obtained and the expected results (measured by the targets of result indicators and specific impact indicators), by highlighting the deviation from the targets and explaining what caused such deviation.

National-level assessments may be conducted by an auditing body that is independent from the Ministry and has the adequate characteristics and technical competences. The auditing body may be selected in compliance with the existing regulation on public procurement. During the Plan implementation, the Ministry will provide guidelines for assessing the measures, to ensure a coordinated and consistent methodological approach at national level.

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